



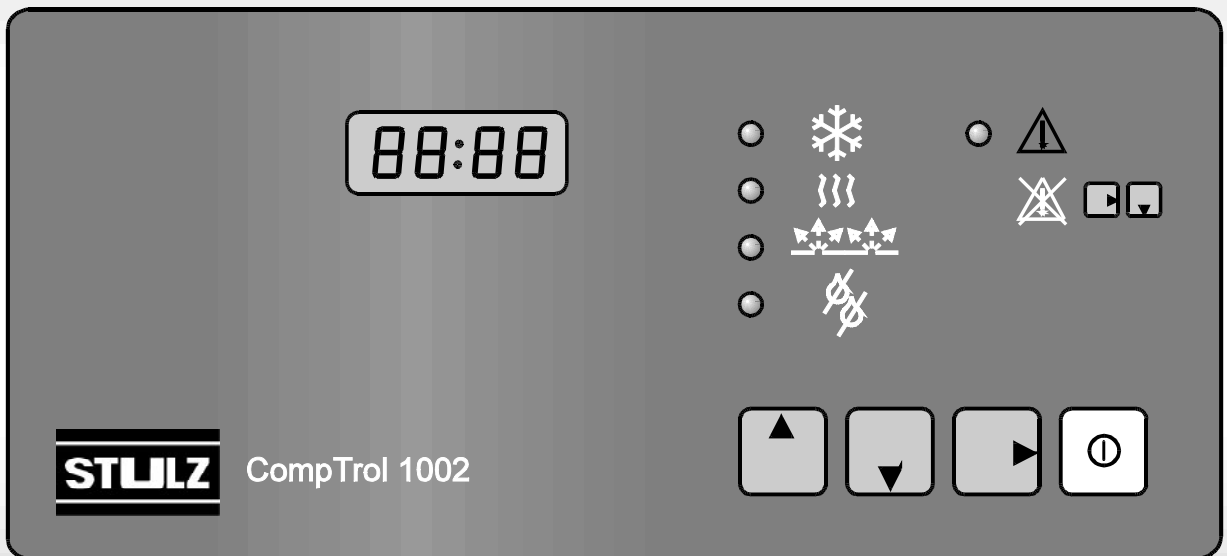
**CompTrol 1002**

**Index 50**

**Issue 3.10**

# AIR CONDITIONING

MICROPROCESSOR



**TECHNICAL MANUAL**



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Subject to technical modifications - precedent manuals are not valid anymore

## 1. Features

STULZ CompTrol 1002 is a complete control system for A/C-Units. The controller is build in a compact microprocessor design and is completely digital. The controlling system is driven by software only.

CompTrol 1002 controls temperature and humidity and supervises the room in respect of freely adjusted limit values.

With the CompTrol 1002 single-module Chilled water (CW) units or units with a 2-stage compressor can be controlled. A 2-unit-sequencing is also included.

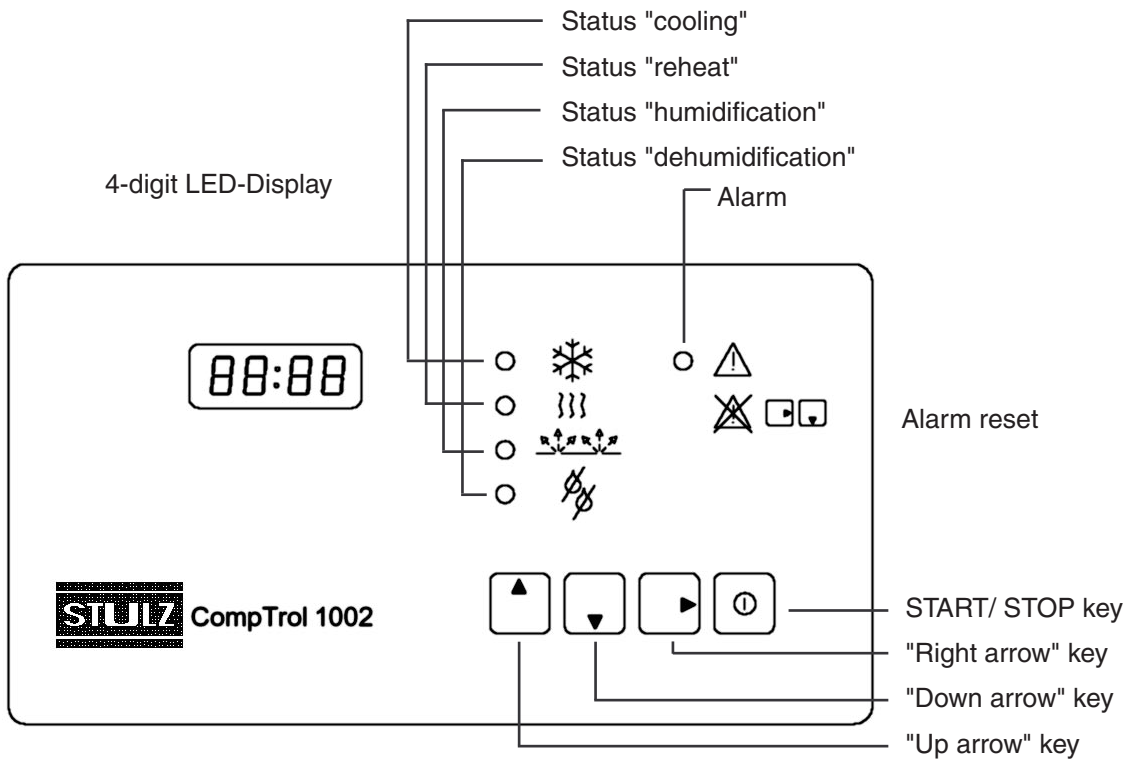
Functions such as cooling, reheat, humidification and dehumidification are continuously controlled and supervised. In case of any deviation from setpoints, the CompTrol 1002, will initiate necessary measures immediately. Parameters for the control system and the functions which have to be controlled can be adjusted by three keys on the CompTrol 1002.

The CompTrol 1002 can be connected to the STULZ Monitoring System.

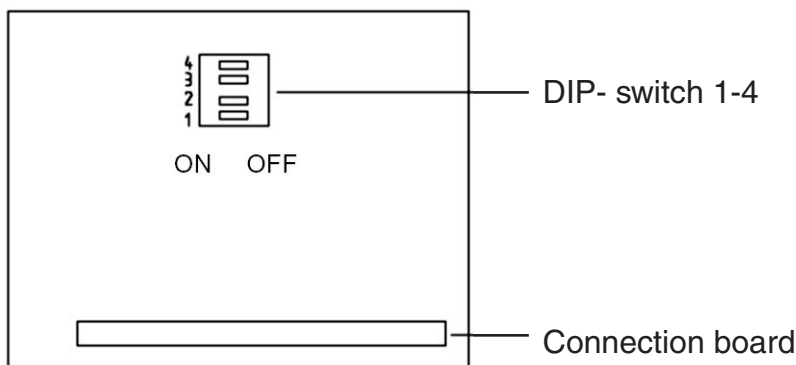
This manual is valid from CompTrol 1002 Software-Version 2.0

## 2. Operation and Status Elements

### Face Plate



### Rear Plate



## 4-Digit LED-Display

In this LED-display all controlling parameters such as setpoints, actual values and limiting values, are shown.

## Status LED

Status LED shows actual operation mode of controller. As a function is switched on, the corresponding Status LED is indicated. On a CW-Unit, Status LED "cooling" indicates when CW-valve has an opening degree bigger than 0%.

Status LED "alarm" indicates when an alarm occurs.

## DIP-Switch 1-4

Adjustments that need not to be changed after initial installation, are made by these DIP- switches. DIP- Switches 1-4 have the following functions:

### DIP-Switch 1

No function

**Modification from Version 2.1:** When the sequencing is active (i.e. menu point 24 > 0), the start of the stand-by unit can be chosen by this switch.

ON: No start by passing over a limit value

OFF: Start of stand-by unit in addition, 3K before the limit value "Temp. too high" is reached.

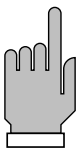
### DIP-Switch 2

The control of the compressor version or the CW version can be chosen by this DIP-switch.

OFF: Control of compressor version is chosen.

ON: Control of CW version is chosen.

Some menu items, alarm inputs and outputs will obtain another meaning. DIP Switch 2 must only be switched when dead.

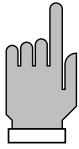


### DIP-Switch 3

Two alarm inputs can be chosen by this DIP- switch.

ON: The inputs "auxiliary alarm 1" and "auxiliary alarm 2" have the function of external alarms.

OFF: The input alarm 2 has the function of a fire and smoke detector.  
The input alarm 1 has the function of a water sensor.



Consequences of alarm inputs "auxiliary alarm 1" and "auxiliary alarm 2" depends on position of DIP-switch 3. DIP-switch 3 can be switched at any time, even during controller operation. The function of this switch is immediately valid without further measures.

#### DIP-Switch 4

Temperatures in °C or °F can be chosen by this DIP-switch.

