

Translation of the original instruction manual

Temperature test cabinet

Type: **T-65/50**

Serial no.: **127003** **Year of construction:** 02/2012

Temperature range: -65°C to +180°C

Nominal voltage: 230V 1/N 50Hz

Nominal output: 2,8 kW

Nominal current: 13,7 A

Cooling-Compressor: SC18CLX/SC18CLX Refrigerating agent: R404A/R23

Hechingen, on 15 February 2012

.....

Manufacturer: **CTS GmbH**
Lotzenäcker 21
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1 General Information

1.1 Handling of the operating instructions

These operating instructions are to be permanently available on the installation.

These operating instructions are to be read and applied by any person working on/with the installation, i.e.

- operating, including equipping, care or trouble-shooting
- service and maintenance
- transport

These operating instructions aim at facilitating the knowledge about the machine and the machine handling.

These operating instructions include important remarks for a secure, correct and economic installation operation. They contribute to avoid dangers, to prevent repair costs and to reduce the failure times as well as to increase the reliability and the serviceable life of the installation.

These operating instructions contain instructions and information concerning the CTS range of temperature test cabinets type T.

They describe the assembly, starting-up and function of the installation.

They also include details in the case of failures and for maintenance works.

The abbreviation CTS is used in these operating instructions as a company designation for Clima-Temperatur-Systeme.

The type designation of the CTS range of cabinets consists of

i.e. Type T -65/50

- | | | |
|--------|--------|-----------------------------|
| 1) T | means: | Temperature |
| 2) -65 | means: | low temperature -65°C |
| 3) 50 | means: | 50 litres test space volume |

We reserve the right to make technical modifications, compared with representations and information given in these operating instructions, aiming at an improvement of the installation, as long as they are not in contradiction with security aspects,.

1.2 Short Instructions

Remark: The short instructions in the appendix must be available near the refrigerating installation and be clearly legible.

Remark: The owner or the operator of the installation must enter the following data with a wipe-proof pen in the short instructions:

- The name of the person in charge of the refrigerating installation
- The addresses and phone numbers of the fire department, the police, the hospital and of centres for burnt persons

The pipe diagram must also be available near the refrigerating installation.

2 Safety regulations and equipments

2.1 Safety regulations

All regulations as listed below have been observed for the design and the manufacture of the installation.

2.1.1 EC Directives

- EC Directive for machines 2006/42/EC
- EC Directive on Low Voltage 2006/95/EC
- EC Directive on 2004/108/EC
- EC Directive for pressure devices 97/23/EC

2.1.2 Mechanical Norms

- EN ISO 13857 (issue 06/2008)
- EN ISO 14121-1 (issue 12/2007)
- EN 378-1,2,3,4 (issue 06/2008)
- EN 563 (issue 01/2000)
- EN ISO 12100-1,2 (issue 04/2004)
- AD2000 (issue 10/2000)

2.1.3 Electrical Norms

- EN ISO 13849-1,2 (issue 12/2008)
- EN 61000-6-3 (issue 09/2007)
- EN 61000-6-2 (issue 03/2006)
- EN 61010-1 (issue 08/2002)
- DIN 12880 (issue 05/2007)
- VDE 0100-410 (issue 01/1997)
- BGV A3 (issue 2005)

2.2 Safety remarks

2.2.1 Signal words

The following signal words (acc. to ANSI Z535.4) are used in these operating instructions

DANGER	means an <i>immediate threatening danger</i> . If nothing is done to avoid it, death or very severe injuries <i>will</i> follow.
WARNING	means a <i>possibly dangerous situation</i> . If nothing is done to avoid it, death or very severe injuries <i>may</i> follow.
CAUTION	means a <i>possibly dangerous situation</i> . If nothing is done to avoid it, light injuries <i>may</i> follow.
ATTENTION	means a <i>possibly damaging situation</i> . If nothing is done to avoid it, the <i>product</i> or something in its environment <i>may</i> be damaged.
REMARK	indicates application recommendations and other particularly useful situations

2.2.2 Warranty and liability

Attention: It is absolutely necessary to read these operating instructions before starting-up the installation in order to prevent damages and failures due to wrong handling.
The operation of the installation as well as its maintenance must be performed by instructed and authorised personnel.
We decline any responsibility and any warranty in the case of handling mal-practice against these operating instructions.

The installation has been checked before its delivery with respect to its perfect function and safety.

Any modification of the installation requires the agreement of CTS.

2.2.3 Application in accordance with the purpose / Misuse

The installation is designed, constructed and manufactured for the sole application consisting in trials for temperature tests.

The installation **cannot** be used for tests on explosive, corrosive, toxic or easy inflammable materials nor with specimens generating or releasing such materials. This applies particularly to all tests with liquids that boil easily, fuel, hydraulic fluids, lubricants and the like.

In this case, the information on the material safety data sheet is to be kept in mind. Prior to commencement of the tests, the operator has to check the material compatibility of the materials fitted in the testing room (stainless steel 1.4301, non-ferrous metals, aluminium, silicone) to the materials/gases which might be discharged by the test material. The latter can form acids or bases when exposed to humidity. The leaking materials/gases can lead to extensive damage of the equipment.

Danger: No living being is allowed to stay in the test chamber. There is danger to life.

Danger: The preparation of any food with the installation is prohibited.

The observance of the operating instructions and of the maintenance prerequisites as described in chapter 5 - page 15, belong to the scope of applications in accordance with the purpose.

The installation is to be used only in a technically perfect condition, as well as in accordance with its purpose, under observance of safety rules and dangers, and following these operating instructions. Malfunctions must be eliminated immediately.

The installation is built according to the to-date technical knowledge and recognised safety-related rules. Its application can however cause risks to the life of the user or to the life of third persons or prejudices to the installation or to other material property.

Warning: The owner must compile operating instructions for the operators of this installation regarding the security measures with regard to the handling of a refrigerating installation resp. with the applied refrigerating agents.

2.2.4 Limits of the machine

Refer to the drawing of the devices (see chapter 4.1 - page 12) for the limits of the machine. The operation takes place from the door side.

2.2.5 Warning against remaining dangers



Caution:

Depending upon the test temperature set, there is a risk of injuries inside the test chamber, if you touch hot surfaces!
This is also valid after the test run.



Caution:

Depending upon the test temperature set, there is a risk of injuries inside the test chamber, if you touch cold surfaces!
This is also valid after the test run.

2.3 Safety devices

The installation is equipped with the following safety devices:

- Maximum pressure governor in the refrigeration circuit
- Temperature limiter in the test space
- Specimen protection device (option)

If a safety equipment is actuated the installation remains switched off. A restart is only possible after the elimination of the trouble (see pdf file "II.4 Reports and digital channels" chapter 1.1 - Error reports (disruptions in the unit))

Warning: The sheet metal cocer of the airconditioning space may be removed for repair jobs by authorized personel only.

2.4 Behaviour in Case of Emergency in relation with refrigerating agents

The safety data sheets for the applied refrigerating agents are to be observed!

Refer to the safety data sheets for the respectively necessary personal protection equipment.

CAUTION: If missing of refrigerants, the chamber has to be switched off and service of CTS has to be called. The security remarks in the safety data sheets in appendix has to be observed.

2.5 Remarks on PED 97/23/EG

Refer to chapter 3.1 - page 9 for the characteristic data for the conditions of installation.

Pressure tanks and ducts built-in into this pressure equipment (refrigerating agent circuit) meet max. class I (see test certificate under tab. 1.2) according to Pressure Equipment Directive 97/23/EC. The applied refrigerating agents meet group 2 according to art. 9 Pressure Equipment Directive 97/23/EC, equivalent to group A1 according to DIN EN 378-1.

REMARK The operator of the equipment must obey the rules for recurrence tests in EN 378-2 and Directive for pressure devices 97/23/EC. For cooling equipment outside Germany the national rules regarding cooling equipment must be obeyed.

3 Starting-up: Preparation and Execution

3.1 Requirements for the place of installation

Attention: CTS uses refrigerants of the group 'A1' according to EN 378-1 annex E. Installation of refrigerating is designed according to EN 378-1 for class B of the installation ranges.
According appendix 'C' of EN 378-1 there are no limits regarding the quantity of the refrigerants filling, if the chamber will be installed at ground floor or at underground/upper floor with enough emergency exits.
Otherwise for quantity of refrigerant filling following dimensioning value will be responsible for :
R404A → 0,48 kg/m³ (m³ - volume of installation room)
R 23 → 0,68 kg/m³
Please take the quantity of refrigerant from the type plate of the chamber, the circuit with max. refrigerant filling will be considerable.
The floor in the place of installation must be made in such a way that the ground is safe against possible release of the medium.
The owner or the operator must take into account this conditions!

The admissible ambient temperature lies between +15 and +30°C, and the admissible ambient humidity between 20 and 75 % rel. humidity. The place must be well ventilated and dry. The floor must be plane.

Refer to the equipment drawing for the floor space required.

3.2 Installation and preparation of the test cabinet

Attention: Transport of the chamber by motor lorry may only be carried out when the chamber is mounted on the delivered pallet. If the chamber has to be moved inside the factory, one may use a fork lift. The fork must be at least 10 cm longer than the chamber length/width. The weight may be taken from the technical data sheet, chapter 4 - page 12.

Install the test cabinet as follows:

1. Unpack the test cabinet and check the extent of supply.
2. Remove the accessories from the test space or from the supplied boxes.
3. Adjust the test cabinet on the workshop floor using a spirit level and turning the adjustable footing.

Attention: Never use the test cabinet without its adjustable footing or rollers!

4. If equipped with rollers*, engage the roll stop device.

5. Connect the compressed-air* supply to a compressed-air ductwork system from the user.

Attention: Observe following compressed air parameters!

Pressure:	7 to 10 bar overpressure
max. inlet temperature	+35°C
quality classes acc. to ISO 8573-1:	
by direct discharge of the compressed air:	
particle, water and oil content:	class 3
by using an air dryer:	
particle and oil content:	class 3;
water content:	class 6

6. Close entry port with plugs.

Remark: If you put in wires or pipes, the entry port must be closed with plastic sealing (i.e. from Bostik). The sealing material must be appropriate for the range of temperatures.

7. Before connecting the electric power supply, check the tension, the frequency and the mains fuse at the user's workshop and compare them with the indications on the nameplate. The nameplate is under the main switch.

8. If the parameters are correct, connect the test cabinet to the electric power supply.

Attention: Switch on the test cabinet only after it has reached the admissible ambient temperature of +15°C to +30°C!

*optional equipment

3.3 Starting-up

1. Place a suitable specimen into the test space

Attention **Exothermal specimen in the switched-off installation would heat the test space at unacceptably high values. The operator must ensure that the heat loss from the specimen is interrupted when the machine is stopped (even in the event of a malfunction). The interruption can i.e. be performed with the potential-free interference contact.**
(See connection diagram BG 00 page 1 for the connection)

2. Check whether all jobs described under 3.2 or whether due maintenance (see chapter 5 - page 15) jobs have been carried out.
3. Turn main switch on "I"

Attention: **The main switch must be switched on at least 1 hour before the refrigerating machine is switched on as preheating period for the crank pit heating installation of the compressor.**
If you don't pay attention about the pre-heating time, you will get damage to the compressor.

4. Start further equipment, such as compressed-air drier*, if available
5. Check the sense of rotation of the ventilator once the installation has started. (see direction arrow on the ventilator motor).
6. Check the sense of rotation of the ventilator for the condenser once the installation has started (see direction arrow on the ventilator motor).
7. Place the sensor (Pt 100) of the specimen protection device* onto the specimen and adjust the maximum temperature for the specimen on the specimen protection device

The installation is now ready to work and can be operated with the corresponding inputs on the control unit (see chapter 6) or through the interfaces RS232 or RS485.

