S-Klima

User manual

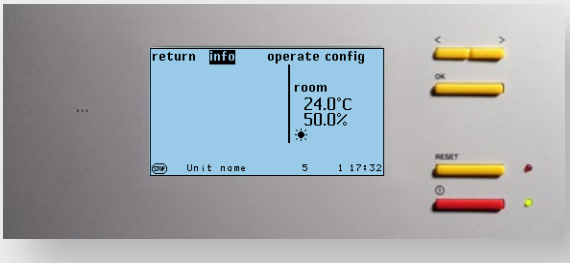
C7000 Controller for EC Tower

for ECD/U 091 (version 05), ECD/U 091, 181, 251 (versions 06, 07),

ECD/U 502 (as of version 02)

Original operating instructions
Read carefully before use!
Keep for later reference!

Version 01-2019 – 1000755 English



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Many thanks for choosing to buy a Stulz product. Stulz has been a purveyor of sophisticated technical solutions for comfort and precision climate control applications since 1947.
In Germany, Stulz is the exclusive sales partner for energy-efficient comfort air-conditioning systems of Mitsubishi Heavy Industries.

Kind regards,
Stulz GmbH

Current updates to technical documentation
You can find the latest documents and brochures at
http://www.s-klima.de/downloads.

Figure 1: QR code for S-Klima downloadcenter

MITSUBISHI Heavy Industries Support-App
Download free of charge and use on-the-go: the app makes things easy!

- Offline error code analysis
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Figure 2: QR code for the support app

Manufacturer's address
Stulz GmbH
S-Klima Division
Holsteiner Chaussee 283
D-22457 Hamburg
Germany

Contents

1. Information on this document

These operating instructions contain detailed information about operating and troubleshooting.
Always keep the operating instructions at the operation site.
Make sure that persons responsible for operating the product and those working on the product have fully read and understood these operating instructions. If you have any queries, please call the Service Center.

1.1 Scope

These operating instructions apply to the following sizes and versions of the EC tower:
- Size 1 comprises the downflow and upflow units ECD/U 91:
  - ECD/U 91 version 05: Production from 01.01.2017 to 03.31.2017 (Electric heater change)
  - ECD/U 91 version 06: Production from 04.01.2017 (Fan impeller change)
  - ECD/U 91 version 07: Production from 01.2018
- Size 2 comprises the downflow and upflow units ECD/U 181 and ECD/U 251:
  - (ECD/U 181 and 251 version 05: This version has been skipped)
  - ECD/U 181 and 251 version 07: Production from 01.2018
- Size 3 comprises the downflow and upflow units ECD/U 502:
  - (ECD/U 502 version 01: prototype)
  - ECD/U 502 version 02: Production from 05.2017
  - ECD/U 502 version 03: Production from 04.01.2018

These operating instructions are valid as of the following software versions:
- Size 1 (ECD/U 91) as of version 05: as of IOC-V6.71 and AT-V4.66
- Size 1 (ECD/U 91) as of version 07: as of IOC-V6.71 and AT-V4.66
- Size 2 (ECD/U 181 and ECD/U 251) as of version 06: IOC-V6.71 and AT-V4.66
- Size 2 (ECD/U 181 and ECD/U 251) as of version 07: IOC-V6.71 and AT-V4.66
- Size 3 (ECD/U 502) as of version 02: as of IOC-V6.71 and AT-V4.66
- Size 3 (ECD/U 502) as of version 03: as of IOC-V6.71 and AT-V4.66

1.2 Other applicable documents

Besides these operating instructions, please also observe the following documents:
- EC Tower technical instruction manual (for ECD/U 091 (version 05), ECD/U 091, 181, 251 (version 06))
- EC Tower technical instruction manual (for ECD/U 091, 181, 251 (version 07))
- Technical instruction manual for EC Tower 502 as of version 03 (size 3)
- Technical instruction manual for outdoor unit
- Circuit diagram (included in the delivery of the air conditioning unit and as a download on the S-Klima website)
- Operation and connection data of the EC tower
- Commissioning log for EC tower (for ECD/U 091 (version 05), ECD/U 091, 181, 251 (version 06) and for ECD/U 091, 181, 251 (version 07)) (Download on the S-Klima website)
- Commissioning log for EC tower 502 (versions 02 and 03) (Download on the S-Klima website)
- WIB 8000 technical instruction manual (Download on the S-Klima website)
- BMS technical instruction manual (Download on the S-Klima website)

The newest technical documentation is available to download from the S-Klima website:
http://www.s-klima.de/downloads.

2. Presentation of the control system

The C7000 control system offers operational reliability for industrial applications in combination with two designs for the user interface. The C7000IOC is responsible for the control. The C7000 Advanced is optional and serves as a convenient user interface.

Every air conditioning unit has its own controller, while all controllers can be connected with one another via a bus system.

Beyond the basic functions of air conditioning technology, the C7000 control system offers its own interesting functions, e.g. intelligent management of the high/low pressure alarms, a constant fan speed regulation, which introduces a further field of application, and time-based functions such as:

- Week timer
- Unit sequencing within definable unit groups

A watchdog on the C7000IOC monitors the CPU function and generates a reboot as soon as no CPU activity has been detected for 0.5 seconds.

Up to 4 EAIO/EDIO boards for additional inputs and outputs can be inserted at right angles on the C7000IOC.