OFF: All temperatures are shown in °C.

Temperature differences are shown in K.

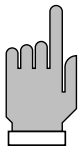
The actual value is marked by a "C".

ON:

All temperatures are shown in °F.

Temperature differences are converted to degree

Rankin. The actual value is marked by an R.



DIP - switch 4 can be switched over any time, even during controller operation. Function of switch is valid without further measures.


### Membrane Keys

#### Start/Stop Key

Operation mode "start" and "stop" are the only functions of this key. If the controller is in enter mode, the key is ineffective.

#### Operation Mode "Stop"

Control system and unit are not in operation. CW-valve closes. Limit values are supervised. Independent failures (like sensor break-down, water sensor alarm, fire alarm, smoke detector and other external alarms) are supervised. Display indicates `OFF_ .`

The horizontal bar in display means that controller has been locally turned off by the  Start/Stop-key.

Occuring alarms and failures can be reset in menu item 1. Inputs and modifications in all menu items can be made.

### **Operation Mode "Start"**

Control system and unit are in operation. Unit functions are turned on when start values match setpoints of corresponding functions. Limit values are supervised. Menu item 1 is shown. Display is alternating between actual value "temperature" and actual value "humidity" in 2- second- intervals.

Occuring alarms and failures can be reset in menue item 1. Inputs and modifications in all menue points can be made.

### **Right Arrow Key**

This key has several functions.

### **Menu Item 1 And Operation Mode "Stop"**

Alarm reset is activated by pressing the key.

### **Menu Items 2 to 24**

The enter mode for these menu items is activated by pressing the key. After pressing this key there is a request for entering in the password.

### **Enter Mode**

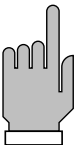
Being in the enter mode, you can confirm the entered parameters and leave the enter mode by pressing this key again. The value shown last is stored in the memory and is used for controlling.

### **Up Arrow Key**

Next menu item can be entered by this key. The shown value is increased in enter mode.

### **Down Arrow Key**

Last menu item can be reached by pressing this key. The shown value is diminished in enter mode.



Pressing one of these two keys longer than one second in enter mode means pressing this key 12 times.

If none of the keys is used within five minutes, the display automatically returns to menu item 1.



### 3. Start-up

Prior to initialization, the software version number is displayed for about 1 s.

Example:

Software version 2.1

When the C1002 is started (operation voltage is supplied) the following symbol appears in the display for one second during initial phase:

In this initial phase all values of the EEPROM memory are loaded into the RAM. Independent of the requirements for a certain function the CW- valve is closed for the time entered in menu item 8. This procedure is necessary to synchronise the control system with the modulating valve.

#### Start- up in Operation Mode "Stop"

If the CompTrol 1002 was in operation mode "Stop" before cutting off the power supply, the controller will be in this operation mode again after the restart. Three possibilities of how the unit has been stopped, exist:

1. Start/Stop-Key: local mode

Display

2. Remote On/Off: remote mode

3. Software On/Off: Monitoring system

If controller is stopped from several locations, the corresponding bars in the fourth character position appear on the display. Restarting is only possible if the controller is locally started by the Start/Stop-key. The Start/Stop-Key has the highest priority.

#### Start-up in Operation Mode "Start" (Autostart)

The CompTrol 1002 is equipped with an "Autostart"- function. This means that the unit starts automatically after a power supply failure when it was in operation mode "Start" before. A restart of several units equipped with the C1002 at the same time can be avoided by entering a time delay in menu point 22.

### Start-up with Standard- Program

If the two keys which represent the password are pressed at the same time as power is turned on, the following reading appears on the display:

A rectangular display showing the characters 'P' and '99' in a simple, blocky font.

At this time the standard program is loaded from program memory EPROM to the EEPROM memory and RAM. During this procedure the control system is not working. By loading the standard program the controller is switched off locally and has to be set in operation mode "start" by pressing the Start/Stop-key.

### Start- up with new EEPROM

If the CompTrol 1002 is started with a new EEPROM, the following symbol appears in the display during the initial phase (about 1 second):

A rectangular display showing the characters 'EEP' in a simple, blocky font.

The standard values of the program memory EPROM are loaded into the EEPROM and into the RAM. During this procedure the control system is not working. During this time the controller is not working. By loading the standard program the controller is switched off locally and has to be set into operation mode "start" by pressing the Start/Stop-key.

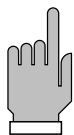
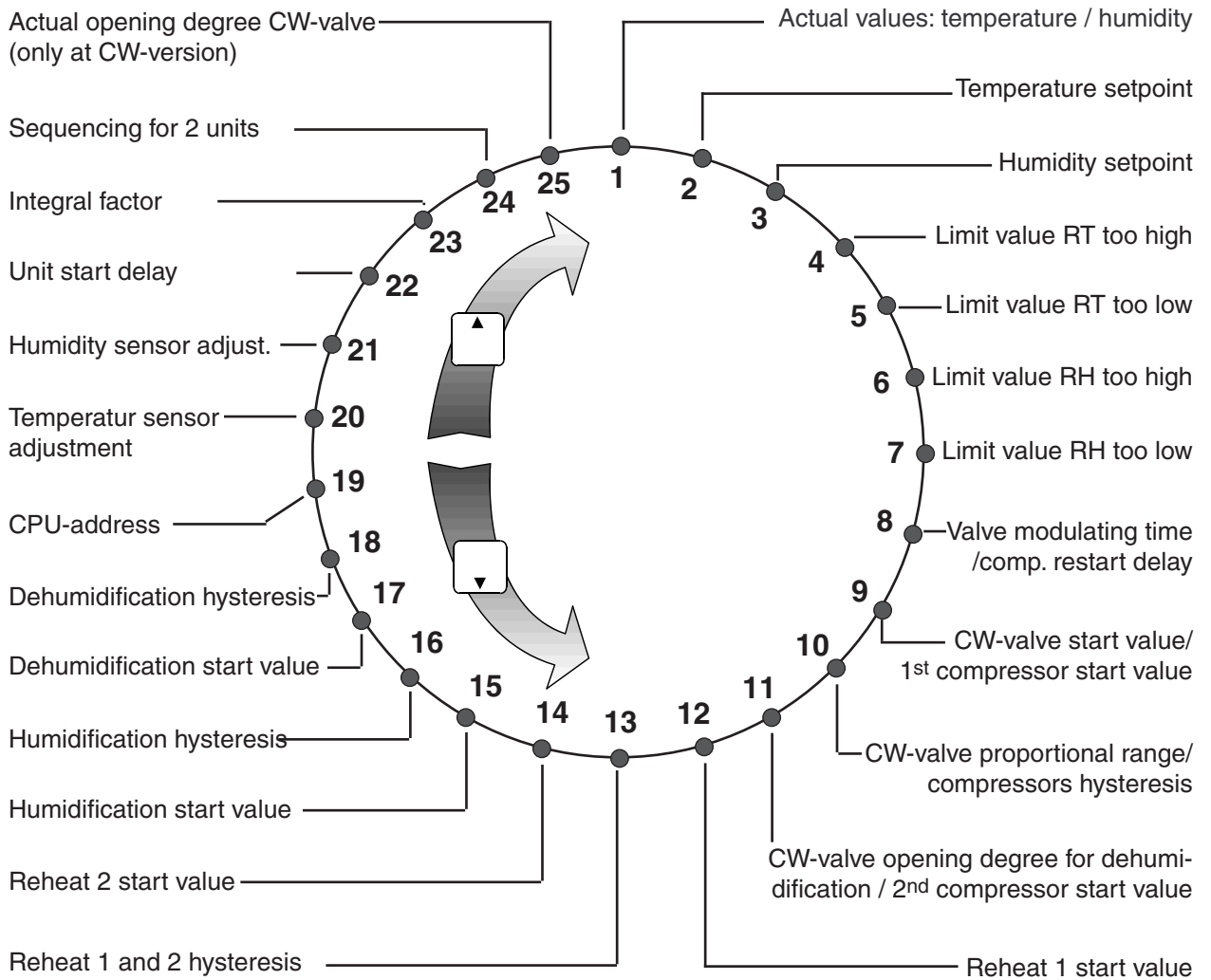
### Warm start

The Controller CompTrol 1002 is equipped with a "watchdog-timer". This "watchdog-timer" increases the operating safety and restarts the program if a runtime error occurs. In such a case the following reading appears in the display:

A rectangular display showing a series of vertical bars of varying heights, resembling a bar code or a diagnostic indicator.

If the C1002 was in operation mode "start", the autostart function is activated in this case.

## 4. Menu













The menu items 8-11 depend on the position of the Dip-switch 2. The menu item 25 only exists, if the Dip-switch 2 is in position "ON".