3.4 Closing down

The following storage conditions are to be observed for longer immobilisation periods:

ambient temperature + 5°C to + 30 °C
dry, clean atmosphere
even floor surface
it is appropriate to cover the whole installation with a plastic sheet.

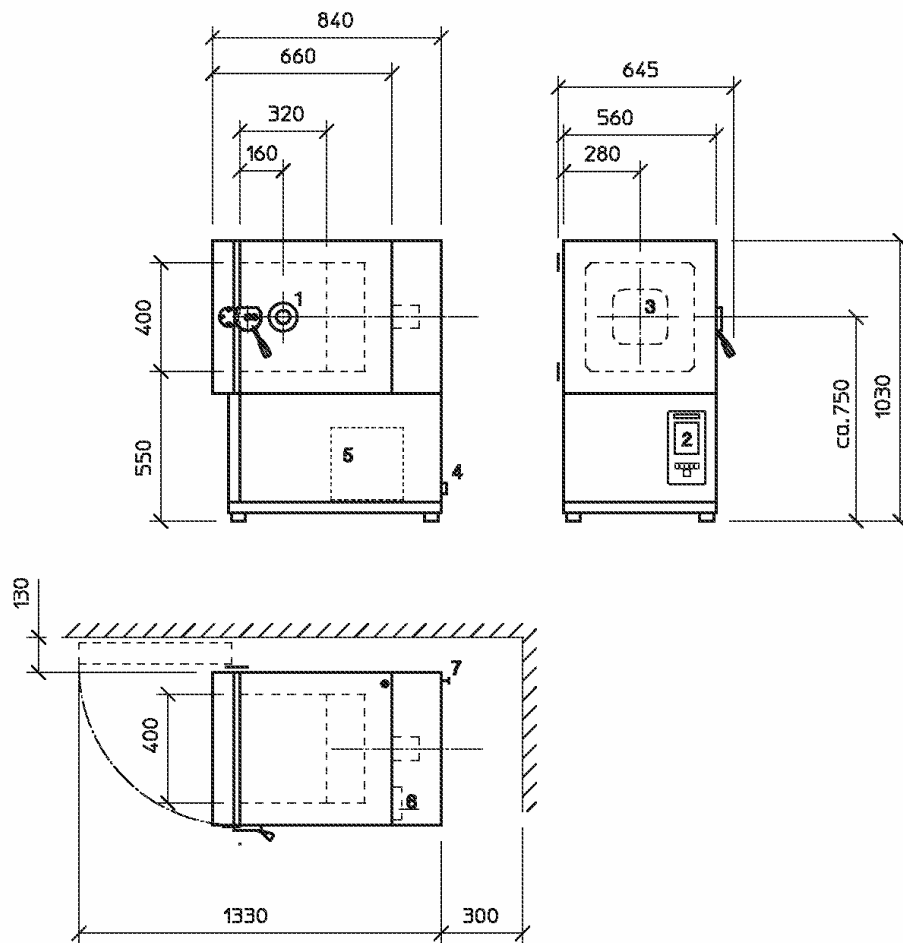
3.5 Shutdown, disposal

Contact CTS if an elimination is required after the shutdown of the installation.

The owner must in particular take care that the elimination of the operating mediums (refrigerating agents, possibly heat transfer liquid and refrigerating machine oil) takes place professionally and correctly and according to the respectively valid state of the pertinent directives.

4 CTS-Chamber

4.1 Position of accessories and connections + dimensions



- 1 Entry port Ø 50
- 2 Control terminal
- 3 Window 200x200, (Option)
- 4 Electr. connection
- 5 Area for cooling air inlet
- 6 Air dryer, Option
- 7 Compressed air inlet R 1/4"AG, (Option)

4.2 Technical performance characteristics

Temperature tests:

Temperature range	-65°C to +180°C
Temperature fluctuation	$\leq \pm 0.3$ K temporally
Temperature change rate according to ICE 60068-3-5	Heating: 6 K/min Cooling: 4 K/min
Heat dissipation	appr. 400 W at +20°C

The technical data refer to an ambient temperature of +25 °C, nominal voltage 230V, without specimen nor radiation nor accessories.

Dimensions:

Test volume	50 Litres
Dimensions of test chamber	see layout
Overall dimensions	see layout

Operational characteristics:

Electric supply	230 V +6/-10 %, 1/N, 50 Hz
Nominal output	2,8 kW
System of protection	IP 20
Acoustic pressure level (acc. DIN EN ISO 3744, measured in a distance of 1m from the front)	< 52 dB(A)
Weight	ab. 160 kg

Technical Equipment:

Refrigerating unit	-air-cooled, low noise level, fully hermetic, continuous performance adjustment via electronic monitoring and control system, -anti-pollution refrigerating agent R404A/R23
Heating	stainless steel heating unit with safety temperature limiter
Casing	electrogalvanic steel with anti-pollution powder coating.
Colour	RAL 9006, white aluminium
Doors	wide-opening doors, left-side door hinge, one-hand operation, lockable.
Test space	stainless steel grade no. 1.4301 floor load 150 kg / m ²
Air circulation	central axial suction fan with external motor and stainless steel shaft.
Shelf	with a rack (available as option) from stainless steel, bearing area 340 x 300 mm max. load per shelf 10 kg total load under max. shelf occupancy 30kg
Test space illumination	lamp 20 W, 12 V
Control	- 32 bit - controller - LCD display - digital display of set and actual values - numerical input of set values - error messages in plain text - interface RS 232 - digital switching channels
Malfunction signal	supplied to potential - free contact max. load 30 V - DC, 2 A

4.3 Description of the installation

The function or the material property of a specimen under the influence of temperature can be tested using the temperature test cabinet.

The correct ventilation with an accordingly high quantity of circulating air is the warrant for a good transmission onto the specimen.

The air treatment space is on the back of the interior space. The aggregates which are easily accessible from the sides, are in the substructure of the installation. The control unit is also integrated in the front of the subconstructure of the installation.

The operating unit is user-friendly integrated in front covering of the subconstructure.

5 Maintenance

Our installations are to a large extent free of any maintenance. Regular attendance and maintenance do however contribute to a failure-free operation of your installation.

Maintenance jobs on the systems belonging to this installation are to be performed only by the manufacturer or his authorised representations.

Caution: The owner or the operator must ensure that the installation is checked in a satisfying way, regularly monitored and maintained.

Caution: Only the manufacturer or his authorised representatives are authorised to proceed to maintenance or resp. repair works on the systems of the installation, in particular filling, draining and replacing of the refrigerating agents or of the heat transfer liquids.

Attention: Use only genuine spare parts.

Warning: For any maintenance job, the main switch must be off and secured against any restart.

5.1 List of maintenance works

Some maintenance jobs which can be performed by trained personnel are listed here below.

Time	Element	Work description
After each test	Test chamber	Clean test chamber. To prevent corrosion it is necessary to wash the sides of the test space as well as the bowl-type humidifier and dehumidifier after each test with clear water. Scrapes in the test space container can be removed with an usual domestic cleanser for stainless steel (i.e. Si-dol).
	Test chamber door	Clean the seals with clear water. Check whether the door is really sealed all around.
If necessary	Condenser	Check dust deposits on the air-cooled condenser and clean it if necessary with a hand brush or a vacuum cleaner.
	Test chamber lighting	Change the halogen bulb (order no. 10000117).
	Compressed-air drier*	see separate operating instructions

*optional equipment

Caution: Removal of the protective plates, for example, for the purpose of cleaning, may only be done in consultation with CTS. Protective gloves and protective glasses are mandatory during the removal! Tools may not be used during the removal!

Remark: For recurrence tests of the cooling equipment please take notice of chapter 2.5.

The CTS after-sales service department performs these works and can submit you a corresponding offer. For any question, any order of consumables etc. please contact next CTS Service department (see attached list).

6 Control unit of the installation

6.1 General control

Controls are to be found in the base part of the device.

Warning: The electronics compartment may only be opened by qualified electronics personnel.

- Before opening:
1. Set the master switch to '0'.
 2. Take the plug out of the mains.
 3. Ensure that the device cannot be switched on.

The master switch can be found on the right side of the device. The quick connectors for floating contact, the digital- and analogue-inputs and outputs, as well as the interfaces are to be found on the back of the device.

6.2 Specimen protection (option)

In order to protect the specimen from overheating, an independent regulator is integrated above the master switch. The specimen protector has its own temperature sensor (Pt 100) in the test chamber. This Pt 100 is freely manoeuvrable and as such can be directly attached to the specimen.

The upper display on the specimen protector is for the actual value of the free-moving sensor on the specimen. The lower display is for the threshold value. Setting the value of the threshold is done with the ↑ and ↓ buttons. Should the actual value exceed the threshold value, then the device will be turned off and remain in the off position.

(Restarting is described in chapter II.3 Reports and digital channels - 1.1 Error reports (disruptions in the unit))

6.3 Digital outputs

The digital outputs are floating contacts, which may be utilised by the customer, for example, for the controlling of test materials or measurement equipment.

The terminal assignment may be found in the circuit diagram BG 15. Control of the outputs is carried out over the control unit or the interface (see chapter II.3 Reports and digital channels - 2.2 Softkeys).

6.4 Digital inputs (option)

The digital inputs are to be used by the customer as floating contacts. The digital inputs can be queried over the interface, or displayed or respectively registered over the software CTS CID (see chapter II.3 Reports and digital channels - 2.1 Indicators).

The terminal assignment may be found in the circuit diagram BG 15.

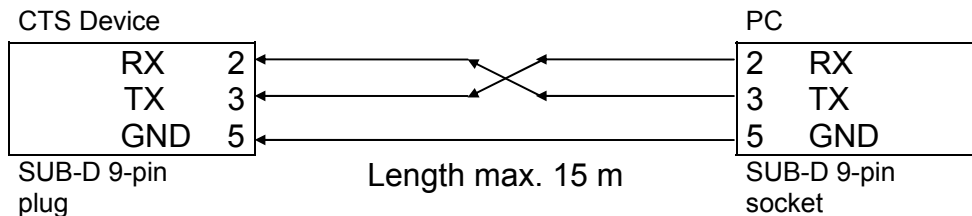
6.5 Revolution control, ventilator, test chamber

Air circulation in the test chamber can be regulated stepless, between 50 and 100%, through the control unit as well as the software CID. It should be noted that the performance data of the device refers to 100% circulation.

6.6 Interface connections

Interface RS 232

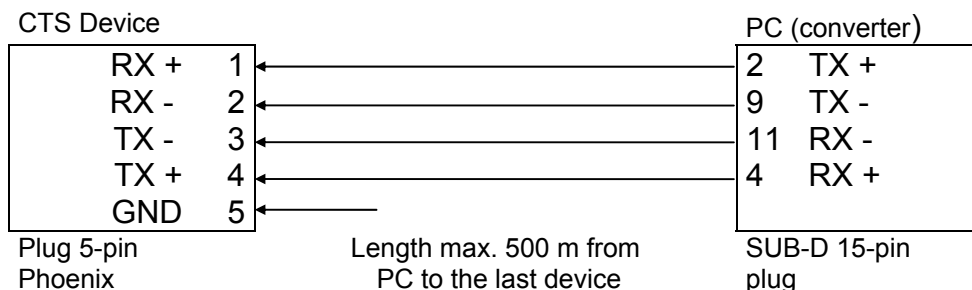
In order to connect a CTS device to a PC, a RS 232 interface cable with the following allocation is required. This cable, with a length of 4 m, is included in our software package CID Pro (option).



