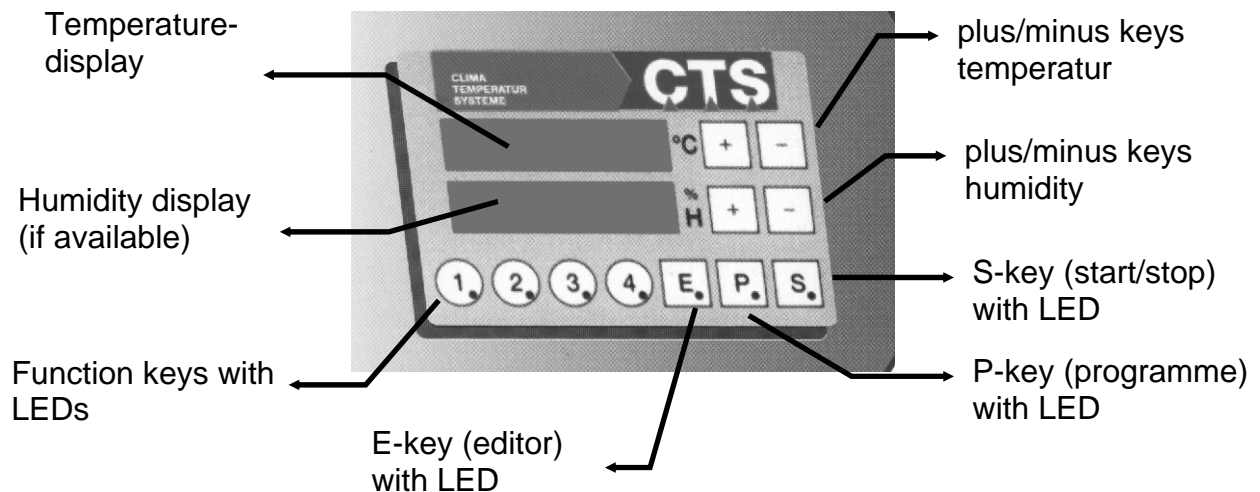







## 6. Operation with CTS operating unit

The CTS operating unit allows to operate the installation by hand meaning with fixed values or automatically with previously written programmes



The **operational mode of the installation** can be read from the state of the green luminous diodes in the P-key and in the S-key.


LED in  -key on:	→ constant mode (see topic 6.2)
LED in  -key off:	→ programme mode (see topic 6.1)
LED in  -key on:	→ installation is running
LED in  -key off:	→ installation is stopped
LED in  -key flashes:	→ operation interrupted in programme mode

Temperature limits can be set as a **specimen protection**.

If the actual value in the test space exceeds or remains under the pre-set limits, the installation is switched off. (see topic 6.3 Software Temperature limiter)

## **6.1 Constant Mode**

In the constant mode, the set index values are regulated as constant values. It's possible to change them during a running. After starting the installation, it tries to fulfil the set index values until it will be stopped or the index values will be changed. Pressing the function keys activates / deactivates the additional functions. More informations are given below.

The installation runs in the constant mode, if the LED in the -key is off.

Adjusting the temperature index value

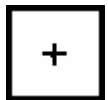


-key on temperature display → higher index value



-key on temperature display → lower index value

Adjusting the humidity index value (if available)



-key on humidity display → higher index value



-key on humidity display → lower index value

**Remarks :**

- **To cut out the humidity: set humidity index value to „0“.**
- **To restart the humidity: set humidity index value on a value within the limits of the installation.**

Starting the installation:



-key → starts the installation if it was switched off (green LED in S-key is on).

**Remark :**

- the index values "F" and the actual values are displayed alternately, if the installation has started.

Stopping the installation:



-key

→ stops the installation if it was switched on (green LED in the S-key is off).

Additional functions:

Function keys:



-key

→ activates / deactivates the respectively assigned function (green LED in the respective key is on/off)

Key assignment:

Key	Function	Description
1	free	Free
2	free	Free
3	free	Free
4	free	Free

**Remark:**

- the digital out-puts are potential-free contacts witch can be used from the customer i.e. for triggering specimens (chap 5.3).

## **6.2 Programme Mode**

### **6.2.1 Basic information for creating a programme**

#### **6.2.1.1 Components of a test programme (programme-cycle)**

##### Test programme

A test programme consists of a random number (1-99) of successive program-lines. It is possible to create test programmes and to store up to 99 of them with the CTS operation unit. The programme appoints the exact logic operation. The working up is explained in chapter 6.2.1.2. You find also important notices and incitations in that chapter. The input with the CTS operation unit is explained in chapter 6.2.2.

##### Programme-line

Such a programme-line comprehends a pair of temperature / humidity, a defined running time, optional a wait-function and optional the switching on/off of additional functions. The beginning and the end of a loop comprehends also a complete programme-line. It is only possible to insert a line at the end of an existing programme with the CTS operation unit. In all other cases the following line will be overwritten, the programme modified and possibly useless. But this operations can be easily realised by using the CID – Software from CTS.

An active programme-line consists of a pair of temperature / humidity with the associated running time.

A passive programme-line comprehends the beginning / end of a loop or the wait-function. The difference to the active programme-line is, that there´s no running time, what means  $t=0$ .

##### Pair of temperature / humidity

A pair of temperature / humidity consists of a temperature index value and of a humidity index value if the installation can regulate the relative humidity. These values build up the “frame” of the test-programme.

##### Running time

The running time appoints either how long a pair of temperature / humidity has to be constant, or in which period the installation should arrive at another pair of temperature / humidity. The running time can be indicated in hours or minutes, but only whole numbers are possible.

##### Loop(manual entry: chap. 6.2.2.4)

A loop is a possibility to make the programming easier, if there are repetitions in the programme-cycle. A whole (passive) programme-line is necessary for programming the beginning / end of a loop. That´s the reason why a loop cannot be inserted in an

existing programme with the CTS operation unit. This is only possible by using the CID – Software from CTS.

It's the same thing with interlaced loops. They are programmable by using the CID – Software, but there is no chance to do that with the CTS operation unit.

#### Wait-function (manual entry: chap 6.2.2.5)

If a dwell time on a required level of temperature / humidity must be proved, the wait-function should be used. Then, the programme will be stopped until the required actual value is in the range of tolerance. The programmer can choose this range. But it is very important to choose the range of tolerance not too small. If the programmer takes not care about that, the installation requires too much time to fulfil the condition, or, in the worst case, the installation cannot reach the range.