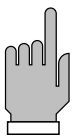
RT : Room temperature  
RH : Room humidity

Menu item	Meaning	Display	Further Functions
1	Actual value "Temperature"	25:30	..1s...  alarm reset
	Actual value "Humidity"	66 H	
2	Setpoint "Temperature"	20:00	
3	Setpoint "Humidity"	50 h	
4	Limit value "Room temperature too high"	35 t <sup>h</sup>	
5	Limit value "Room temperature too low"	00 t <sup>l</sup>	
6	Limit value "Room humidity too high"	80 h <sup>h</sup>	
7	Limit value "Room humidity too low"	00 h <sup>l</sup>	
8a	Valve modulating time (in seconds)	15 0A	
8b	Compressor restart delay	25 5A	
9a	CW-valve start value	00:06	
9b	1. Compressor start value	00:76	
10a	Proportional range of CW-valve	0 1:0c	
10b	Hysteresis of compressors	00:7c	

+ PASSWORD  
 enter mode  
 modification of values by  
 and   
 leaving the enter mode  
 with

Menu item	Meaning	Display	Further Functions
11a	CW-valve opening degree for dehumidification in %	10 0d	<div style="border: 1px solid black; padding: 5px; background-color: #f0f0f0;"> <p> + PASSWORD</p> <p> enter mode</p> <p>modification of values by</p> <p> and </p> <p>leaving the enter mode with </p> </div>
11b	2. Compressor start value	0 1:2d	
12	Reheat 1 start value	00:5E	
13	Reheat 1 + 2 hysteresis	00:3F	
14	Reheat 2 start value	0 1:0H	
15	Humidification start value	05 J	
16	Humidification hysteresis	03 L	
17	Dehumidification start value	05 n	
18	Dehumidification hysteresis	03 o	
19	CPU-address	00 1P	
20	Temperature sensor adjustment	25:3t	
21	Humidity sensor adjustment	66 h	
22	Unit start delay	00 4r	

Menu item	Meaning	Display	Further Functions
23	Integral factor	00 r	<div style="border: 1px solid black; padding: 5px;"> <p> + PASSWORD</p> <p> enter mode</p> <p>modification of values by</p> <p> and </p> <p>leaving the enter mode with </p> </div>
24	Sequencing for 2 units	20 4U	
25	Actual opening degree CW-valve	07 5H	



The menu items 8a-11a and 25 are valid for CW-units.  
 The menu items 8b-11b are valid for units with a compressor.

Item

1

### **Actual Values**

Display is alternating between actual value "temperature" and actual value "humidity" in 2- second- intervals.

Humidity is shown in % r.h. Actual value "humidity" is marked by an H.

Temperatures are shown in °C (marked by C) or °F (marked by F). This can be chosen by DIP- switch 4 at any time.

Resetting an alarm is only possible in this menu item.

2

### **Temperature Setpoint**

"Temperature" setpoint is shown in this item. Unit of temperature is °C or °F.

3

### **Humidity Setpoint**

"Humidity " setpoint is shown in this item.

4

### **High Temperature Limit value**

If the actual value "temperature " is rising up to this point, an alarm "Temperature too high" is released.

5

### **Low Temperature Limit value**

If the actual value "temperature" is going down to this point, an alarm "Temperature too low" is released.

6

### **High Humidity Limit value**

If the actual value "humidity" is rising up to this point, an alarm "Humidity too high" is released.

7

### **Low Humidity Limit value**

If the actual value "humidity" is moving down to this point, an alarm "Humidity too low" is released.

Item

**a. CW-units**

**8 Valve Modulating Time**

Modulating time of CW-valve (operating level 0% up to operating level 100% in seconds) will be entered in this menu point.  
Actuator SQS 82, SQS 81 (L&G): 150 seconds.

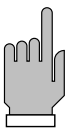
**9 CW valve Start Value**

**10 CW valve Proportional Range**

Start point Cooling and proportional range of CW- valve are entered in these points of menu. Refer to control scheme.

**11 Opening degree for dehumidification**

Opening degree of CW-valve required for dehumidification can be entered in this item.



Maximum opening degree for dehumidification can be passed over when the CW-valve's opening degree for cooling is increased.

**b. Units with Compressor**

**Compressor Restart Delay**

In this item the restart delay in seconds is entered. After a compressor shut down, it can only be restarted when the time set has elapsed.

**1. Compressor Start Value**

**Hysteresis of Compressors**

**2. Compressor Start Value**

The parameters of the compressors' start and hysteresis can be entered in these menu items (9b-11b).

Menu item 11b is only relevant, if a second compressor exists.

If the proportional range or hysteresis is set to actual value "0" the corresponding function is not required, the status- LED is not activated and the corresponding failures are not evaluated.



Item

12 **Reheat 1 Start Value**13 **Reheat 1 + 2 Hysteresis**14 **Reheat 2 Start Value**

Parameters of reheat's stages 1+2 can be entered in these items  
The hysteresis is valid for both stages.

15 **Humidification Start Value**16 **Humidification Hysteresis**

Parameters of 2-point-humidification can be entered in these items.

17 **Dehumidification Start Value****CW-units:**

For dehumidification CW-valve opens to the indicated opening degree entered in item 11a.

**Units with compressor:**

The dehumidification circuit and the compressor will be started.

The "dehumidification" function is stopped when temperature is less than 0.5 K (0.9R) above the low temperature limit value. It is enabled with a hysteresis of 0.5 K (0.9R).

**Modification from version 2.1:**

3K (5R) underneath the temperature setpoint the dehumidification is stopped. This way a fall of the room temperature by keeping the humidity setpoint is avoided.

**Hysteresis Dehumidification**

18 Parameters for dehumidification are entered in this item.



If the hysteresis of humidification and dehumidification is set to zero, the limit value "humidity" is not supervised.

**The values of the items 9a+b, 11b, 12, 14, 15, 17 are entered as a difference to the setpoint.**

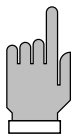
## Item

**19 CPU- Address**

CPU- Address can be entered in this item. If CompTrol 1002 is connected to a STULZ Monitoring System, an address between 1 and 32 for every connected controller has to be adjusted.

**20 Temperature Sensor Adjustment**

Temperature sensor adjustment can be done in this item. The actual value is indicated and can be adjusted to another value, that is measured by use of an independent temperature sensor.

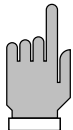


Display is in reference to position of DIP- switch 4 degrees Celsius or Fahrenheit.

By loading the basic program of the controller, sensor adjustment is reset to zero.

**21 Humidity Sensor Adjustment**

Humidity sensor adjustment can be done in this item. The actual value taken from a reference measurement has to be entered.



By loading the basic program of the controller, sensor adjustment is reset to zero.

**22 Unit Start Delay**

Unit start delay can be entered in this item. This is the time, the unit start is delayed in addition to the initialization time, when the unit is turned on in start mode (Autostart)

The start delay can be entered in 4-second intervals.

Item

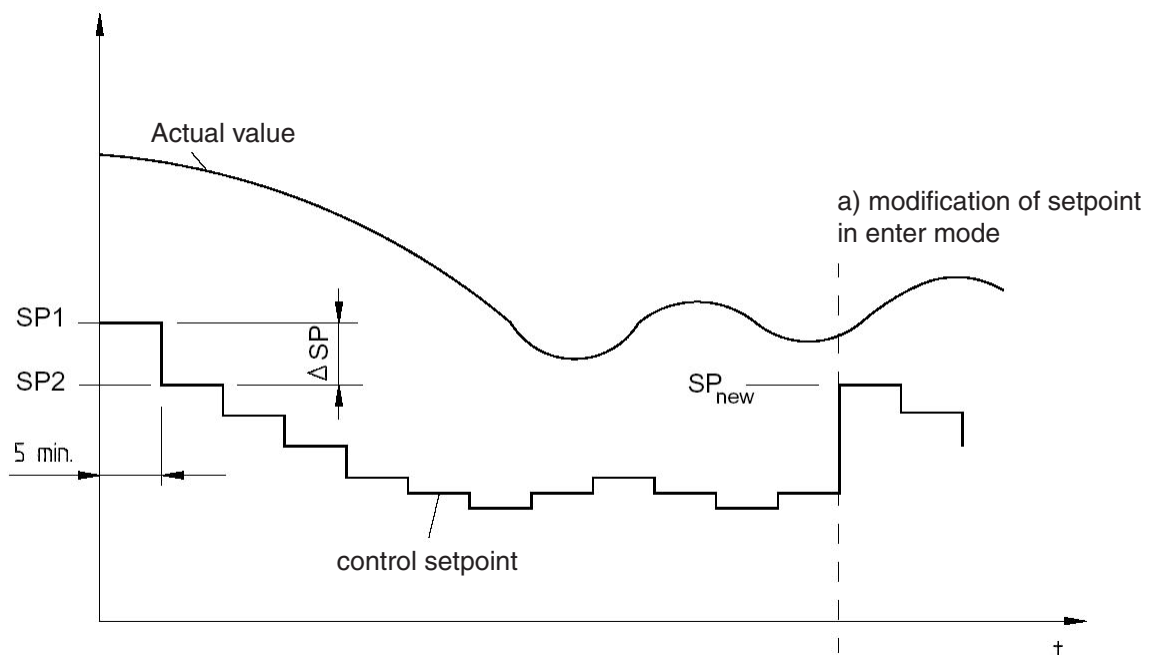
### 23 Integral Factor for Setpoint "Temperature"

In this point of the menu, the I-proportion of the PI controller can be preset. If a **non-zero** value is entered, the control discrepancy, which is characteristic for P-controllers, is avoided. The setpoint  $SP_1$  entered becomes "control setpoint". Now, it is no more a constant value but is changed in integral intervals of 5 minutes and indicated in the menu item 2 "temperature setpoint". Alteration of the setpoint is made using the following formula:

$$\Delta SP = (\text{Setpoint} - \text{Actual Value}) \times \text{Integral Factor } \%$$

which results in

$$\text{Control Setpoint } SP_2 = SP_1 + \Delta SP$$

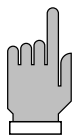


The originally entered setpoint  $SP_1$  appears in the enter mode, which can be changed in this item and which is immediately rendered valid after the alteration has been made (refer to illustration a) ).