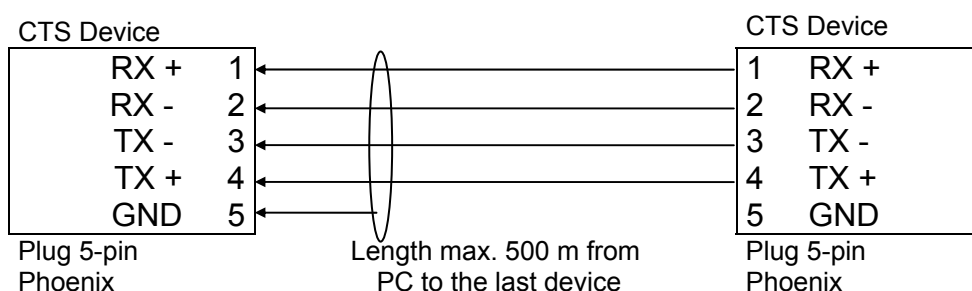
Interface RS 485 (option)

In the case of longer line lengths or respectively if several devices should be networked, then the interface RS 485 should be utilised. For this, a converter or fixed RS 485 interface on the PC is required. The connection cables to be used should be 4-core shielded. (for example, LIYCY 4x 0.25mm²)

Connection cable CTS-device - PC (converter RS485-RS232)

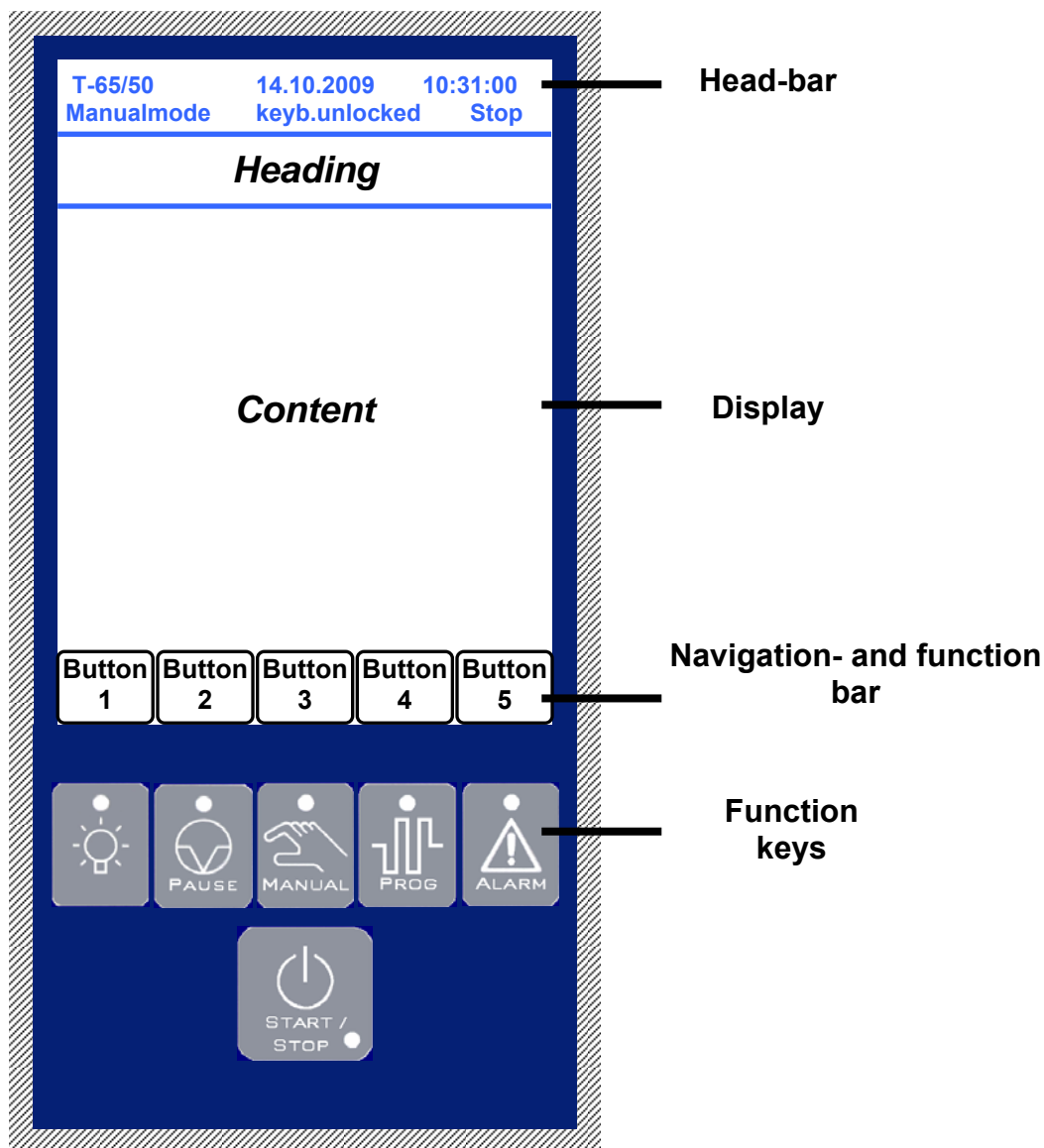


Connection cable CTS-device - CTS-device



7 Operating the CTS - operating feature

7.1 *General information regarding operation*



- **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.

T-65/50	14.10.2009	10:31:00
Manualmode	keyb.unlocked	Stop

T-65/50:	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:



- 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

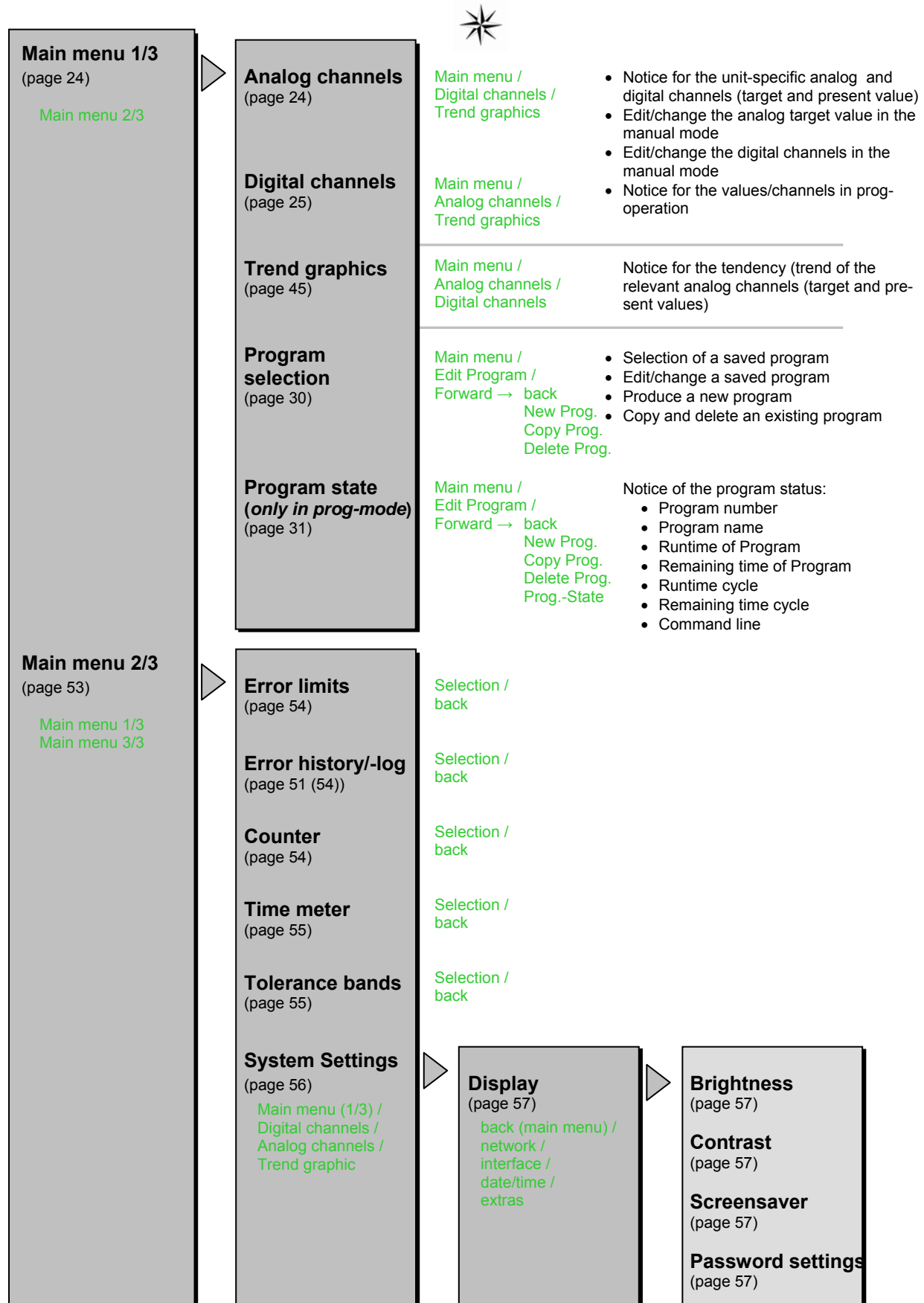


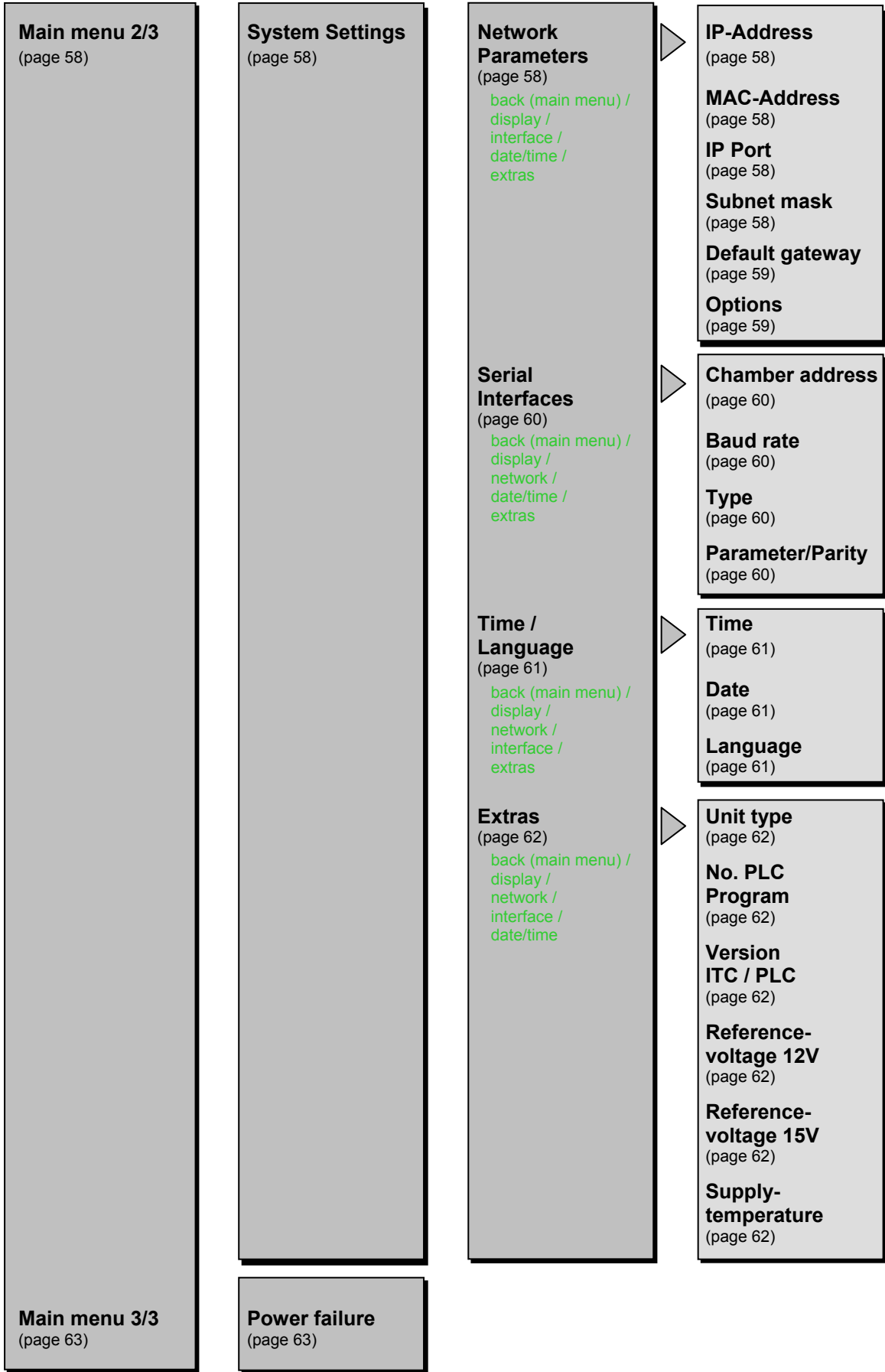
With this indication, either a program is active or the unit is in manual mode.
In the head line the status "start" is once again indicated.