The wait-function is an optional component of each programme-line. Therefore it can principally be inserted into an existing programme. The programmer should read chapter 6.2.1.2 before doing that.

#### Additional function(s)

An installation has up to eight additional functions, depending on type and customer's need (chap.6.1). The CTS operating unit can only activate the first four of them. By the CID – Software from CTS it's possible to program up to eight additional functions. Any of the first four additional functions can be activated / deactivated in a programme-line. If a function should be activated during several programme-lines, it must be set / reset in each line of them.

#### Software-Temperature limiter (manual entry: chap. 6.3)

The Software-Temperature limiter can be used to narrow the allowed temperature range. This is very important, when the specimen must be protected from very high / low temperatures. It's not possible to save this temperature range with a programme-cycle. But if the customer uses the CID – Software from CTS, the saving of temperature range is possible. So the programmer must check the right range before starting a programme, if she/he only can create programmes by using the CTS operation unit (read also chap. 6.3).

### **6.2.1.2 Important notes before creating a programme**

The first programme-line should always comprehend a defined start value, consisting of a pair of temperature / humidity and of a running time  $t=0$ . If the programmer doesn't do that in this way, the automatic control will take over the value ending the last checking operation.

If a linear alteration of temperature / humidity is not quite necessary, it will be more suitable to program it as a „jump“ ( that means a alteration of temperature / humidity with run time  $t = 0$ ). The reason is, that in this case the programmer takes advantage of the highest changing rate of temperature / humidity. If a linear alteration is necessary, there will be some things to think about:

- it has to be proved, whether the maximal temperature changing rate (chap. 4.2) was not passed over.
- If temperature and humidity are controlled simultaneously in a linear alteration, the installation will only can reach a lower changing rate (max. 0,3 K/min), as if the humidity will be switched off before the linear alteration. That's because different ways of tempering have to be used. Therefore the programmer should think about the necessity of the simultaneous linear alteration.
- controlling the humidity is only possible in a certain range of temperature (chap. 4.2). If the programme-cycle leaves that range, humidity will be controlled until reaching the limit, outside it will be switched off automatically. The other case, what means coming from a temperature outside, is treated similar. If the installation reaches the range, in which controlling of humidity is possible, a linear alteration of humidity will be done if necessary. Basic information: If the index value of temperature leaves the range of climatic testing, the humidity control will be switched off. An eventually appointed index value of humidity will be ignored. But don't forget, the actual value humidity value can be any uncontrolled value, because there is always a humidity in the installation.

The course of a test programme is idealized. Above all if there are jumps in the course of temperature / humidity, it won't be possible for the installation to observe exactly this appointed course. Important notices:

- an intense alteration of temperature / humidity can be realised by the installation more rapid than a linear alteration. If a certain dwell time is appointed on a temperature / humidity level, the programmer should use the wait-function to insure that. This programme step is unavoidable when a dwell time is needed, because an intense alteration cannot be completed in just a few seconds.
- it can be the same with linear alterations of temperature / humidity, although the maximal temperature change rate was not passed over. That could happen, if it's necessary to control next to the limits of the temperature / humidity range (chap. 4.2). The nearer a pair of temperature / humidity is located at these limits, the slower the installation can reach the appointed course. But sometimes, depended on the specimen, such a slow, linear alteration must be realised. Here, the wait-function insures a dwell time on a certain temperature / humidity level, too.

The wait-function should always be programmed as an additional passive programme-line. If you don't think of that, the run time, of the programme line in which the wait-function was programmed, won't be recognizable by using the CTS operation unit to check an existing programme (chap. 6.2.2.8). That will be the same, if a wait-function is inserted to an existing programme. The best way is to avoid both of them. One exception: After a desultory alteration of temperature / humidity, the additional programme-line can be omitted, because in a jump the run time is  $t = 0$ . In this case, there's also no problem to insert the wait-function in an existing programme.

## 6.2.2 Manual entry of a programme with the CTS operation unit

A test programme can be entered manually by using the automatic editor

### 6.2.2.1 Head of programme

In the head of a programme, the programmer has to select the number of the programme (1-99). It's possible to overwrite existing programmes. Additionally to the number, it's necessary to choose the time base between minutes or hours.



-key

→ opens the mode "editor"



or key of  
temperature display

→ select programme number

#### Remark:

- In the humidity display the amount of programme-lines "PL xx" is shown.
- Display "PL 0" means, that there is no programme saved under this programme number.



-key

→ closes the input of the programme number



-key

→ time base:  
- 1 = minutes „´“  
- 2 = hours „h“



-key

→ closes head of programme



### 6.2.2.2 Programme body

In the programme body, the programmer has to appoint the different pairs of temperature / humidity and their running times. It's also possible to activate / deactivate the additional functions (see key functions chap. 6.1). Together these informations build up a programme-line.



#### Remarks :

- A defined starting value with run time  $t = 0$  should always be programmed as first line, so that the automatic control does not take over the value ending the last checking operation.
- The additional functions were activated / deactivated at the beginning of a programme-line

Input of the 1<sup>st</sup> pair of temperature / humidity :

 or  key of temperature display

→ index value for temperature display "P xxx.x"

 or  key of humidity display

→ index value for humidity with an index value of 0, the humidity is switched of (Display: "-----")

    - keys

→ switching on/off the additional functions, i.e. digital outputs (see key functions chap. 6.1)



 - key

→ closes the entry of the 1<sup>st</sup> pair of temperatur / humidity. The display changes to the run time input for the 1<sup>st</sup> pair of temperature / humidity.

#### Remark :

- The current programme line " L xx " is shown in the humidity display.



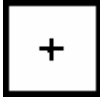

 or  key of temperature display

- Run time of the 1<sup>st</sup> pair of temperature / humidity
  - display “ ’ “ for time base minutes
  - display “ h “ for time base hours



 -key

- closes the run time input for the 1<sup>st</sup> pair of temperature humidity

### Input of the 2<sup>nd</sup> pair of temperature / humidity:

 or  key of temperature display

- index value for temperature display „P xxx.x“

 or  key of humidity display



- index value for humidity with an index value of 0, the humidity is switched off (Display - - - -)

    - keys

- switching on / off the additional functions

 - key

- closes the entry of the 2<sup>nd</sup> pair of temperature / humidity. The display changes to the run time input for the 2<sup>nd</sup> pair of temperature / humidity.

 or  key of temperature display

- Run time of the 2<sup>nd</sup> pair of temperature / humidity
  - display “ ’ “ for time base minutes
  - display “ h “ for time base hours

**Remark :**

**- The current programme line “ L xx “ is shown in the humidity display.**

Input of the 3<sup>rd</sup> pair of temperature / humidity:

The same as input of the 2<sup>nd</sup> pair of temperature / humidity

.....and so on.....