The values of the integral factor may be adjusted between 0 and 80%. As a rule, a low value should be used to start with, otherwise the system will start oscillating. 10% are proposed, which can be increased step by step, until the system has been adjusted.

Item

For test purposes or in case the I-proportion is not desired, the integral factor is set to **zero**. A P-controller exists and the control setpoint is equal to the setpoint.



Under the following circumstances, the setpoint is immediately taken over into the control setpoint:

- during initialization phase (switch on voltage)
- turning on (start mode)
- failure "sensor break-down" active
- limit alarms "temperature" active
- modification of setpoint

The range of the control setpoint is limited to setpoint  $\pm 3$  K ( $\pm 5.4$  R).

**24 Sequencing for 2 units**

A 2-unit-sequencing is integrated in the software. The display during input mode and normal mode can vary.

input mode	normal mode	Meaning
0	0	No sequencing function.
1	5-4-3-2-1	Short sequencing 5 min for testing purposes. In normal mode the remaining minutes till sequencing are shown.
2...254	254...1	Sequencing shown in hours. In the input mode a time lap of 2 to 254 hours can be chosen. In normal mode the remaining hours till sequencing are shown.
255	Un2	If "255" is set in the input mode, the unit is set as the "2nd" unit. No adjustments are carried out on this unit. The sequencing time is only set and displayed on the „1st“ unit.

In case of failure (unit 1 or unit 2) the sequencing time is frozen. This state is maintained until a failure reset is carried out. After that, sequencing continues as normal.

## Item

If unit 1 is the StBy-unit (i.e. the unit, which is not in operation at the moment, due to the sequencing), a colon (":") is displayed in item „U“. If unit 2 is the StBy-unit the colon disappears.

3K below the alarm „temperature too high“ the StBy-unit starts in addition. The sequencing time will not be interrupted. At a hysteresis of 3K the unit stops again.

The sequencing uses the standard inputs for remote on/off and water detector/Aux1 and the standard outputs for common alarm and heating 2.

If the input Aux1/water detector and/or the output heating 2 is needed, an extension board is installed, on which one input and output are available for the sequencing. This way the 2nd heating stage and the water detector input are available again on the processor board.

As the sequencing is carried out by using the input for remote on/off, the display of the StBy-unit shows:



**from version 2.1:** If the sequencing is enabled (i.e. menu item 24 > 0), the start of the standby unit can be adjusted by DIP switch 1.

ON: no start at limit value

OFF: Start at 3K before attaining the limit value  
"Temp. too high".

A connection scheme for both units is shown on the pages 32 and 36.

## 25 Actual Opening degree CW Valve

In this item, the actual opening degree of the CW valve is displayed.  
This item exists only at CW-units.

## 5. Alarms and Failures

### General

An alarm or failure is indicated via a short text in the display and status-LEDs.

Conditions that activate the alarm relay are shown in the following table. The delay with which the alarm relay is activated, depends on the failure and is documented in the table.

Texts for alarms and failures are only shown in operation mode "start", in menu item 1 , and in operation mode "stop". All alarms and failures that have occurred up to this time and corresponding operation modes are indicated by showing up every four seconds.

### Warnings

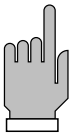
Warnings have no direct influence on the function of the unit, i.e. after a warning has occurred, the unit can be continued in operation for a while. The alarm relay is not activated.

These functions are only supervised in start mode:

- Ultrasonic humidifier (5 $\mu$ S/cm)
- Filter

### Alarms

Actual values are supervised not to reach limit values. After a delay of about 30 seconds the limit alarm is activated. Limit values are supervised even in operation mode "stop".



Alarm "humidity" is only evaluated if dehumidification and humidification hysteresis is not set at "0".

### Failures

Failures on the following functions are **only** supervised in the **operation mode "start"**:

- |                                  |                           |
|----------------------------------|---------------------------|
| - Reheat                         | Compressor 1 low pressure |
| - Humidification (20 $\mu$ S/cm) | Compressor 1 failure      |
| - Airflow                        | Compressor 2 low pressure |
|                                  | Compressor 2 failure      |

Failures on the following functions are **also** supervised in the **operation mode "stop"**.

- Aux 1 / water sensor
- Aux 2 / fire and smoke detector
- Sensor break-down

If the alarm input is supplied with 24V, there is no failure/alarm. If the alarm inputs are not used they have to be supplied with 24V or, if possible, the hysteresis of the function has to be set to „0“. The inputs concerned are:

- Heating 1 and 2
- Air volume 1 and 2
- Water sensor/Aux 1 Alarm
- Fire/Aux 2 Alarm
- High pressure, low pressure failure compressor
- Humidifier alarm / 20  $\mu$ S/cm
- Alarm 5  $\mu$ S/cm
- Filter alarm

### Reset Alarms And Failures

Resetting of alarms and failures can only be done in menu item 1.

### Warning (Alarm Relay Inactive)

Press  key and within 1 s later, press key  . After that, warning is reset and the alarm LED disappears.

### Alarm + Failure (Alarm Relay Active)

Press  key and within 1 s later, press key  . The alarm relay is deactivated.

Press  key and within 1 s later, press key  . All failures indicated are reset and the alarm LED disappears.

In case of a failure reset the components are switched on sequentially (same as after power failure), to prevent an overcharge of the alimentation line by the starting current.

**Table of Alarms and Failures**

		<b>Alarms</b>			
Display	Meaning	Alarm LED	Alarm Relay	Time Delay	Consequences
r t n	Room temperature too high	X	X	about 30 s	-----
r t u	Room temperature too low	X	X	about 30 s	-----
r h n	Room humidity too high	X	X	about 30 s	-----
r h u	Room humidity too low	X	X	about 30 s	-----
		<b>Failures</b>			
HEA	Reheat 1 or 2 failure	X	X	about 3 s	Reheat 1 and 2 are switched off.
HU	Humidifier (20µS/cm) failure	X	X	about 5 min.	Humidifier off.
CO n	Conductivity meter (5µS/cm)	X	-	about 5 min.	-----
FL 01	Airflow 1 failure	X	X	about 20 s	All compon. off,
FL 02	Airflow 2 failure	X	X	about 20 s	Valve is closing, Damper is closing. The alarms "HEA", "HIP" and "LOP" are inhibited.
LOP1	Low pressure compressor 1	X	X	3 min.	Compressor 1 off.
LOP2	Low pressure compressor 2	X	X	3 min.	Compressor 2 off.
HIP1	Compressor 1 failure	X	X	3 s	Compressor 1 off.
HIP2	Compressor 2 failure	X	X	3 s	Compressor 2 off.
FI L	Clogged filter	X	-	about 5 min.	-----
AU 1 ①	Auxiliary alarm 1	X	X	about 3 s	-----
AU 2 ②	Auxiliary alarm 2	X	X	about 3 s	-----
SE T	3°C > T > 50°C Sensor break-down (temp.)	X	X	about 3 s	Reheat, compressor off, valve closed.
SE h	3% > r.h. > 97% Sensor break-down (humidity)	X	X	about 3 s	Humidifier off, dehum. off.
Fire ②	Fire alarm / smoke detector	X	X	about 3 s	All components off, valve is closing.
LL 5 ①	Water alarm	X	X	about 3 s	Humidifier off.
CP U	Controller defective			immediately	All components off. Exchange controller.