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





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



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:

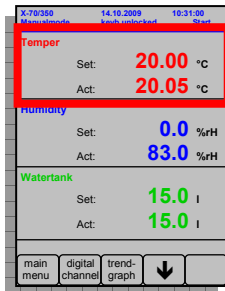
Prior to opening the unit-hatch, it is recommended to activate the pause-function, since the air-circulator will be turned off. This avoids the blowing of either extremely cold or extremely hot air into the face of the user.

7.3.1 Analog channels

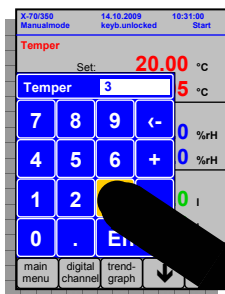
General:

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.

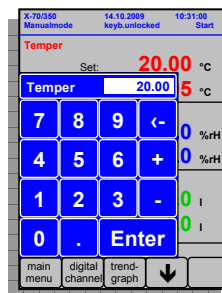
Setting an analog channel:



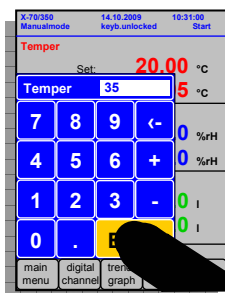
Notice of an analog channel such as temperature (temper), indicated in red color and framed in. In order to change the target value, the red field must be touched with a finger.



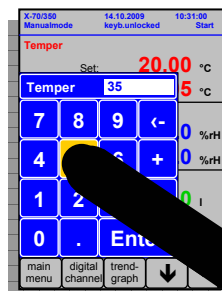
Enter the desired value through the block of numbers.



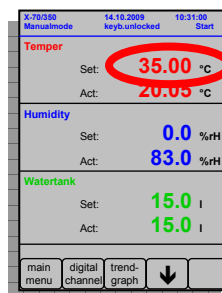
A block of numbers will appear thereafter with indication of the variable to be changed (temper in this case) and the value that can then be edited/changed



By pressing the key "Enter" the entry is then completed.



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



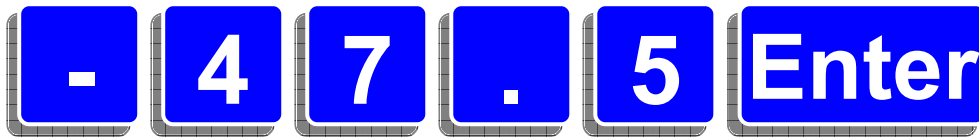
The block of numbers is thereafter closed and the new temperature target value is carried over to the indicator.

Important information regarding humidity:

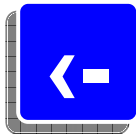
- To turn off the humidity: Set humidity-value to " 0 "
- To restart the humidity: Set the humidity-value within the limitations of the unit

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



- 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.



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 [low de-humidity] = 0 - not active		Channel [temperature] = 1 - active
Channel [additional regulator] = 0 not active		Channel [Humidity] = 1 - active
Channel [customer outputs] = 0 - not active		Channel [dew-point > 7°C] = 1 - active
		Channel [dew-point < 7°C] = 0 not 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:

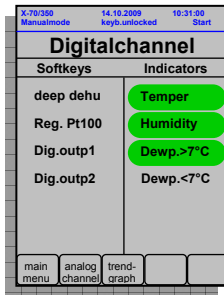
- **Indicators**

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

- **Softkeys**

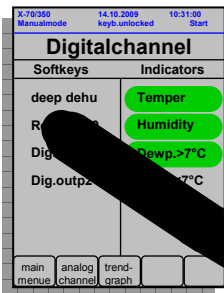
Softkeys are digital channels, which can both be indicated as well as changed.

Changing the status of a digital channel (soft keys):

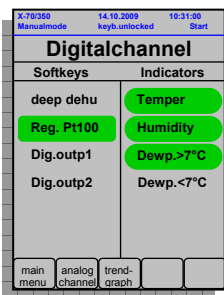


For this example there are two soft keys.

The digital channel "Reg. Pt100" is not active at the moment, i.e. it carries the logical value 0.



If it is to be activated, i.e. assumes the logical value 1, the field of the channel must be pressed.

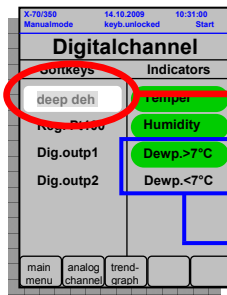


If the digital channel "Reg. Pt100" has been successfully changed from the guidance, and thereby the unit (to the value 1), then the channel is set to green.

If this channel "Reg. Pt100" 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 guidance, 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.

For example, the deep dehumidification can only be set, when the indicator [dew-point < 7°C] is activated and the indicator [dew-point > 7°C] is de-activated. The status of these indicators is, of course, dependent upon the target value of the temperature and the humidity. This is why these target values have to be correspondingly selected.

- The representation or notice of the digital channels does not necessarily have to correspond to the analog channels. In these instructions the analog channels “temperature”, “humidity”, “dew-point < 7°C”, „dew-point > 7°C“, “Reg. Pt100” and “deep dehumidification” are, on the other hand, represented according to the configuration of the unit.

7.4 Program mode

7.4.1 Basic information regarding programming

7.4.1.1 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 7.4.3.2.

- **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 active program line always consists of a temperature and humidity pair

A passive 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.

7.4.1.2 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 basically valid 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:

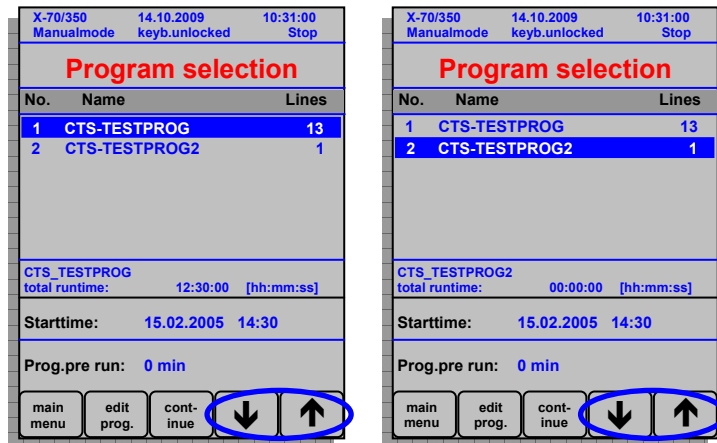
- A considerable and sudden change in temperature and humidity can be dealt with by the unit much quicker than a gradual linear change. Since the change cannot take place at a desired rate, it is better to use the wait-function in this case. It guarantees a secure runtime of stability at a required temperature 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.

7.4.2 Handling of the program mode

7.4.2.1 Program selection

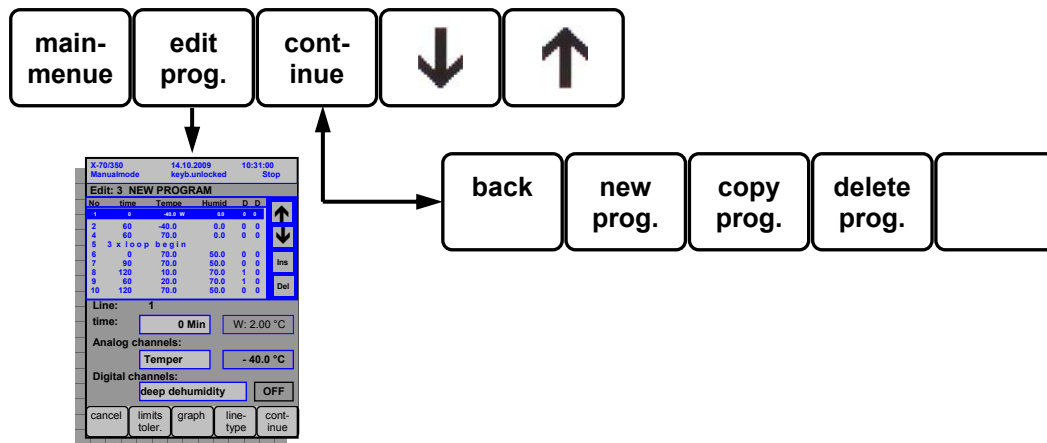
Program selection is achievable through the  key.

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.

7.4.2.2 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.



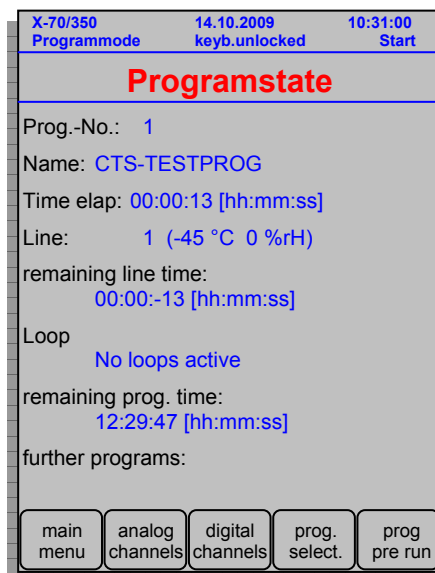
7.4.2.3 Program stop

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.



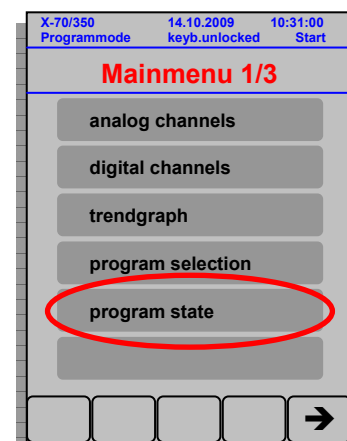
7.4.2.4 Program state

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 %rH))
- 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.

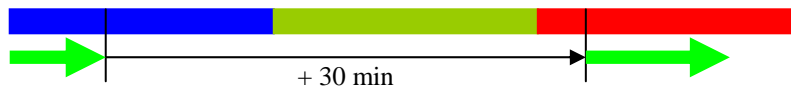


7.4.2.5 Special features of the running program, i.e. before the program start

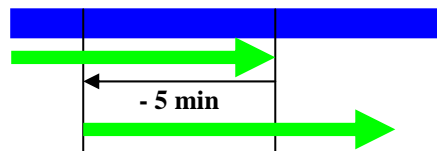
■ Program forerun (in the running program)

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.