### **6.2.2.3 Programme end**

either:

**E**

- key

→ sets the programme end onto the current line (display changes to “ PE xx “ up and “ PL xx “ down)  
PE corresponding to programme end  
xx = programme number  
PL corresponding to current line  
xx = current programme line

then:

**E**

- key

→ quits the editor without saving

or:

**P**

- key

→ quits the editor and saves the programme up to the current line

or:

**P**

- key

→ saves always the whole programme  
**Attention:** if an existing programme is reduced and saved by that way, the number of the programme lines will stay the same as before the reduction.

#### 6.2.2.4 Method of programming a loop

If there are repetitions in the programme-cycle, a loop will make the programming easier. The Interlacing of loops is also possible, but it's impossible to entry them by using the CTS operation unit. Therefore, the programmer needs to have the CID – Software developed by CTS. This Software makes it easy to create and entry complex programmes.

##### Opening a loop:

A loop wants to be opened after the entry of the  $x^{\text{th}}$  pair of temperature / humidity (see chap. 6.2.2.2):

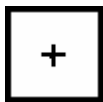


-key

- closes the entry of the  $(x+1)^{\text{th}}$  pair of temperature / humidity. The display changes to the run time input of the programme step.
- display of temp. changes to “”
- display of humid. changes to “L ..”

##### Remark:

**- It doesn't matter what was entered in the pair of temperature / humidity, when the programmer opens / closes a loop. That's because the automatic control will ignore them, if the programmer enters the beginning of a loop. The same thing happens with the entered run time.**



or key of humidity display

- enters the beginning of a loop, pushing again appoints the number of loop passages (display changes to “ SA xx “ . SA according to beginning of a loop, xx loop passages)

##### Remark:

**- display “ SA 10 “ means, that the programme-lines between beginning and end of the loop are passed ten times.**



-key

→ input of beginning a loop is done

Go on programming the next pair of temperature / humidity.

**Remark :**

**- If a loop is opened by the programmer, she/he will have to close it.**

Closing a loop:

A loop wants to be closed after the input of the  $x^{\text{th}}$  pair of temperature / humidity. (chap. 6.2.2.2).

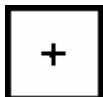


-key

→ closes the entry of the  $(x+1)^{\text{th}}$  pair of temperature / humidity. The display changes to the run time input of the programme step.  
→ display of temp. changes to “”  
→ display of humid. changes to “L ..”

**Remark:**

**- It doesn't matter what was entered in the pair of temperature / humidity, when the programmer opens / closes a loop. That's because the automatic control will ignore them, if the programmer enters the beginning of a loop. The same thing happens with the entered run time.**



- key of humidity display

→ pushing the + key defines the end of the loop (display changes to “SE “ according to end of the loop)



- key

→ closes the input

Now go on programming the next pair of temperature / humidity or end the programme.

### 6.2.2.5 Wait – function

The only way to insure a appointed dwell time on a certain temperature / humidity level is to use the wait-function. The moment and the range of tolerance can be chosen freely. The programme stops until the actual index is in the appointed range. It's possible to insert a wait-function in an existing programme (but read chap. 6.2.1.2).

Procedure, while the programmer entries a pair of temperature / humidity:

A wait-function wants to be programmed after the input of the  $x^{\text{th}}$  pair of temperature/ humidity (see chap. 6.2.2.2).

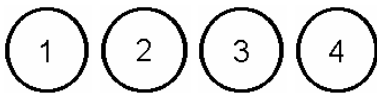


-key

- closes the entry of the  $(x+1)^{\text{th}}$  pair of temperature / humidity. The display changes to run time the input of the programme step
- display of temp. changes to “ ‘ “
- display of humid. changes to “L ..“

**Remark:**

**- Because the wait-function should always be realised as additional, passive programme line, the pair of temperature / humidity is taken over from the previous line. Changing the run time is not necessary, because it should stay at  $t = 0$ .**



– keys

- Switching on / off the wait-function.
- temperature = 1-key
- display “Hold 0“, wait for temp.
- i.e. display “lo 5.0 “, tolerance 5°
- humidity = 2-key
- display “Hold 1“ wait for humidity
- i.e. display “lo 5.0 “, tolerance 5%
- The range of tolerance for the wait function can be given in the humidity input field with the +/- key.

## Remarks :

- The range of tolerance defines with which index value deviation (+/-) the next step in the programme runs.
- If the tolerance is set to 0.0, the programme will be blocked, because the deviation between index value and actual value cannot become smaller than the tolerance.



- key

→ closes the input of the wait-function

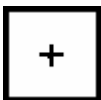
### 6.2.2.6 Insertion of a wait-function

It's possible to insert a wait-function in an existing programme.



- key


→ opens the mode " editor "



or  key of  
temperature display

→ selects the programme you want to  
change



Use the  -key to go through the programme. Stop at the line in which the wait-function shall be inserted.

→ run time of line x is displayed  
- display " ' " for time base minutes  
- display " h " for time base hours

Next step see chapter 6.2.2.5 wait-function.

### 6.2.2.7 Delete / shorten a programme

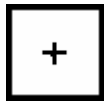
It is possible to delete / to shorten a programme if you set the programme end onto the respective line.

Method: *delete*



- key

→ opens the mode " editor "



or key of temperature display

→ select the programme you want to delete



- key

→ display 2<sup>nd</sup> line changes from " PL xx " to " PL 0 "



- key

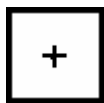
→ saves the programme with zero lines. programme is deleted.

Method: *shorten*




- key

→ opens the mode " editor "




or key of temperature display

→ select the programme you want to shorten


Use the  -key to go through to the programme. Stop at the line, you want to be the first deleted

- run time of line x is displayed
- display “ ’ “ for time base minutes
- display “ h “ for time base hours

 - key


- display shows programme number “ PE xx “ and line “ PL xx “

then either:

 - key

- saves the programme up to the previous line, which isn't displayed.

or:

Use the  -key to go on checking the programme.

### **6.2.2.8 Check the programme**



It's possible to visualize or to check an existing programme.