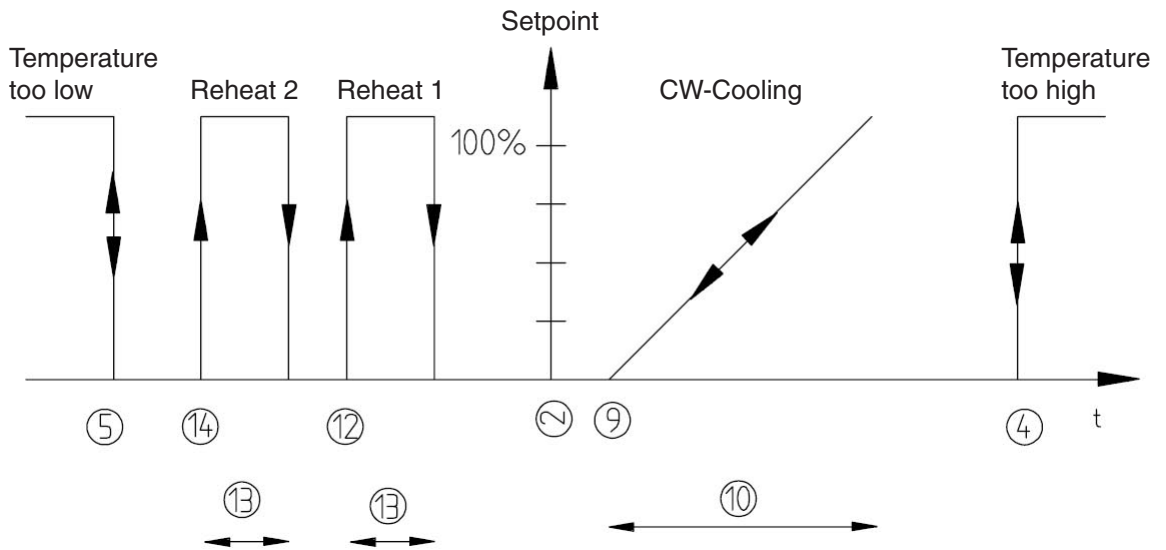
① ② These failures can be alternatively chosen (DIP-switch 3).

③ After compressor start, otherwise 3 s.

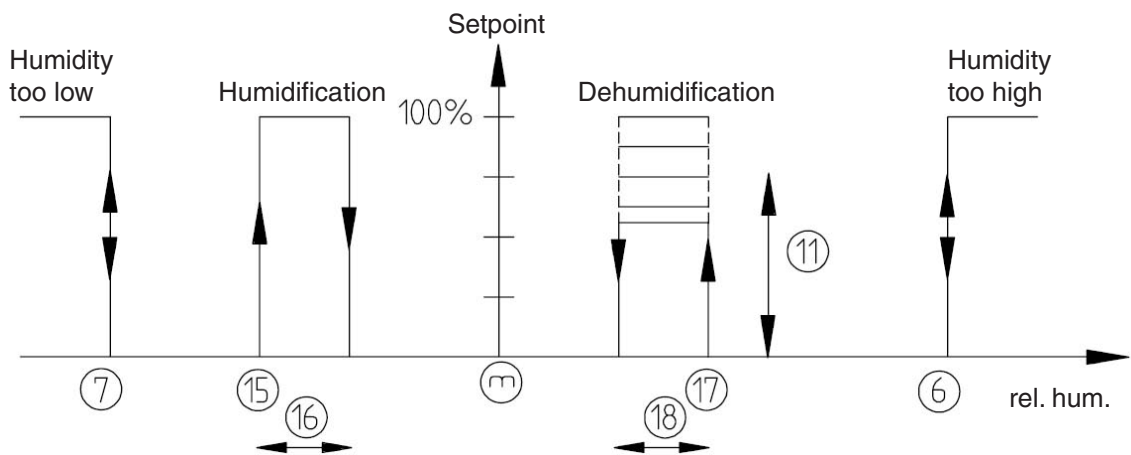


## 6. Control Diagram for CW-Units

### Temperatur Control Diagram



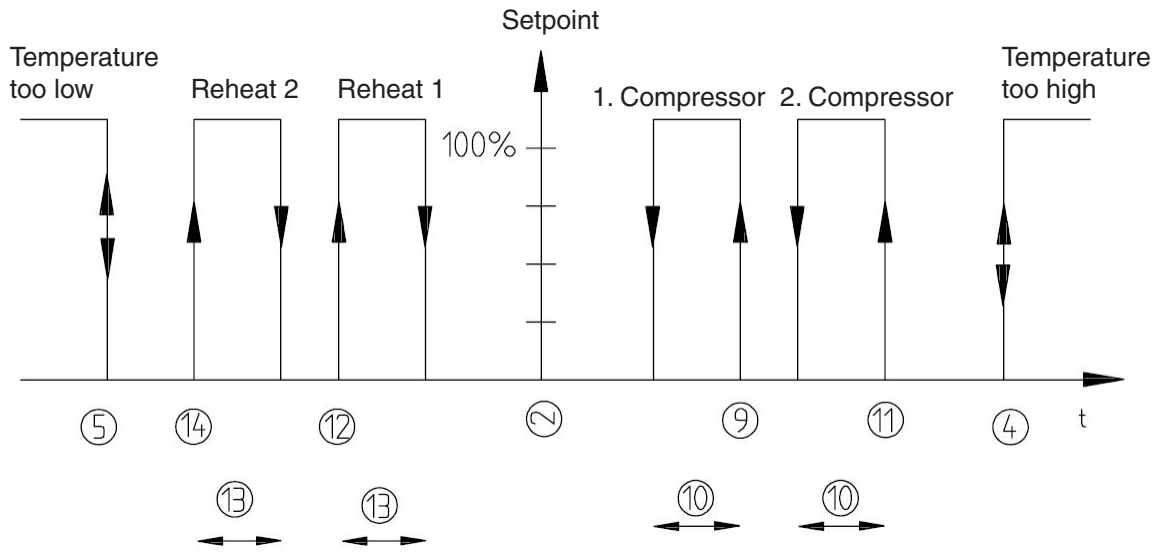
### Humidity Control Diagram



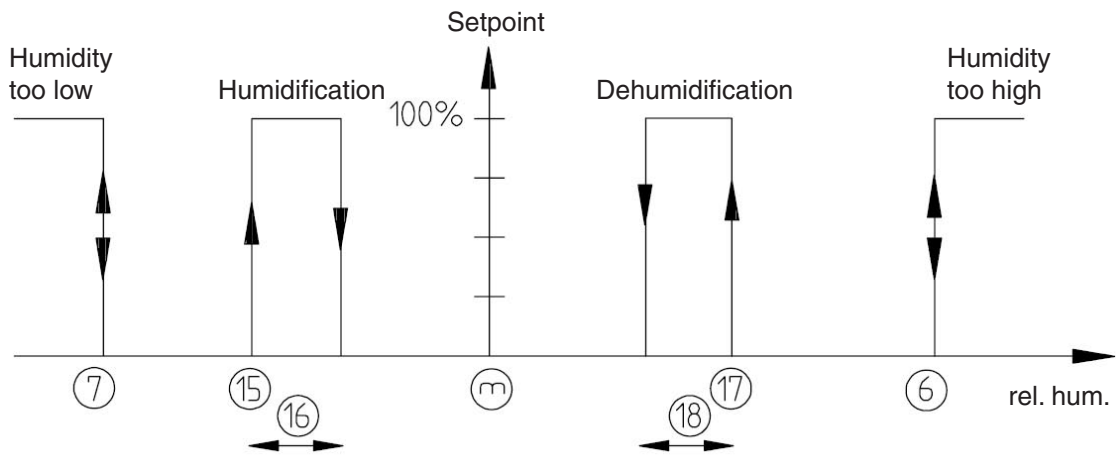
Numbers refer to the menu items.