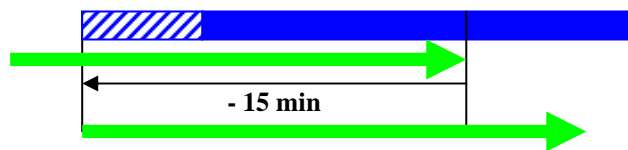
Given a normal input of, for instance, -30 min. or + 30 min., the program jumps to the desired point and may continue the program in a new line.



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			
Negative gradient			

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 32). 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 fore-run 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.

7.4.3 Program construction - Edit prog.

The construction of the program is described in the following:

Edit:
**Program number
and name**

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

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

X-70/350
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 Loop begin						
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	Loop end						
12	0	20.0	0.0	0	0	0	0

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

chanel
limits toler.
graph
line-type
cont-inue

Navigation tools

↑ Scroll upwards

↓ Scroll downwards

Ins Insert line

Del Delete line

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:

7.4.3.1 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.”)

The left screenshot shows the 'Program selection' screen with a table of lines. The 'new prog.' button is highlighted with a red box. The right screenshot shows the 'Create new program' form with fields for No., Name, and Time base.

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

CTS_TESTPROG
total runtime: 12:30:00 [hh:mm:ss]
Starttime: 15.02.2005 14:30
Prog.pre run: 0 min

back new prog. copy prog. delete prog.

Create new program
No: 0 OK
Name:
Time base: Minutes
back new prog. copy prog. delete 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:

The first screenshot shows the 'Create new program' form with the 'No.' field containing '0'. The second screenshot shows the 'No.' field containing '3'. The third screenshot shows the 'No.' field containing '3' and the 'Enter' key highlighted.

Program selection

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

Create new program
No: 0 OK
Name:
Time base: Minutes
back new prog. copy prog. delete prog.

Program selection

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

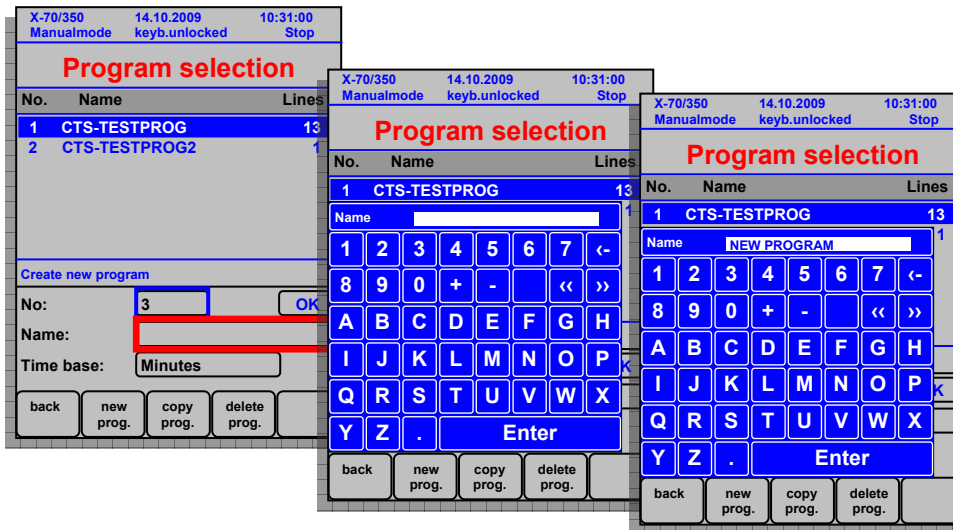
Create new program
No: 3 OK
Name:
Time base: Minutes
back new prog. copy prog. delete prog.

Program selection

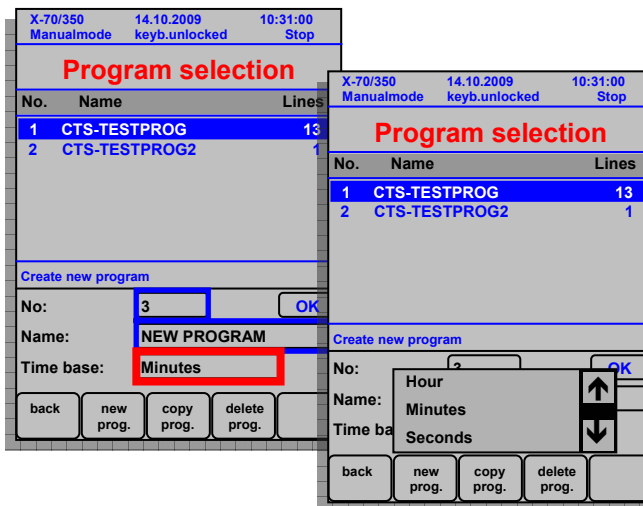
No.	Name	Lines
1	CTS-TESTPROG	13
2	CTS-TESTPROG2	1

Create new program
No: 3 OK
Name:
Time base: Minutes
back new prog. copy prog. delete prog.

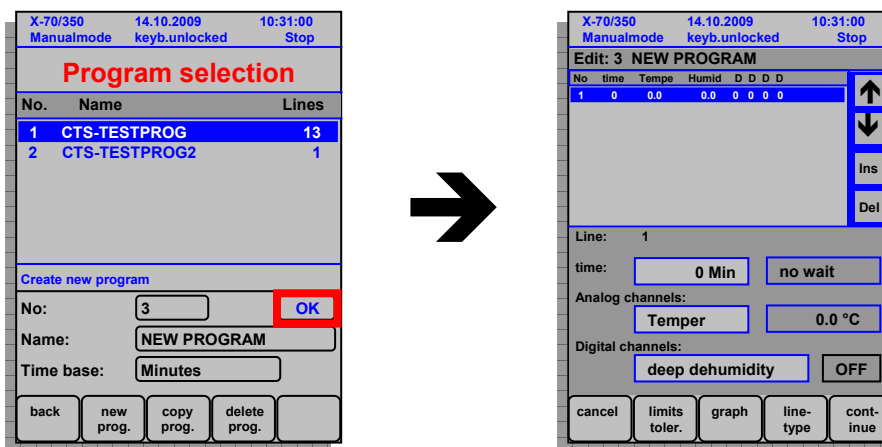
- After entry of the program number, the **program name** must be entered:



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



- 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 7.4.3.2 - page 38)



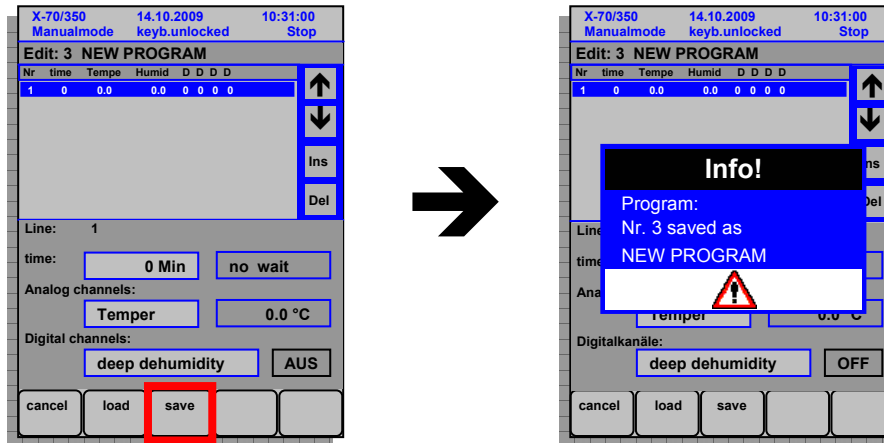
- In order to avoid losing the produced program and all data with it, the program must be secured with the save key. (This key is also to be found in the second navigational area → first press “continue”, then “save”).
After deleting the indication -

“Info!

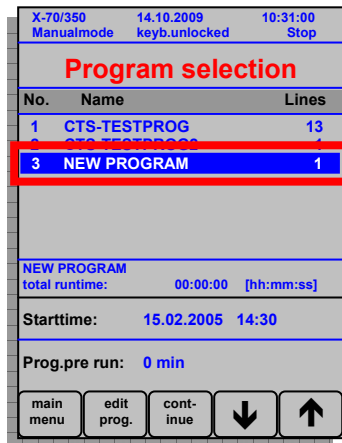
Program:

**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.



7.4.3.2 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.

The left screenshot shows the 'Edit: 3 NEW PROGRAM' screen. The table below is the first line of the program:

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

The right screenshot shows the same screen with a sample program filled out with 13 lines:

Nr	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 Loop begin						
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	Loop end						
12	0	20.0	0.0	0	0	0	0

The callout box shows the 'line-type' button and its options:

- Value line
- Loop begin
- Loop end

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.

Program line —

No	time	Tempe	Humid	D	D	D	D
1	0	20.0	0.0	0	0	0	0

Runtime —

Line: 1

time: 0 Min no wait — **Wait-Function**

Analog channels: Temper 20.0 °C — **Analog channels**

Digital channels: deep dehumidity OFF — **Digital channels**

- **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:

No	time	Tempe	Humid	D	D	D	D
1	0	20.0	0.0	0	0	0	0

- **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.

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						

↑
↓
Ins
Del

Line: 2

Start of loop

Number of loops:

5 → **Number of loops**

- **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:

No	time	Tempe	Humid	D	D	D	D
1	0	20.0	0.0	0	0	0	0
2	5 x Loop begin						

- **Loop - loop end**

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

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						

Line: 5

End of loop

- **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						

7.4.3.3 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

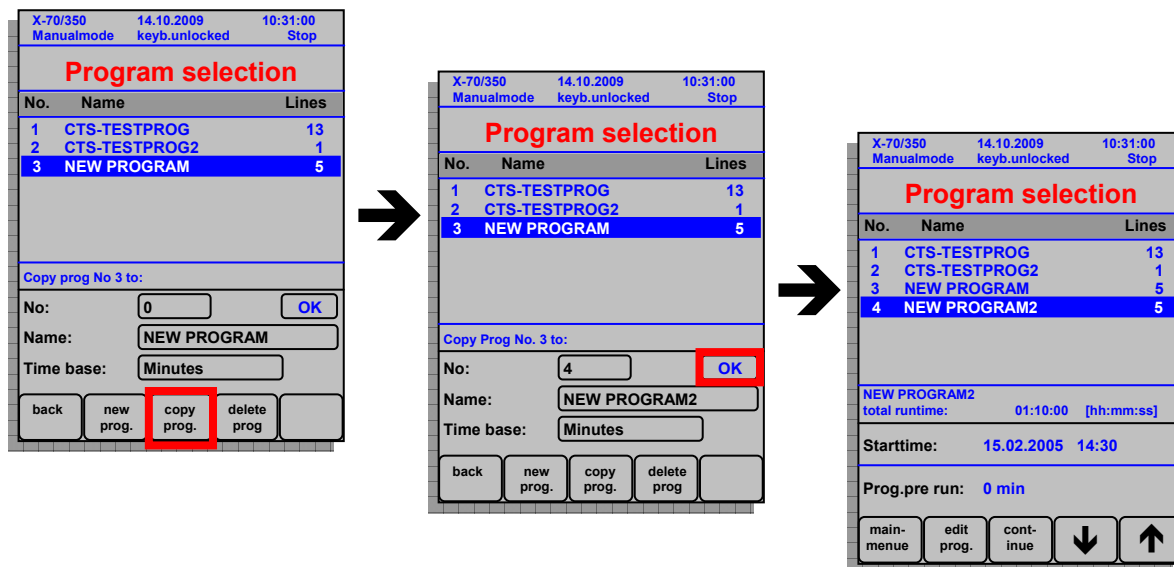
inactive 0.0 °C

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)

7.4.3.4 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.