**Proceed as follows:**

 - key

 or  key of temperature display

- select the programme

 - key,  - key, .....and so on. → passage




## 6.2.3 Start a programme-cycle / running state

### 6.2.3.1 Starting the installation in programme mode / starting time

Very often, a programme-cycle shall start to a later time. Therefore the programmer can appoint the starting time while he is selecting a programme.



Stop the installation, if it runs in constant mode.

(green LED in  - key is off)

Start the installation in programme mode:

 - key

→ opens the mode "automatic"/  
"programme"

 or  key of  
temperature display

→ select programme number



If the installation should start immediately, continue with:

 - key

→ starts the installation (green LED in  
S - key and P - key are on)


Or appoint later starting time:



The humidity display shows the actual time as xx.xx h. If necessary, the starting time can be freely selected by actuating the:

 or  key of  
humidity display

→ select starting time xx.xx h.

If the installation should start only on the next day, the time can be set after 24.00 h.  
In this case, the temperature display shows the starting date.

With the  -key you take over the adjusted time. The programme starts then

At the defined time. (Display: LED in  -key on, in  -Taste off)

### **6.2.3.2 Interrupts in programme-cycle / malfunctions**

If it is necessary, a running programme-cycle can be interrupted. The index values and the run time of each programme line are preserved. The ventilator and the temperature control of the installation are switched off.

If there is a malfunction (see chap. 7 – Possible malfunctions), the programme-cycle will be stopped automatically.

An error, which has nothing to do with the technical things of the installation, will be displayed as a warning. The programme-cycle is interrupted, too. Such a warning will be displayed, if i.e. someone opens the door of a walk-in chamber while it is running.

#### Interrupting the programme:

 - key

→ the installation interrupts the programme-cycle. (LED in S -key flashes)

then either:

continue the programme:

 - key

→ the programme-cycle will be resumed (LED in S - key and P – key is on)

or:

end the programme:



- key

→ the programme-cycle will be ended. If the installation is started again, the programme-cycle will begin with the first step. (green LED in S -key and P -key is off).

### Malfunction indication:

temperature display

→ shows the temperature

humidity display

→ “ E “ and error code number flash (see chap. 7 – Malfunctions )

If there is a malfunction, the programme-cycle will be interrupted. If the cause of the malfunction cannot be eliminated immediately, the best thing to do will be to end the



programme by pushing the - key, to turn out the installation and to inform the service from CTS.

When the programmer is able to eliminate the cause of the error himself:



- key

→ The error is now acknowledged and the installation restarts.

### Remarks:

- **A warning (display “ LE “) has not to be acknowledged. The installation restarts automatically, when the warning is no longer actual.**
- **If there are more errors, the error code number from the last one will be displayed. ( x- errors → display “ x E “)**
- **If there are more errors, every single one of them will have to be acknowledged.**

### 6.2.3.3 Interrogate the number of the running programme

If necessary, the number of the programme running can be interrogated.



- key

- the current programme number is displayed "P xx"
- in humidity display the remaining run time of the current line is shown. "time base xx"
- in the 2<sup>nd</sup> step, the current quantity of executed loops is shown.
- temperature display: passes of the main loop "LC xx".
- humidity display: passes of present loop (only for interlaced loops) "xx"

**Remark :**



- **In case of misoperation, stop the programme with the  -key and repeat the operation with the desired programme number.**

### **6.3 Software – temperature limiter**

The temperature limiter software allows to limit the range of temperature of the installation. If the effective temperature value is not within this range, the temperature control trips and the control unit indicates an error.

After the beginning of a new climatic test in the constant mode, the range of temperature is taken over from the last testing in this mode. Therefore, the range will have to be reset before using the installation, if the specimen needs another temperature limit.

Method:

Press following keys one after the other:

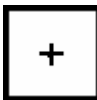


- key



- key

→ opens the mode  
“temperature limiter “



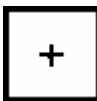
or



key of

temperature display

→ temperature limiter max.



or



key of

humidity display

→ temperature limiter min.