## Control Diagram for Units with Compressor

### Temperature Control Diagram




### Humidity Control Diagram



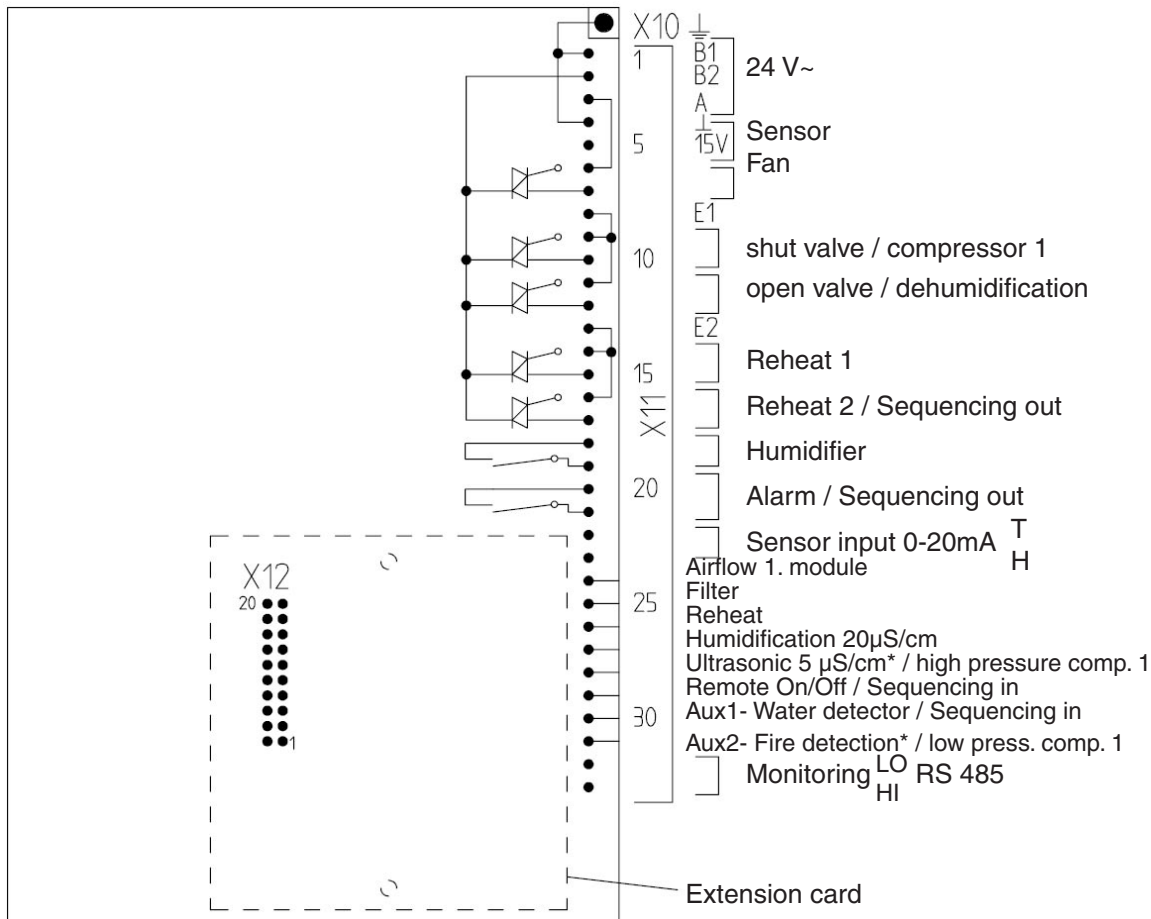
Numbers refer to the menu items.

## 7. Specification CompTrol 1002

### 7.1 Technical Data

Dimensions L x W x H	280 x 195 x 45 mm (11.0" x 7.7" x 1.8")
Power supply	(24 V + 20 % / - 15 %) V AC X10, X11.1 grounded
Power consumption	12 W
Fuse	1 Amp
Power output	15 V DC, 40 mAmp
Sensor input	2 (0..20 mAmp)
Operating resistance "temperature"	330 Ohm
Operating resistance "humidity"	162 Ohm
Display	4-Digit LED-display 4 LED green for status $\phi$ 3 mm (1/8") 1 LED red for alarm $\phi$ 3 mm (1/8")
Service elements	4 keys
Interface for BMS (Building Management System)	RS 485 9600 Baud
Outputs	2 x relays 3 Amp, 24 V, 1 normally open for alarm, humidification 5 x triac 4 Amp, 24 V fan, valve or compressor and dehumidification saver circuit, reheat 1, reheat 2
	 <b>The consumer is connected to 24V.</b>
Inputs	8 x 24 V AC 2.7 kOhm input resistance
Operating temperature	0°C ... 40°C (32°F ... 104°F)
Storage temperature	-10°C ... 60°C (14°F ... 140°F)

## 7.2 Connection Diagram of Processor Board C1002

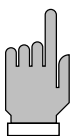


X10: flat-cable plug 6.3 • 0.8  
 X11: connection terminal 33 pins  
 X12: extension plug 20 pins

The **sequencing** uses the standard inputs for Remote on/off and Aux1/water detector and the standard outputs for reheat 2 and the common alarm.

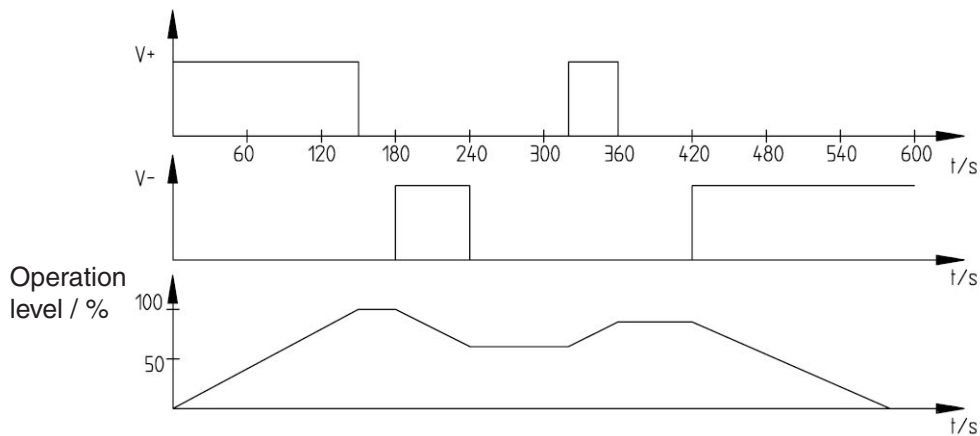
If the input for Aux1/water detector and/or the output for reheat 2 are required, an extension card must be installed, which provides an input/output for the sequencing.

This way the water detector input and the output for the 2nd reheat are provided on the processor board again.



\* If an extension card is installed, the inputs for Ultrasonic 5µS/cm and Aux2/fire are situated on the extension card.

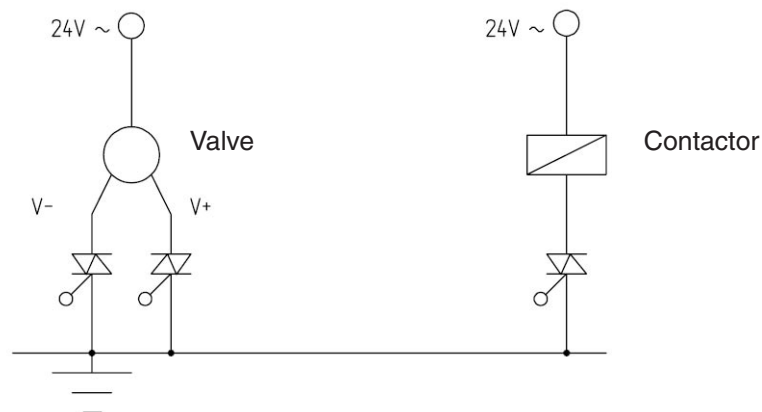
In a CW application, the CompTrol 1002 is usually used for a proportional valve with motor drive. The operation of the control is explained in the following drawing (example for a 150- seconds-runtime).



When connection V+ is supplied with power, the valve is completely opened within 150 seconds (operation level 0% to operation level 100%). Shorter times mean steeper operation level. When connection V- is supplied by power the valve is closing. If there is a power interruption to the valve, the last operation level is fixed.

The consumer is connected to 24V.

Examples:

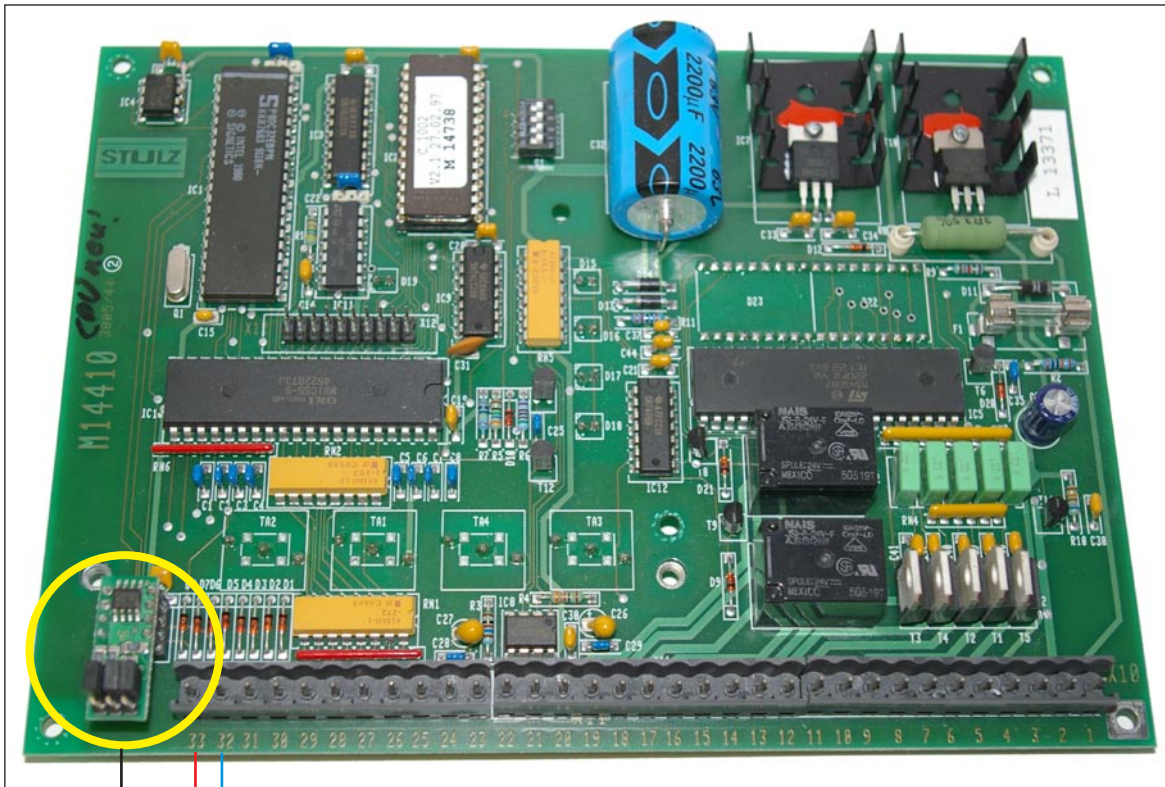


The function of a triac **cannot be checked** by means of an ohmmeter. Measurements provided by these instruments would give faulty results because a triac needs a load for a correct function. For an operational test, a tester with filament lamp (about 2 W) should be used.