7.4.3.5 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.”)

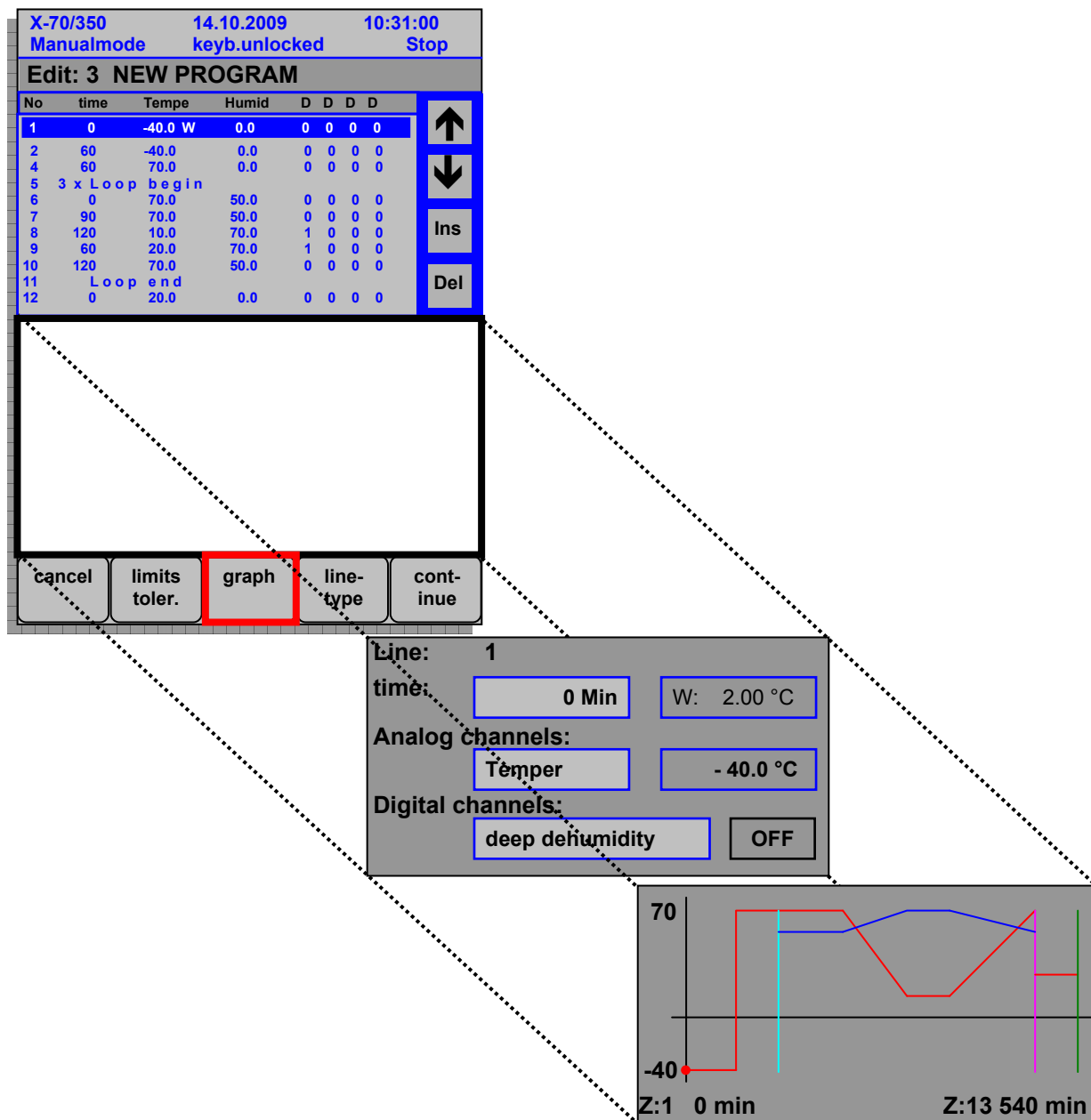
X-70/350			14.10.2009	10:31:00
Manualmode			keyb.unlocked	Stop
Program selection				
No.	Name	Lines		
1	CTS-TESTPROG	13		
2	CTS-TESTPROG2	1		
3	NEW PROGRAM	5		
4	NEW PROGRAM2	5		
NEW PROGRAM2				
total runtime:		01:10:00	[hh:mm:ss]	
Starttime:		15.02.2005	14:30	
Prog.pre run:		0 min		
back	new prog.	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”

7.4.3.6 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.



7.5 Trend graphics

7.5.1 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.

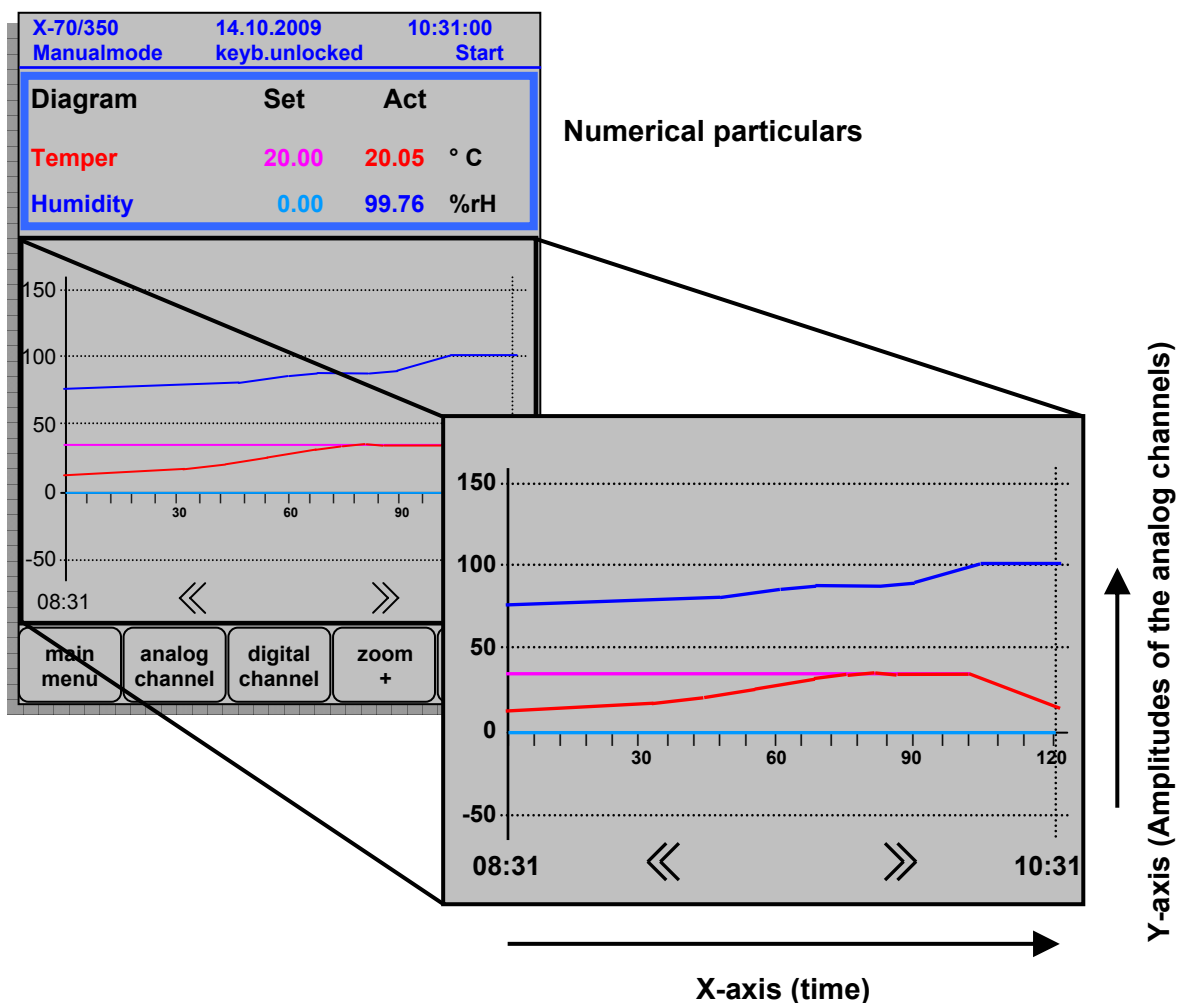
The diagram in the lower half of the display consists of the X- and the Y- axis.

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 7.5.2.1 Zooming - page 47).

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.

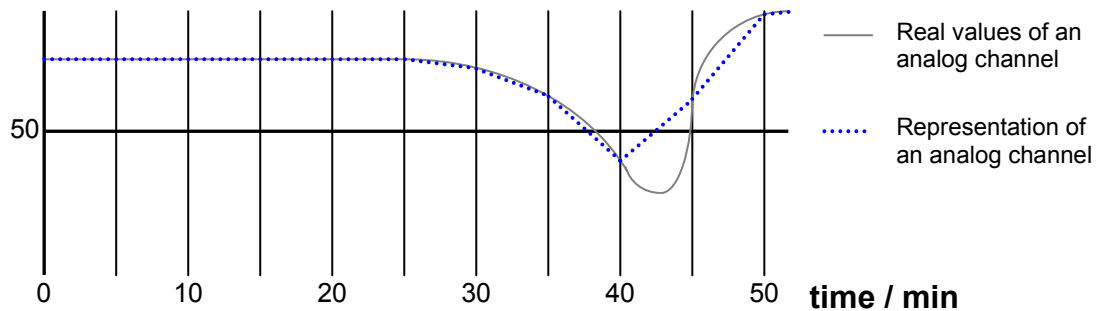


The curves represented here will be updated according to the time-run of an axis section. The values are of the current time are then connected with the values of the time which has already passed (section).

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

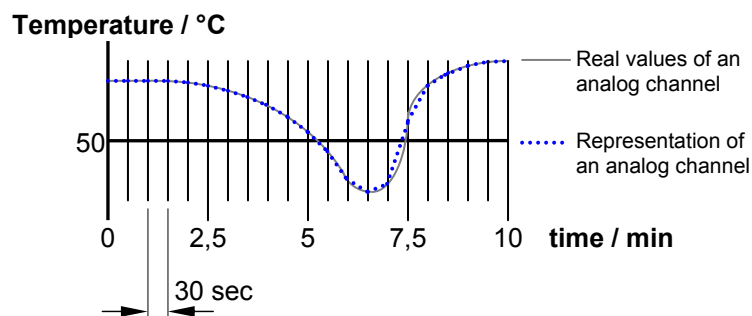
Schematic representation:

Temperature / °C

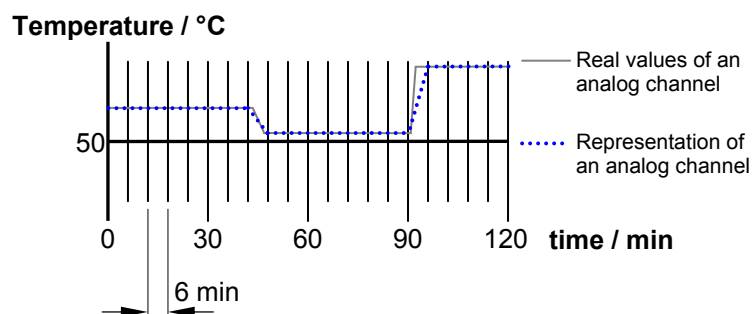


Notice:

- 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.