- key

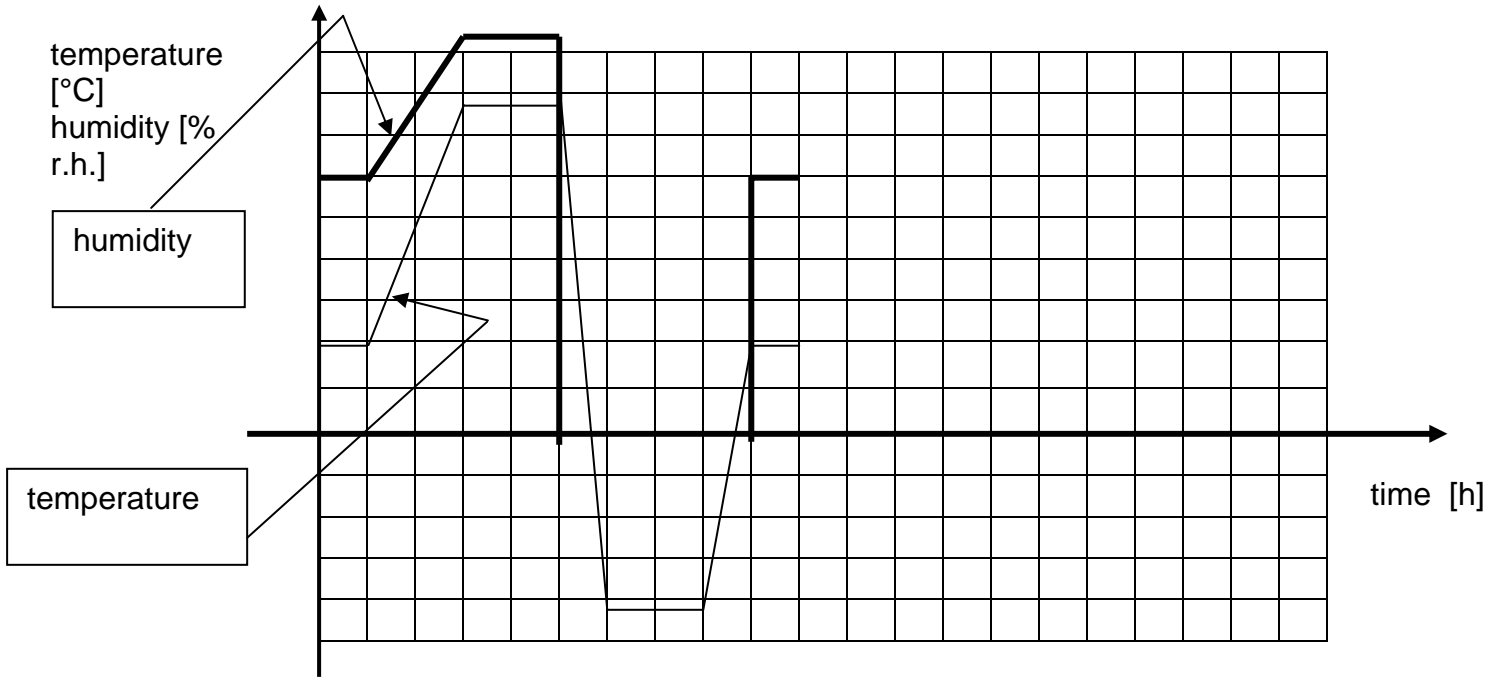
→ save

## Remarks:

- **If the temperature limits are modified during an testing in programme mode, these limits are only valid until the actually running programme-cycle is finished. Afterwards, the old temperature limits are valid.**
- **It is impossible to store temperature limits with a created programme. If a programme needs another temperature range than the actual, someone will have to set them onto the right limits before starting the programme. This is not necessary, when the CID – Software from CTS is used. The CID allows to store temperature limits together with a programme. So the manual change be dropped in this case.**

## 6.4 Programming example with a loop and wait-function

programme name: Programming example



Function key	Description	Function key	Description
1	Not used	3	Not used
2	Not used	4	Not used

Head of programme:

Programme number	Time base
12	h

Programme body:

line	Ind.value Temp.	Ind.value humidity	Fct. 1	Fct. 2	Fct. 3	Fct. 4	Run time	loop start	loop end	wait Fct.	Remarks
0	20	60	-	-	-	-	0	-	-	-	
1	20	60	-	-	-	-	1	-	-	-	
2	20	60	-	-	-	-	0	X	-	-	<b>3 runs</b>
3	80	95	-	-	-	-	2	-	-	-	
4	80	95	-	-	-	-	2	-	-	-	
5	80	0	-	-	-	-	0	-	-	-	Humidity off
6	-40	0	-	-	-	-	1	-	-	-	
7	-40	0	-	-	-	-	0	-	-	X	
8	-40	0	-	-	-	-	2	-	-	-	
9	20	0	-	-	-	-	1	-	-	-	
10	20	60	-	-	-	-	0	-	-	-	Humidity on
11	20	60	-	-	-	-	0	-	X	-	
12	20	60	-	-	-	-	1	-	-	-	

**Remarks:**

- Time base can be chosen as hours, because in this example, there are only programme steps with full hours.
- You should always program a definite start value with run time  $t = 0$ , here in the example  $20\text{ °C} / 60\% \text{ r.h.}$  with run time  $t = 0$  hours. This is to insure, that the automatic control does not take over the end value from the last testing with the installation.
- We suggest to write the programmes with the CID – Software, because the programming with CID is more easy.

**Programming:**

The programme shall be stored under programme number 12.

If there is already a programme saved with number 12, the amount of programme lines will be shown, i.e. " PL 13 ". In this case, the programme should be canceled (chap. 6.2.2.7). Now the amount of programme lines is shown " PL 0 " like in head2 below.

The installation has not to be turned off to edit a programme.

Line Nr.	display op. unit	key operation unit	Remarks				
Standard display Temp. Humidity	<table border="1" style="width: 100%;"><tr><td style="text-align: right;">xyz</td></tr><tr><td style="text-align: right;">xyz</td></tr></table>	xyz	xyz	<table border="1" style="width: 40px; height: 40px; margin: auto;"><tr><td style="text-align: center; vertical-align: middle;">E</td></tr></table>	E	Opens the editor.	
xyz							
xyz							
E							
Head1	<table border="1" style="width: 100%;"><tr><td style="text-align: right;">0</td></tr><tr><td style="text-align: right;"> </td></tr></table>	0		°C <table border="1" style="display: inline-table; width: 40px; height: 40px; vertical-align: middle;"><tr><td style="text-align: center;">+</td></tr></table> <table border="1" style="display: inline-table; width: 40px; height: 40px; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	+	-	Selection of programme number
0							
+							
-							
Head2	<table border="1" style="width: 100%;"><tr><td style="text-align: right;">12</td></tr><tr><td>PL <span style="float: right;">0</span></td></tr></table>	12	PL <span style="float: right;">0</span>	<table border="1" style="width: 40px; height: 40px; margin: auto;"><tr><td style="text-align: center; vertical-align: middle;">S</td></tr></table>	S	Closes selection of number	
12							
PL <span style="float: right;">0</span>							
S							
Head3	<table border="1" style="width: 100%;"><tr><td style="text-align: right;">12</td></tr><tr><td style="text-align: right;">,</td></tr></table>	12	,	<table border="1" style="width: 40px; height: 40px; margin: auto;"><tr><td style="text-align: center; vertical-align: middle;">2</td></tr></table>	2	Select time base hours	
12							
,							
2							
Head4	<table border="1" style="width: 100%;"><tr><td style="text-align: right;">12</td></tr><tr><td style="text-align: right;">h</td></tr></table>	12	h	<table border="1" style="width: 40px; height: 40px; margin: auto;"><tr><td style="text-align: center; vertical-align: middle;">S</td></tr></table>	S	Stores head of programme	
12							
h							
S							
0.1	<table border="1" style="width: 100%;"><tr><td>P <span style="float: right;">0.0</span></td></tr><tr><td style="text-align: center;">- - - -</td></tr></table>	P <span style="float: right;">0.0</span>	- - - -	°C <table border="1" style="display: inline-table; width: 40px; height: 40px; vertical-align: middle;"><tr><td style="text-align: center;">+</td></tr></table> <table border="1" style="display: inline-table; width: 40px; height: 40px; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	+	-	Set start value $T = +20\text{ °C}$
P <span style="float: right;">0.0</span>							
- - - -							
+							
-							