Inputs are designed for 24 V AC, but also a voltage 24V DC can be used.

### 7.3 Bus connection

#### C1002 board with driver module



Low, terminal 32 } RS 485, for Stulz bus connection  
High, terminal 33 }

Driver module

The C1002 controller can be integrated in the Stulz bus. The driver module serves to properly adjust the C1002 as a bus participant in dependence of the position within the bus. For a detailed description of the driver module see next page.

## Driver module

The driver module has the following features:

1. a static bus termination (120 Ohm), which can be activated by a jumper.
2. a circuit to set the bias for the bus. By means of two jumpers either a low bias (bus middle) or a high bias (bus end) can be set.
3. protection against electrostatic discharge (ESD) impulses on the data lines

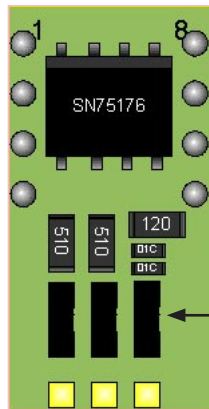
The interference immunity of the bus is increased by the driver module.

As far as the jumper settings are concerned, only the two settings shown below are allowed. The jumpers must be changed blockwise. Other settings result in an unstable bus communication.

### Participant at the end of the RS485 bus

This figure shows the jumper position for the participant at the end of the bus.

The rightmost jumper is located in a position where the termination resistor is activated. The other jumpers are set for a high bias.



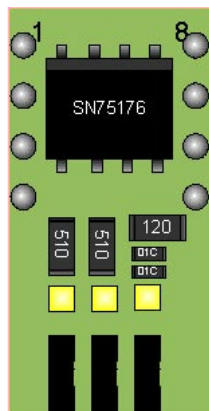
Jumper to activate the termination resistance

Two jumpers to set the bias on the bus.

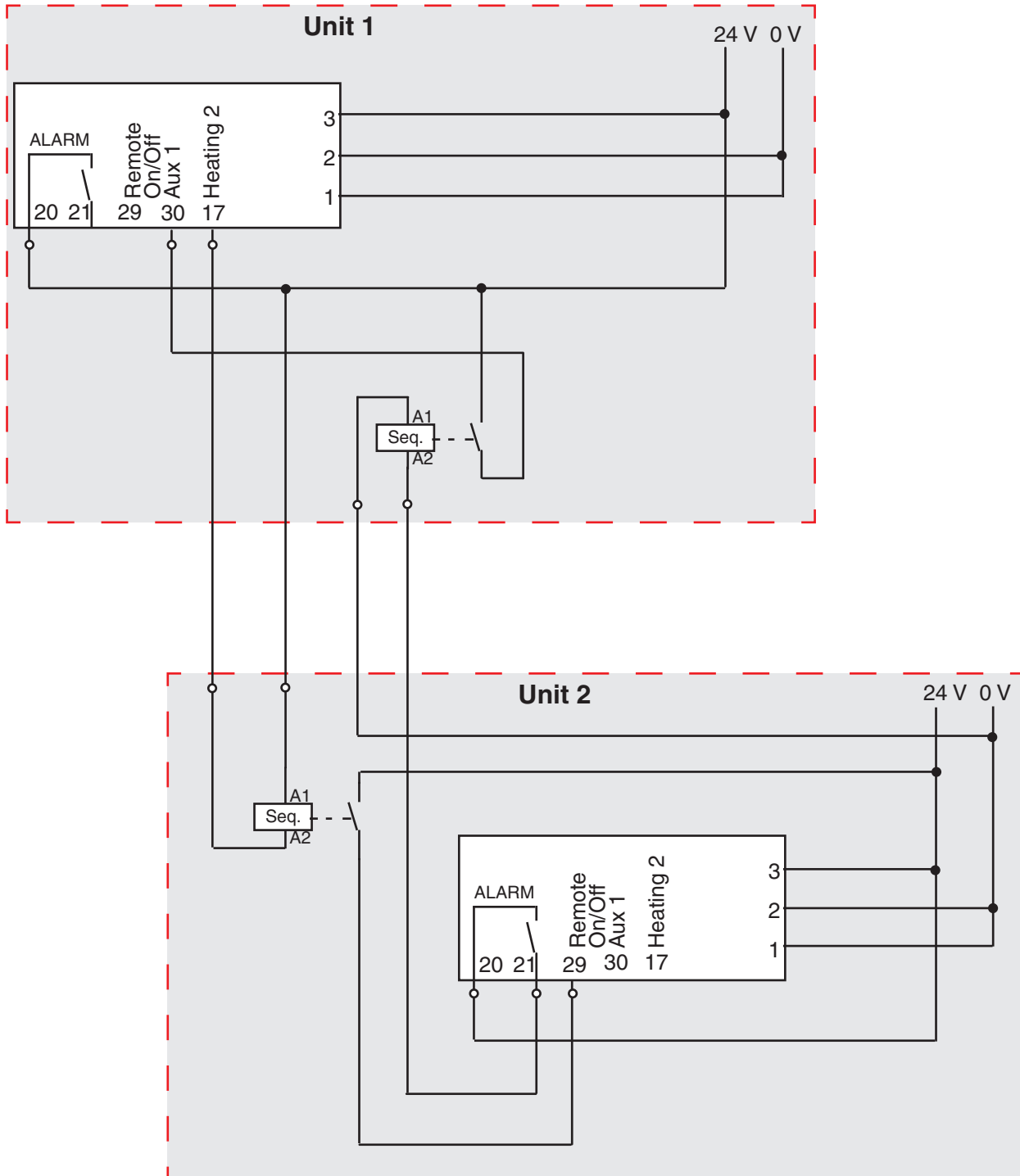
### Participant in the middle of the RS485 bus

This figure shows the jumper position for the participant in the middle of the bus.

The rightmost jumper is located in a position where the termination resistor is deactivated. The other jumpers are set for a low bias.



### 7.4 Connection Diagram for Sequencing at the Processor-Board





## 8. Specifications of the Extension Card 1b

### Characteristics

With the extension card 1b, additional inputs and outputs are provided for the CompTrol 1002. The extension card 1b is fixed on the CompTrol 1002 by means of the two distance pieces enclosed. Electric connection to the basic board is made by a 20 pins plug connector. As soon as the extension card has been connected, the alarms aux 2 / fire and smoke detector and Ultrasonic humidifier 5 $\mu$ S/cm can only be detected on the extension board.

### Operating Elements (DIP Switches 1-6)

<b>DIP-Switch 1</b>	Configuration of a damper
ON:	A damper is configured. Fan start is delayed by approximately 90 s.
OFF:	A damper is not configured. The fan starts immediately.
<b>DIP-Switch 2</b>	Configuration of a second compressor.
ON:	A second compressor is available. The DIP switch on the rear side of the CompTrol 1002 must be set to OFF (Compressor version).
OFF:	A second compressor does not exist.
<b>DIP-Switch 3-6</b>	No function



All DIP switches on the extension card 1b must only be switched when no voltage is applied!

## 8.1 Technical Data Extension Card 1b

Dimensions L x W x H	125 x 70 x 30 mm (4.9" x 2.8" x 1.2")
Power supply	(24 + 20 % / - 15 %) V AC X20.24 grounded
Power consumption	4 W
Fuse	0.4 AT
Operating elements	6-fold DIP switches
Outputs	3 x triac (4 A, 24 V) for damper, compressor 2, sequencing



The consumer is connected to 24 V.

Inputs	8 x 24 V AC 2.7 kOhm input resistance
Operating temperature	0°C ... 40°C (32°F ... 104°F)
Storage temperature	-10°C ... 60°C (14°F ... 140°F)

## Function of Extension Card 1b

### Compressor Sequencing

If two compressors are configured, these are subject to compressor sequencing, according to the "first in - first out" principle, i.e. should both compressors be turned on, the compressor which has been turned on first will be turned off first. Start parameters (menu items 9 and 11) will be changed internally, not visibly, after each compressor start.