7.5.2 Navigation in the trend graphics

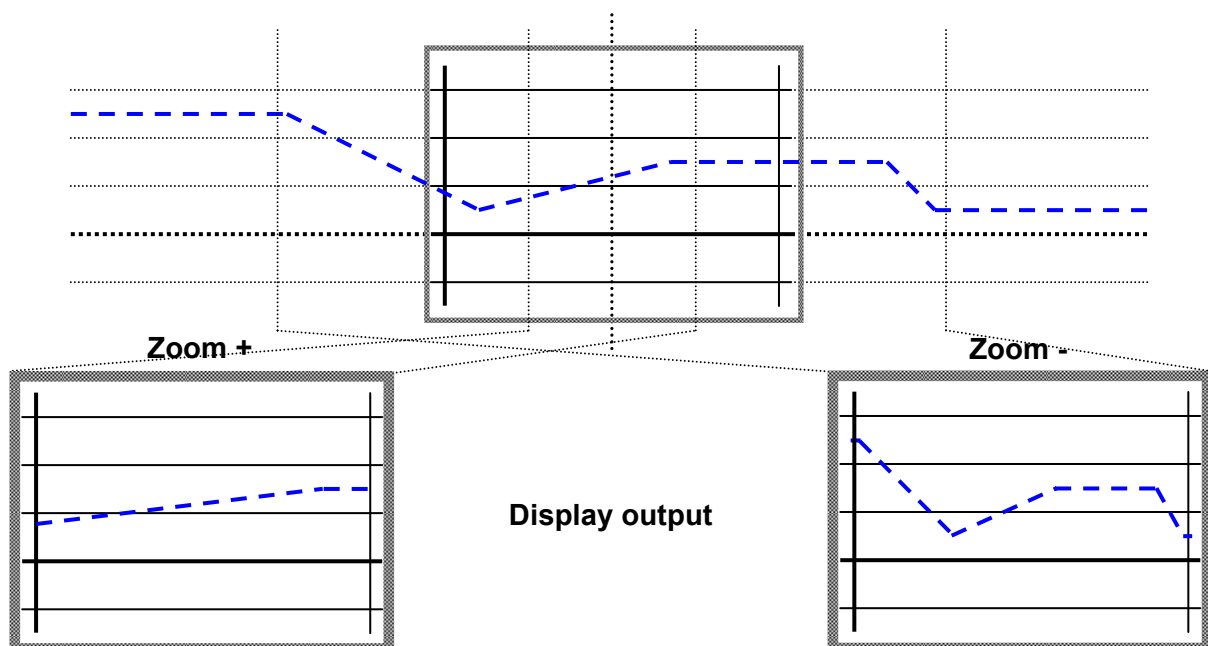
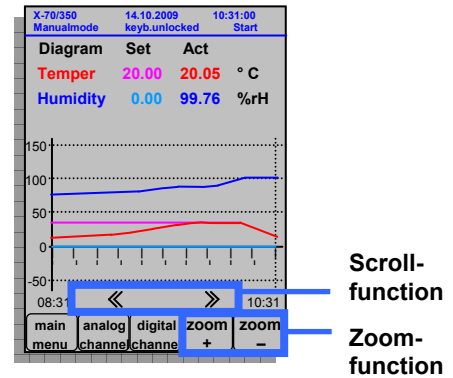
The following functions are available to navigate in the graphics:

7.5.2.1 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.

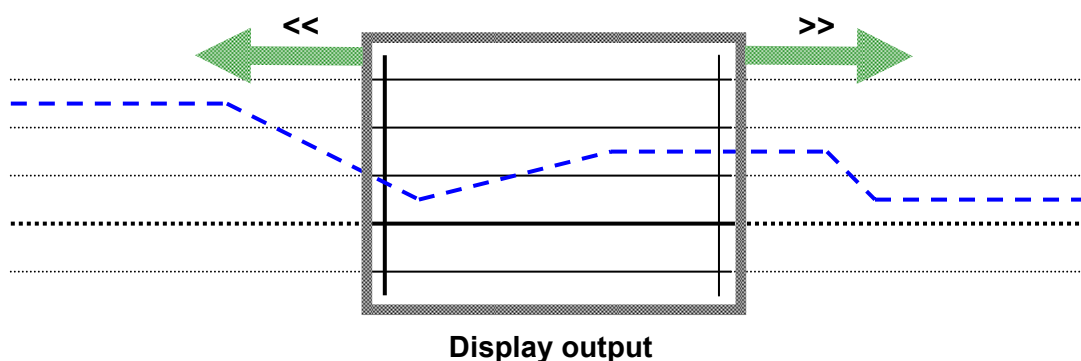


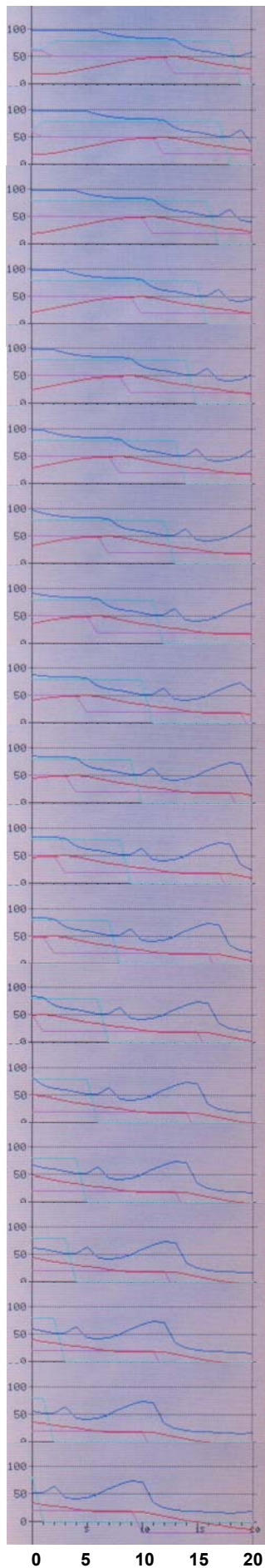
7.5.2.2 Scrolling

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.





7.5.3 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

7.6 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 reports (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.



7.6.1 Error menuue

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 representation is explained more specifically in the following graphic:

Menu list:

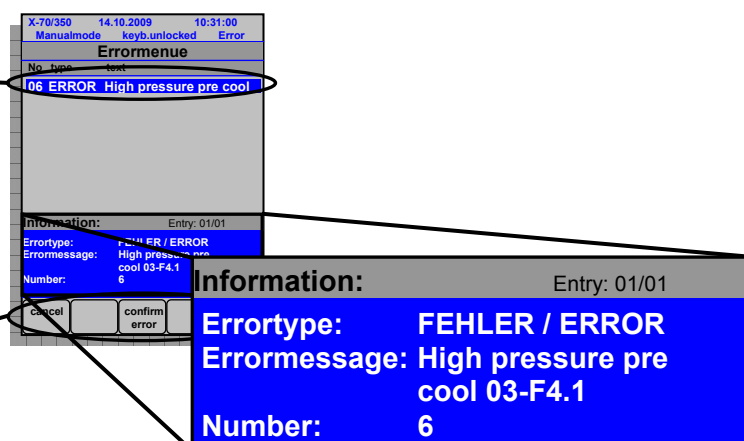
An overview of all reports.

Report details:



Details for the selected report are indicated.

Menu function bar:

For some reports, navigational arrows are given, in order to enable selection of a specific report.



- 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 warning is taken care of, the indication of this report will be immediately acknowledged (without stopping the warning).
- If the cause of an existing error is taken care of, the report must then be acknowledged so that it will be deleted.

7.6.2 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 **eradicat**ed
- **ER + QUI** **ERROR** , which has been **acknowledged**

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

X-70/350	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.

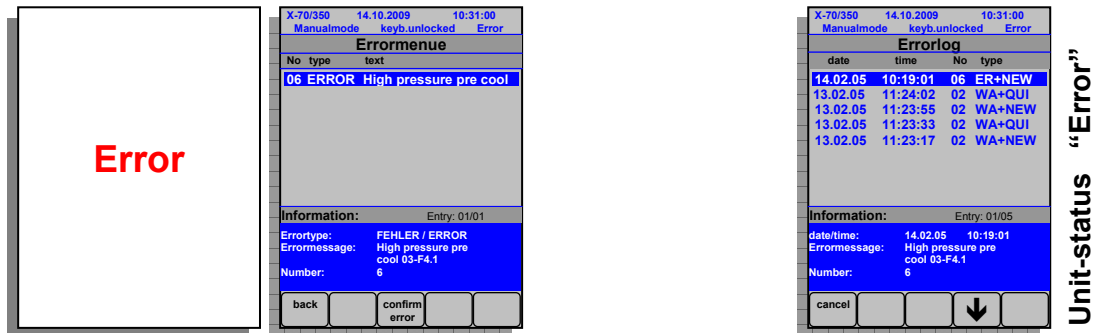
Notice:

Reports in the error history cannot be deleted by means of an acknowledgement.

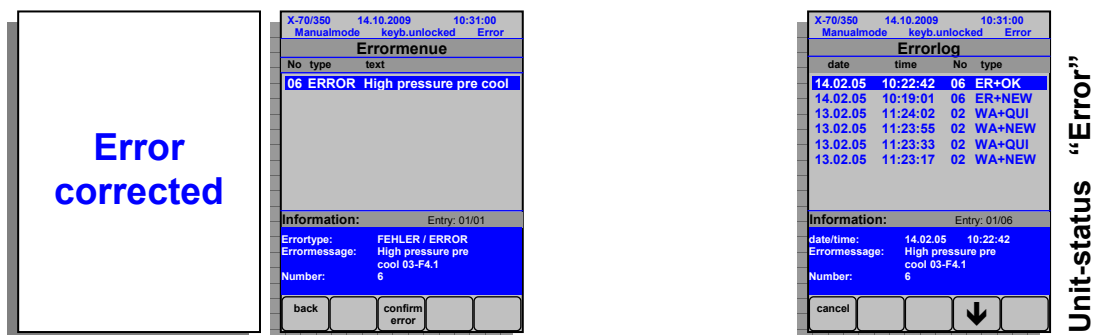
7.6.3 The relationship between error-menu and error-history

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:

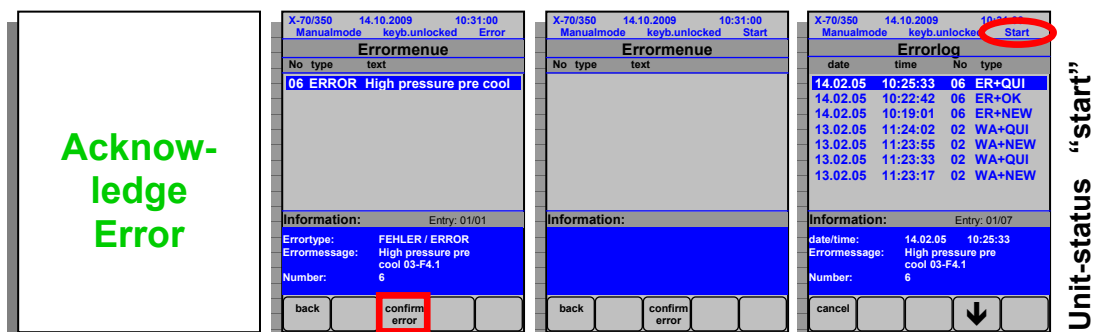
- 1) An error is reported → red LED of the alarm key illuminates.
 - The error-menu indicates the error-report “high-pressure in pre-cooling 03-F4.1” upon opening- by clicking on the alarm-key.
 - The error-history lists an **ER+NEW** - report with the error-text “high-pressure in pre-cooling 03-F4.1”. 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.