0.2	<table border="1"><tr><td>P</td><td>20.0</td></tr><tr><td>-</td><td>- - - -</td></tr></table>	P	20.0	-	- - - -	%H <table border="1"><tr><td>+</td><td>-</td></tr></table>	+	-	Set start value 60 % r.h.
P	20.0								
-	- - - -								
+	-								
0.3	<table border="1"><tr><td>P</td><td>20.0</td></tr><tr><td></td><td>60.0</td></tr></table>	P	20.0		60.0	<table border="1"><tr><td>S</td></tr></table>	S	Takes over index value of temperature / humidity	
P	20.0								
	60.0								
S									
0.4	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>0</td></tr></table>		0h	L	0	<table border="1"><tr><td>S</td></tr></table>	S	Sets run time of line 0 to 0 hours (defined value for line 0) end of line 0	
	0h								
L	0								
S									
1.1	<table border="1"><tr><td>P</td><td>20.0</td></tr><tr><td></td><td>60.0</td></tr></table>	P	20.0		60.0	<table border="1"><tr><td>S</td></tr></table>	S	Takes over the same values like in line 0.	
P	20.0								
	60.0								
S									
1.2	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>1</td></tr></table>		0h	L	1	°C <table border="1"><tr><td>+</td><td>-</td></tr></table>	+	-	Run time of line 1.
	0h								
L	1								
+	-								
1.3	<table border="1"><tr><td></td><td>1h</td></tr><tr><td>L</td><td>1</td></tr></table>		1h	L	1	<table border="1"><tr><td>S</td></tr></table>	S	Hold 1 hour +20°C / 60% r.h. Takes over run time of line 1.	
	1h								
L	1								
S									
2.1	<table border="1"><tr><td>P</td><td>20.0</td></tr><tr><td></td><td>60.0</td></tr></table>	P	20.0		60.0	<table border="1"><tr><td>S</td></tr></table>	S	Beginning of line 2 (passive programme line)	
P	20.0								
	60.0								
S									
2.2	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>2</td></tr></table>		0h	L	2	%H <table border="1"><tr><td>+</td></tr></table>	+	Sets beginning of the loop	
	0h								
L	2								
+									
2.3	<table border="1"><tr><td>SA</td><td>1</td></tr><tr><td>L</td><td>2</td></tr></table>	SA	1	L	2	%H <table border="1"><tr><td>+</td><td>-</td></tr></table>	+	-	Set number of passing through the loop (3x)
SA	1								
L	2								
+	-								
2.4	<table border="1"><tr><td>SA</td><td>3</td></tr><tr><td>L</td><td>2</td></tr></table>	SA	3	L	2	<table border="1"><tr><td>S</td></tr></table>	S	Takes over the number of loops End of the passive programme line	
SA	3								
L	2								
S									
3.1	<table border="1"><tr><td>P</td><td>20.0</td></tr><tr><td></td><td>60.0</td></tr></table>	P	20.0		60.0	°C <table border="1"><tr><td>+</td><td>-</td></tr></table>	+	-	Input new temperature index value +80 °C
P	20.0								
	60.0								
+	-								
3.2	<table border="1"><tr><td>P</td><td>80.0</td></tr><tr><td></td><td>60.0</td></tr></table>	P	80.0		60.0	%H <table border="1"><tr><td>+</td><td>-</td></tr></table>	+	-	Input new humidity index value 95 % r.h.
P	80.0								
	60.0								
+	-								