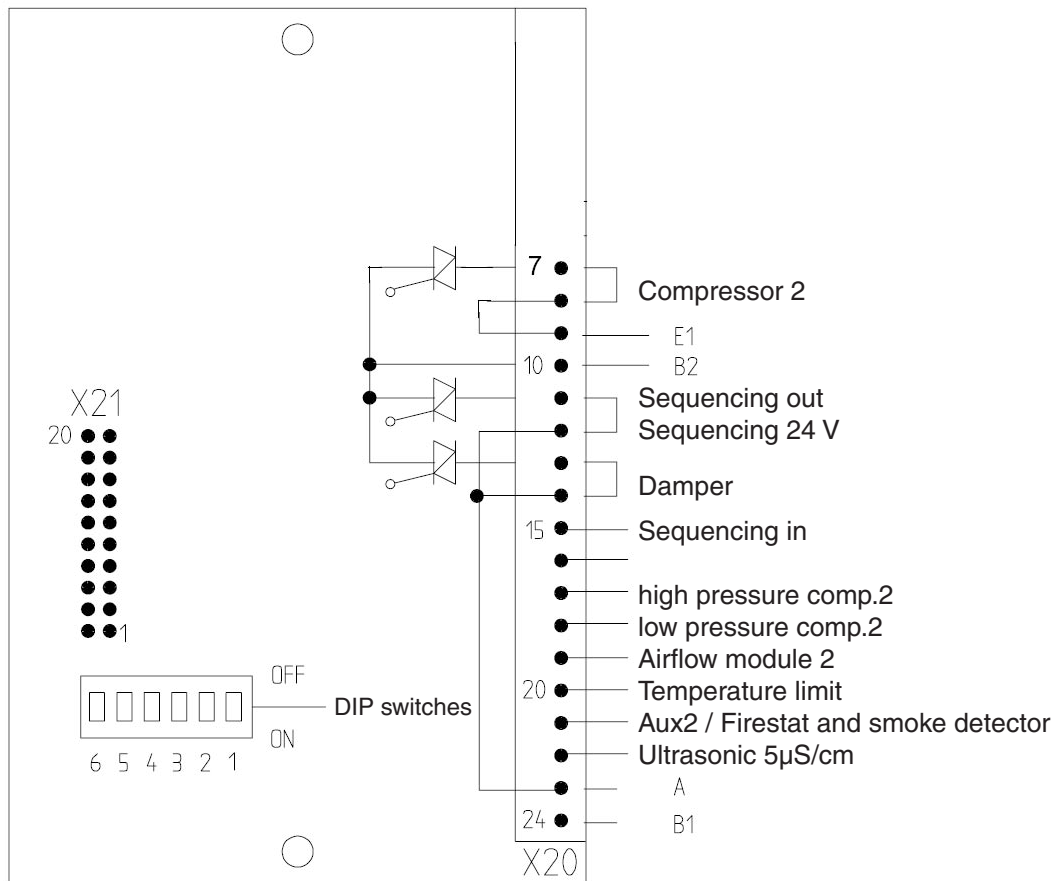
### Temperature Limit

The input "Temperature Limit" exists. As soon as a voltage of 24 V is applied to this input, the cooling is interrupted.

That means for

- CW version: The CW valve closes
- Compressor version: The compressors are switched off.

## 8.2 Connection Diagram of the Extension Card 1b

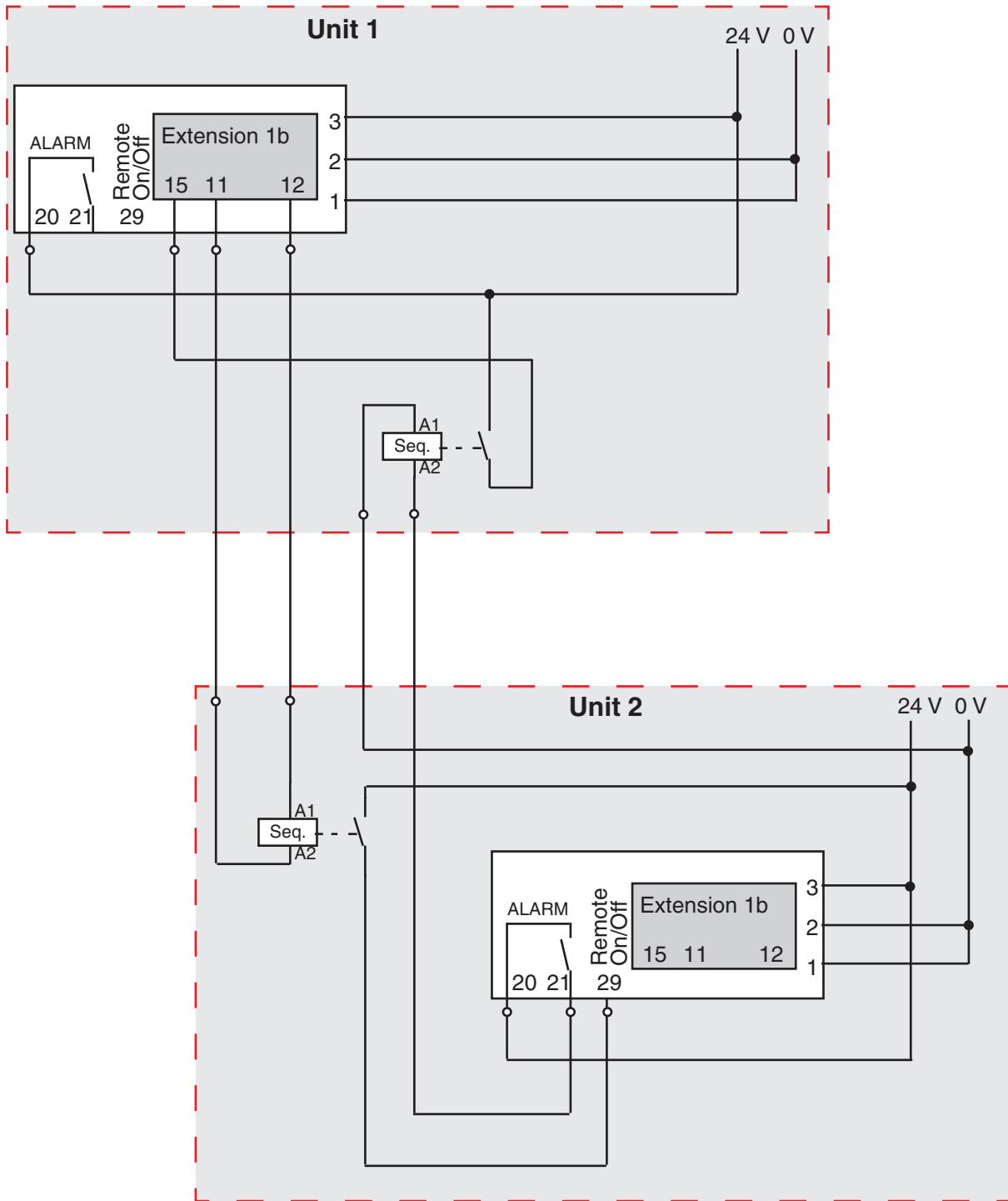


X20: connection terminal 18 pins  
 X21: extension plug 20 pins



The consumer is connected to 24 V.

### 8.3 Connection Diagram for Sequencing with Extension Card



## 9. Appendix



### 9.1 Standard Setting

Menu item	Range	Standard value	Adjusted value
2. Setpoint temperature	10,0...30,0°C	24,0°C	
3. Setpoint humidity	10...90%	45%	
4. Limit value temperature too high	10...50°C	35°C	
5. Limit value temperature too low	0...30°C	0°C	
6. Limit value humidity too high	30...90%	80%	
7. Limit value humidity too low	0...70%	0%	
8a. Valve modulating time	0...255 s	150 s	
8b. Compressor restart delay	0...255 s	255 s	
9a. CW-valve start value	0...9,9 K	0,0 K	
9b. Compressor 1 start value	0...9,9 K	0,7 K	
10a. CW valve proportional range	0...9,9 K	1,0 K	
10b. Hysteresis compressors	0...9,9 K	0,3 K	
11a. Opening degree for dehumidif.	0...100%	100%	
11b. Compressor 2 start value	0...9,9 K	1,2 K	
12. Start value reheat 1	0...9,9 K	0,5 K	
13. Hysteresis reheat 1 + 2	0...9,9 K	0,3 K	
14. Start value reheat 2	0...9,9 K	1,0 K	
15. Start value humidification	0...20%	5%	
16. Hysteresis humidification	0...20%	3%	
17. Start value dehumidification	0...20%	5%	
18. Hysteresis dehumidification	0...20%	3%	
19. CPU-address	1...255	1	
20. Sensor adjustment "temperature"	-12,8...+12,7 K	0	-----
21. Sensor adjustment "humidity"	-24...+24%	0	-----
22. Unit start delay	0...996s	4	
23. Integral factor	0...80%	0%	
24. Sequencing for 2 units	0...255	0	

## 9.2 Password

In menu items 2 to 24 a password is requested in enter mode. The display shows



To enter the password, keys  and  must be pressed within 5 seconds. Now the display flashes and the parameter can be modified.

Should a wrong key be pressed or the time be exceeded, entering of password is aborted.