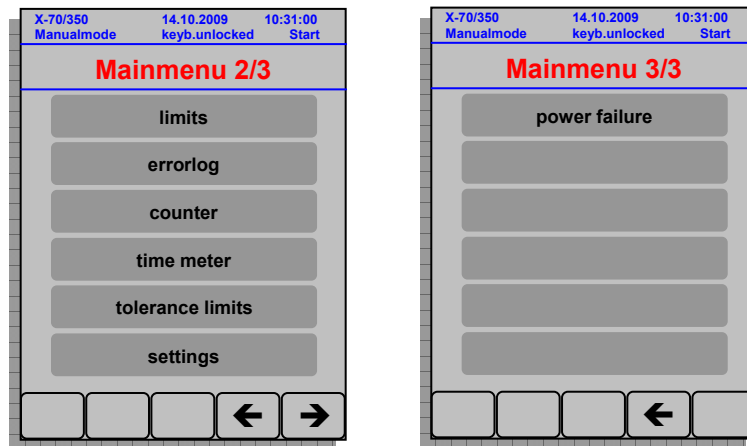


- 3) An error is **acknowledged** → red LED of the alarm-key is no longer illuminated.
 - The error-menu no longer indicates error-reports.
 - The error-history produces a new **ER+QUI** - report with the same error-text. The date corresponds to the time of acknowledgement of the error.



7.7 Unit-specific menus

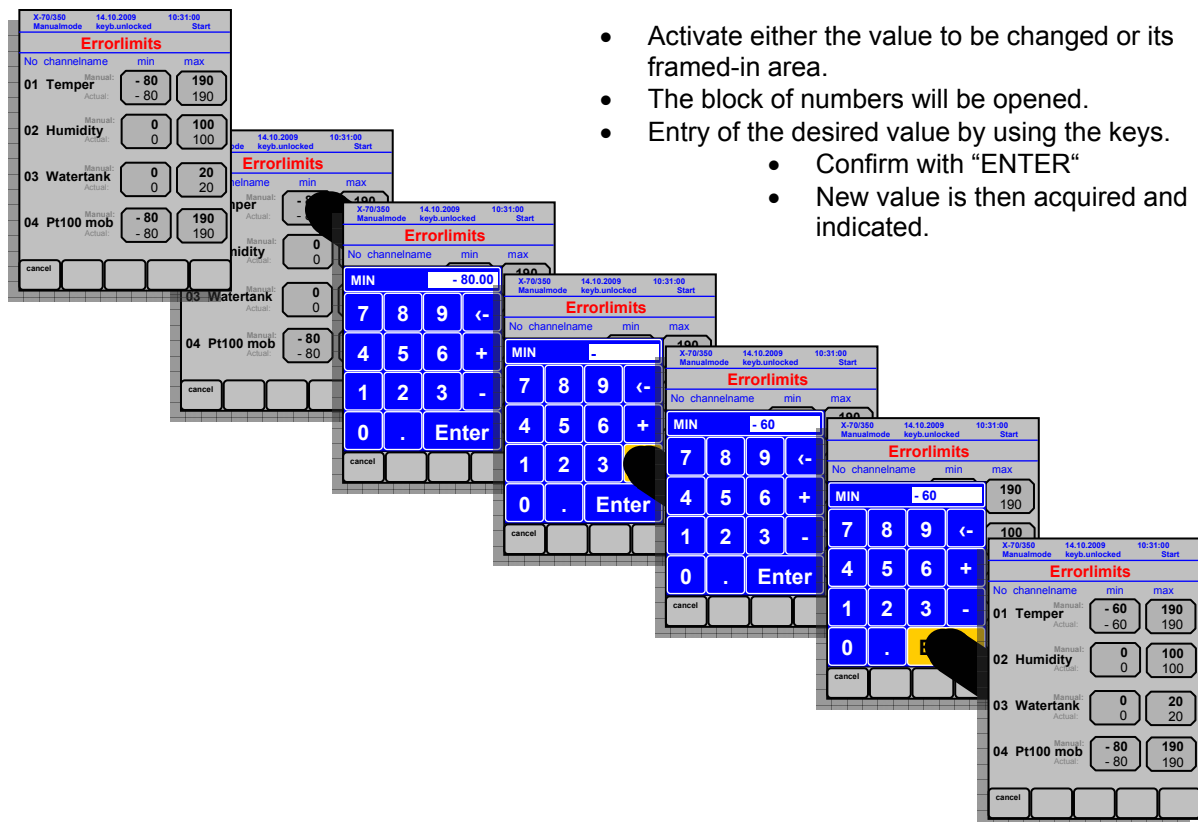
A lot of helpful information on the device and the settings in the device configurations is contained in the main menu (2/3) and (3/3) – reached by arrow navigation in the main menu 1/3 to the right. The specific menus for each device are opened by pressing the respective grey element.



7.7.1 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.



7.7.2 Errorlimits / Limitation values

No	channelname	min	max
01	Temper	Manual: -80 Actual: -80	190
02	Humidity	Manual: 0 Actual: 0	100
03	Watertank	Manual: 0 Actual: 0	20
04	Pt100 mob	Manual: -80 Actual: -80	190

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 ($\pm 10K$). For example, the following limitation values can be set:

Temperature range: -70°C to $+180^{\circ}\text{C}$

Limitation value range: $-70^{\circ}\text{C} - 10K$ to $+180^{\circ}\text{C} + 10K$

i.e.: -80°C to $+190^{\circ}\text{C}$

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 \rightarrow actual limit = current program lines-limit

7.7.3 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 50), since the history is directly connected with the reports and, therefore, the error-menu as well.

7.7.4 Counter

01	sv cooling:	28
Limit 1	0	
Limit 2	0	
02	sv bypass:	30
Limit 1	0	
Limit 2	0	
03	sv clim. cool.:	6
Limit 1	0	
Limit 2	0	

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:

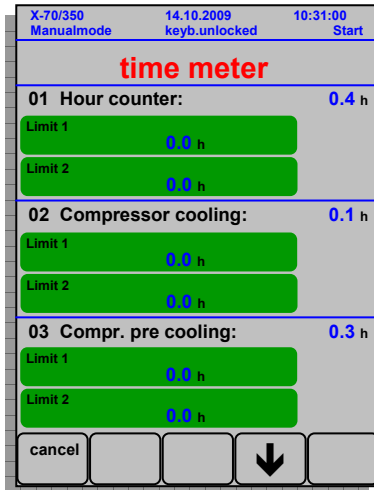
Limit 1:
Oil piston 1 soon **95**

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

Notice:

Each element indicated has a status, which is determined at the time of delivery. In this context there are also elements, which already have pre-defined limits and cannot be changed. Limits of other elements can be optionally configured.

7.7.5 Time meter



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 54). The limits stand for, as with the example of the general time meter for the unit, maintenance or a customer service:

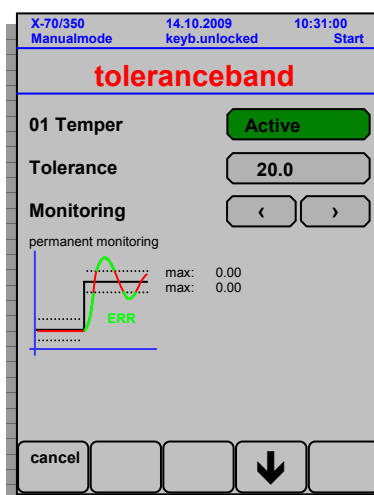
Limit 1:
Contact customer service **10000** hours

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

Notice:

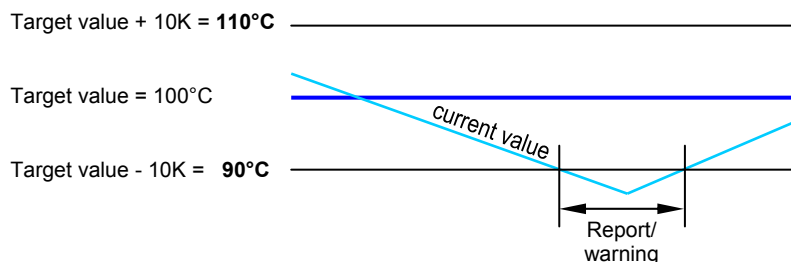
Each element indicated has a status, which is determined at the time of delivery. In this context there are also elements, which already have pre-defined limits and cannot be changed. Limits of other elements can be optionally configured.

7.7.6 Tolerance bands



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.



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

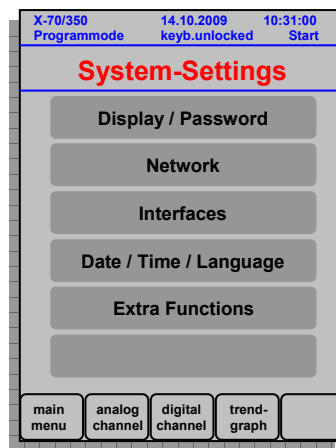
- **Monitoring:**
Permanent monitoring

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.**

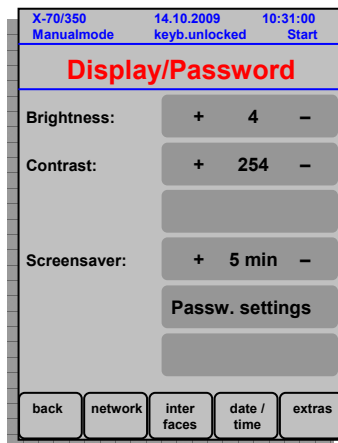
7.7.7 System Settings

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:

7.7.7.1 Display/Password



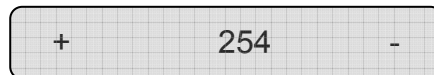
The display sub-menu refers to the settings of the display. The brightness, the contrast and the display screensaver can be increased or decreased by means of the plus-key (+) or minus-key (-).

- **Brightness:**



Brightness is optional within a range from 1 ... 4.
The standard value is 4.

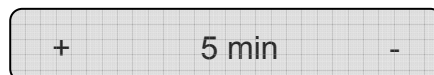
- **Contrast:**



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:**



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 7.8 - Password protection - page 64.

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.

7.7.7.2 Network parameter

X-70/350		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 00000001		
back		save changes	

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

- **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 00000001

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.

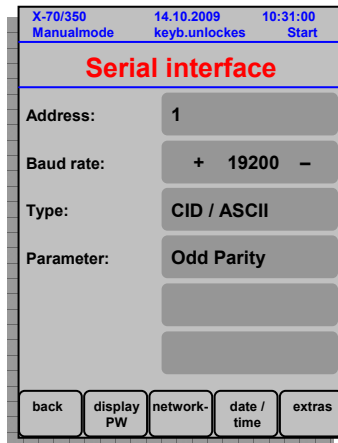
Notice:

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.

7.7.7.3 Serial interfaces



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.

7.7.7.4 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:**

10:31:00

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:**

14.10.2009

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:**

+ English -

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

7.7.7.5 Extras

X-70/350		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 PW	network-	inter faces	date/ time	

In the extra-menu, relevant unit-data are represented, which cannot be changed.

- | | | |
|-----------------------------|----------------|--------------------------------------|
| • Chamber type: | T-65/50 | Exact chamber-type specification |
| • No. PLC Prog: | 127003_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.

7.7.8 Power failure

X-70/350		14.10.2009		10:31:00	
Manualmode		keyb.unlocked		Start	
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		
Number:		01/03			

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.

7.8 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	master-level	level 1	level 2
Display in the head bar	keyb.unlocked	keyb.locked1	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 failure	●	○	○

Legend: ● Full access rights ○ No access rights

7.8.1 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:

7.8.2 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 64).

7.8.3 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 7.8.4:

7.8.4 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.

7.8.5 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.**

7.8.6 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.

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