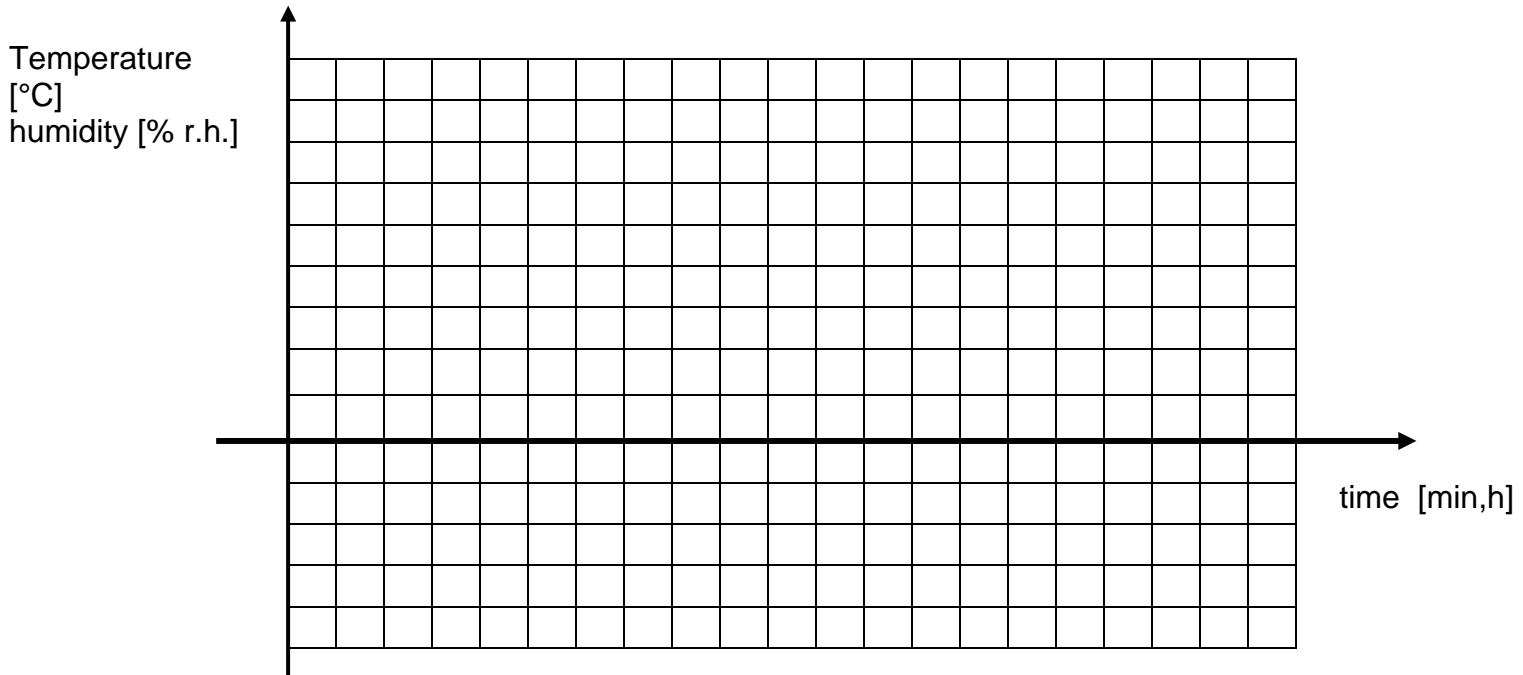
3.3	<table border="1"><tr><td>P</td><td>80.0</td></tr><tr><td></td><td>95.0</td></tr></table>	P	80.0		95.0	<table border="1"><tr><td>S</td></tr></table>	S	Takes over pair of temperature / humidity	
P	80.0								
	95.0								
S									
3.4	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>3</td></tr></table>		0h	L	3	°C <table border="1"><tr><td>+</td></tr></table> <table border="1"><tr><td>-</td></tr></table>	+	-	Set run time of line 3.
	0h								
L	3								
+									
-									
3.5	<table border="1"><tr><td></td><td>2h</td></tr><tr><td>L</td><td>3</td></tr></table>		2h	L	3	<table border="1"><tr><td>S</td></tr></table>	S	Reach in 2 hours +80 °C / 95 % r.h. Take over run time of line 3. End of line 3.	
	2h								
L	3								
S									
4.1	<table border="1"><tr><td>P</td><td>80.0</td></tr><tr><td></td><td>95.0</td></tr></table>	P	80.0		95.0	<table border="1"><tr><td>S</td></tr></table>	S	Take over pair of temperature / humidity	
P	80.0								
	95.0								
S									
4.2	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>4</td></tr></table>		0h	L	4	°C <table border="1"><tr><td>+</td></tr></table> <table border="1"><tr><td>-</td></tr></table>	+	-	Set run time of line 4.
	0h								
L	4								
+									
-									
4.3	<table border="1"><tr><td></td><td>2h</td></tr><tr><td>L</td><td>4</td></tr></table>		2h	L	4	<table border="1"><tr><td>S</td></tr></table>	S	Rest 2 hours on +80 °C / 95 % r.h. Take over run time of line 4. End of line 4.	
	2h								
L	4								
S									
5.1	<table border="1"><tr><td>P</td><td>80.0</td></tr><tr><td></td><td>95.0</td></tr></table>	P	80.0		95.0	%H <table border="1"><tr><td>-</td></tr></table>	-	Switch off humidity (push key until “- - - -“ is displayed )	
P	80.0								
	95.0								
-									
5.2	<table border="1"><tr><td>P</td><td>80.0</td></tr><tr><td></td><td>- - - -</td></tr></table>	P	80.0		- - - -	<table border="1"><tr><td>S</td></tr></table>	S	Take over pair of temperature / humidity	
P	80.0								
	- - - -								
S									
5.3	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>5</td></tr></table>		0h	L	5	<table border="1"><tr><td>S</td></tr></table>	S	Run time of this line = 0 hours. Take over run time of line 5. End of line 5.	
	0h								
L	5								
S									
6.1	<table border="1"><tr><td>P</td><td>80.0</td></tr><tr><td></td><td>- - - -</td></tr></table>	P	80.0		- - - -	°C <table border="1"><tr><td>+</td></tr></table> <table border="1"><tr><td>-</td></tr></table>	+	-	Input the new temperature index value -40 °C
P	80.0								
	- - - -								
+									
-									
6.2	<table border="1"><tr><td>P</td><td>- 40.0</td></tr><tr><td></td><td>- - - -</td></tr></table>	P	- 40.0		- - - -	<table border="1"><tr><td>S</td></tr></table>	S	Take over the index value.	
P	- 40.0								
	- - - -								
S									
6.3	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>6</td></tr></table>		0h	L	6	°C <table border="1"><tr><td>+</td></tr></table> <table border="1"><tr><td>-</td></tr></table>	+	-	Set run time of line 6.
	0h								
L	6								
+									
-									

6.4	<table border="1"><tr><td></td><td>1h</td></tr><tr><td>L</td><td>6</td></tr></table>		1h	L	6	<table border="1"><tr><td>S</td></tr></table>	S	Reach in 1 hour -40 °C Take over run time of line 6. End of line 6.	
	1h								
L	6								
S									
7.1	<table border="1"><tr><td>P</td><td>- 40.0</td></tr><tr><td>-</td><td>- - - -</td></tr></table>	P	- 40.0	-	- - - -	<table border="1"><tr><td>S</td></tr></table>	S	Start of the passive programme line (Wait-function)	
P	- 40.0								
-	- - - -								
S									
7.2	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>7</td></tr></table>		0h	L	7	<table border="1"><tr><td>1</td></tr></table>	1	Sets wait-function for temperature	
	0h								
L	7								
1									
7.3	<table border="1"><tr><td>Hold</td><td>0</td></tr><tr><td>lo</td><td>0.0</td></tr></table>	Hold	0	lo	0.0	%H <table border="1"><tr><td>+</td></tr></table> <table border="1"><tr><td>-</td></tr></table>	+	-	Set range of tolerance to $\pm 1$ K.
Hold	0								
lo	0.0								
+									
-									
7.4	<table border="1"><tr><td>Hold</td><td>0</td></tr><tr><td>lo</td><td>1.0</td></tr></table>	Hold	0	lo	1.0	<table border="1"><tr><td>S</td></tr></table>	S	Takes over wait-function. End of line 7.	
Hold	0								
lo	1.0								
S									
8.1	<table border="1"><tr><td>P</td><td>- 40.0</td></tr><tr><td>-</td><td>- - - -</td></tr></table>	P	- 40.0	-	- - - -	<table border="1"><tr><td>S</td></tr></table>	S	Take over pair of temperature / humidity	
P	- 40.0								
-	- - - -								
S									
8.2	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>8</td></tr></table>		0h	L	8	°C <table border="1"><tr><td>+</td></tr></table> <table border="1"><tr><td>-</td></tr></table>	+	-	Set run time of line 8.
	0h								
L	8								
+									
-									
8.3	<table border="1"><tr><td></td><td>2h</td></tr><tr><td>L</td><td>8</td></tr></table>		2h	L	8	<table border="1"><tr><td>S</td></tr></table>	S	Rest 2 hours on -40 °C Take over run time of line 8. End of line 8.	
	2h								
L	8								
S									
9.1	<table border="1"><tr><td>P</td><td>- 40.0</td></tr><tr><td>-</td><td>- - - -</td></tr></table>	P	- 40.0	-	- - - -	°C <table border="1"><tr><td>+</td></tr></table> <table border="1"><tr><td>-</td></tr></table>	+	-	Set new temperature index value +20 °C
P	- 40.0								
-	- - - -								
+									
-									
9.2	<table border="1"><tr><td>P</td><td>20.0</td></tr><tr><td>-</td><td>- - - -</td></tr></table>	P	20.0	-	- - - -	<table border="1"><tr><td>S</td></tr></table>	S	Take over pair of temperature / humidity	
P	20.0								
-	- - - -								
S									
9.3	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>9</td></tr></table>		0h	L	9	°C <table border="1"><tr><td>+</td></tr></table> <table border="1"><tr><td>-</td></tr></table>	+	-	Set run time of line 9.
	0h								
L	9								
+									
-									
9.4	<table border="1"><tr><td></td><td>1h</td></tr><tr><td>L</td><td>9</td></tr></table>		1h	L	9	<table border="1"><tr><td>S</td></tr></table>	S	Reach in 1 hour +20 °C. Take over run time of line 9. End of line 9.	
	1h								
L	9								
S									

10.1	<table border="1"><tr><td>P</td><td>20.0</td></tr><tr><td>-</td><td>- - - -</td></tr></table>	P	20.0	-	- - - -	%H <table border="1"><tr><td>+</td></tr></table> <table border="1"><tr><td>-</td></tr></table>	+	-	Switch on humidity with an index value of 60 % r.h.
P	20.0								
-	- - - -								
+									
-									
10.2	<table border="1"><tr><td>P</td><td>20.0</td></tr><tr><td></td><td>60.0</td></tr></table>	P	20.0		60.0	<table border="1"><tr><td>S</td></tr></table>	S	Take over pair of temperature / humidity	
P	20.0								
	60.0								
S									
10.3	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>10</td></tr></table>		0h	L	10	<table border="1"><tr><td>S</td></tr></table>	S	Run time of this line = 0 Stunden. Take over run time of line 10. End of line 10.	
	0h								
L	10								
S									
11.1	<table border="1"><tr><td>P</td><td>20.0</td></tr><tr><td></td><td>60.0</td></tr></table>	P	20.0		60.0	<table border="1"><tr><td>S</td></tr></table>	S	Start of passive programme line (end of the loop)	
P	20.0								
	60.0								
S									
11.2	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>11</td></tr></table>		0h	L	11	%H <table border="1"><tr><td>+</td></tr></table>	+	Set end of the loop " SE "	
	0h								
L	11								
+									
11.3	<table border="1"><tr><td>SE</td><td></td></tr><tr><td>L</td><td>11</td></tr></table>	SE		L	11	<table border="1"><tr><td>S</td></tr></table>	S	Take over end of the loop End of line 11.	
SE									
L	11								
S									
12.1	<table border="1"><tr><td>P</td><td>20.0</td></tr><tr><td></td><td>60.0</td></tr></table>	P	20.0		60.0	<table border="1"><tr><td>S</td></tr></table>	S	Take over pair of temperature / humidity	
P	20.0								
	60.0								
S									
12.2	<table border="1"><tr><td></td><td>0h</td></tr><tr><td>L</td><td>12</td></tr></table>		0h	L	12	°C <table border="1"><tr><td>+</td></tr></table> <table border="1"><tr><td>-</td></tr></table>	+	-	Set run time of line 12.
	0h								
L	12								
+									
-									
12.3	<table border="1"><tr><td></td><td>1h</td></tr><tr><td>L</td><td>12</td></tr></table>		1h	L	12	<table border="1"><tr><td>S</td></tr></table>	S	Rest 1 hour on +20 °C / 60% r.h. Take over run time of line 12. End of line 12.	
	1h								
L	12								
S									
13.0	<table border="1"><tr><td>P</td><td>20.0</td></tr><tr><td></td><td>60.0</td></tr></table>	P	20.0		60.0	<table border="1"><tr><td>E</td></tr></table>	E	Set end of programme on current programme line.	
P	20.0								
	60.0								
E									
13.1	<table border="1"><tr><td>PE</td><td>12</td></tr><tr><td>PL</td><td>13</td></tr></table>	PE	12	PL	13	<table border="1"><tr><td>P</td></tr></table>	P	Save the programme.	
PE	12								
PL	13								
P									

### 6.4.1 Blank to create a programme with the CTS operation unit

programme name:



Function key	Prescription	Function key	Prescription
1		3	
2		4	

Head of programme:

Programme number	Time base

Programme body:

Line	Ind.valu e Temp.	Ind.valu e humidity	Fct. 1	Fct. 2	Fct. 3	Fct. 4	Run time	loop start	loop end	wait Fct.	Remarks
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											

Line	Ind.valu e Temp.	Ind.valu e humidity	Fct. 1	Fct. 2	Fct. 3	Fct. 4	Run time	loop start	loop end	wait Fct.	Remarks
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
0											
1											
2											
3											
4											
5											

## 6.5 Interface configuration



Press following keys one after the other:

 key

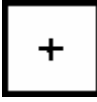

 key

 key

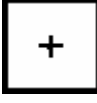

→ opens the mode "Interface driver"

 or  key  
of temperature display

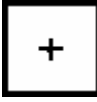

→ 0 = CID display = „cid. 0“

 or  key of  
humidity display



→ = set address

 or  key of  
temperature display



→ 1 = ASCII protocol display „ASC. 1“

 or  key of  
humidity display



→ = set address

 or  key of  
temperature display



→ 2 = printer display „EPS. 2“

 or  key of  
humidity display



→ 0 = 60 mm/h display „60“  
→ 1 = 30 mm/h display „30“  
→ 2 = 6 mm/h display „6“

 or  key of  
temperature display



→ 3 = time display „clo. 3“

 or  key of  
humidity display



→ = set time

 or  key of  
temperature display



→ 4 = date day/month display „ clo. 4“

 or  key of  
humidity display



→ set date

 or  key of  
temperature display


→ 5 = date year display „ clo. 5“

 or  key of  
humidity display

→ set year

 or  key of  
temperature display

→ 6 , 7, ... further configuration, only  
for service purposes.

 key

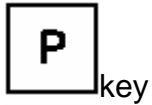
→ save the configuration



## 6.6 Special menus

### 6.6.1 Display of power outage times

Press successively



→ opens the mode "Power outage time".

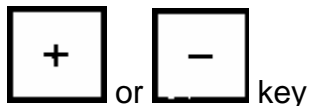
The control unit saves the 10 last power outages with their dates and times.

Temperature display:

→ P.off (Power off n° 1 = last power outage)

Humidity display:

→ Date of the power outage



of the temperature display

→ page up or down to consult the saved power outages. ("-") brings you to the older power outages).



humidity display

→ change between date and time.



→ quit the menu