The C7000 control system manages 4 buses:

1. IIC bus for communication between the C7000 I/O controller and the EAIO/EDIO
2. RS485 IO bus for communication among the air conditioning units
3. RS485 BMS bus for communication with a building management system
4. RS485 component bus (e.g. for EVD driver; µPC)

Analog (A) and digital (D) input and outputs

	A-IN	A-OUT	D-IN	D-OUT
IOC	4	4	11	7
EAIO	4	4	/	/
EDIO	/	/	8	6
Maximum equipment with EEIO				
IOC + 3 EAIO	16	16	11	7
IOC + 3 EDIO	4	4	35	25
Maximum equipment without EEIO				
IOC + 4 EAIO	20	20	11	7
IOC + 4 EDIO	5	4	43	31

EAIO: Expansion board for analog inputs and outputs
EDIO: Expansion board for digital inputs and outputs
EEIO: Expansion board for up to two electronic expansion valves
EBUS: Expansion board for a RS485 bus

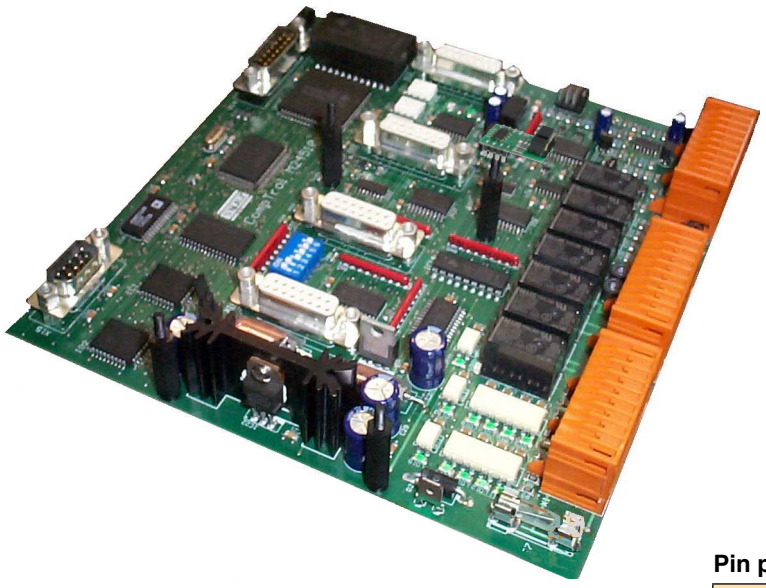
	Interfaces
IOC	1 x RS485 IO bus, terminals 4 x IIC bus, SUB-D15 EBUS connection SUB-D15 RS232, SUB-D9
EAIO	IIC bus, SUB-D15
EDIO	IIC bus, SUB-D15
EEIO	IIC bus, SUB-D15
EBUS	I/O controller connec. SUB-D15 RS485 BMS bus, terminals RS485 component bus, terminals
C7000AT	2 x RS485 IO bus + BMS, terminals 2 x RS232 BMS + service, SUB-D9

IIC bus: internal data bus on the IO controller

Technical data subject to change without notice.

3. Hardware components

3.1 I/O controller (C7000 IOC)



Technical data:

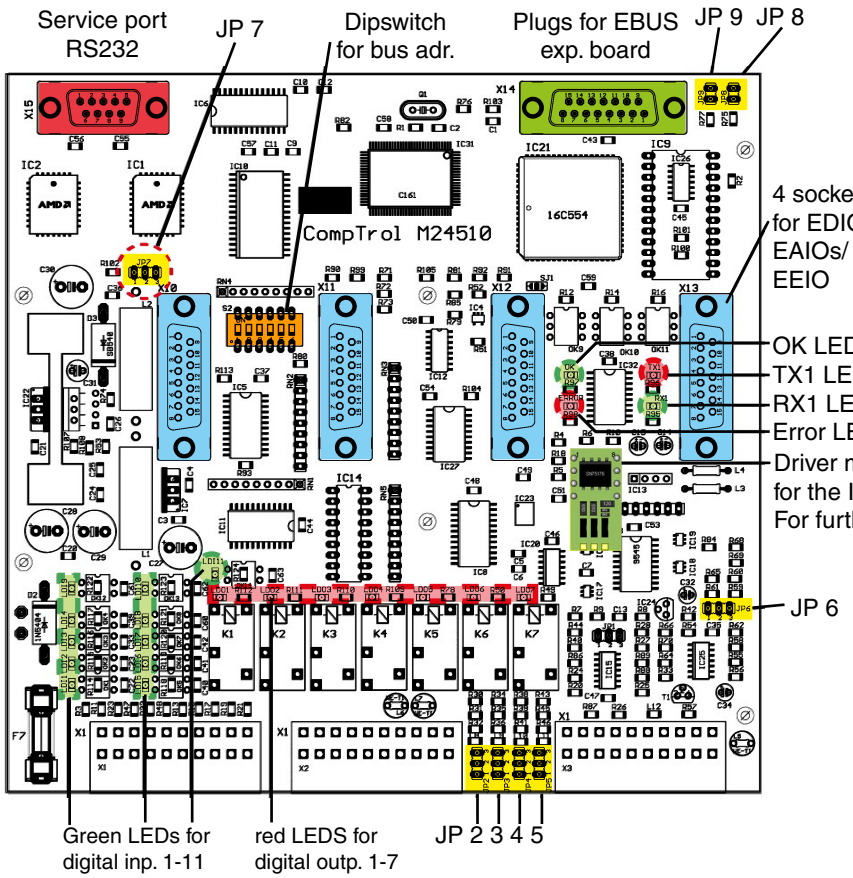
Electrical supply:	24(±15 %) V (AC)
Power consumption:	9.6 VA
Fuse:	2 A inactive
Operating temperature:	5 °C to 40 °C
Storage temperature:	-30 °C to 60 °C

LEDs on the circuit board

The function of the digital inputs is indicated by the green LEDs:
ON: voltage present
OFF: no voltage (Alarm, error)
The function of the digital outputs is displayed by the red LEDs:
ON: relay energized
OFF: relay not energized
The OK LED displays the IIC bus clock. The sensors are evaluated in this cycle.
The TX1/RX1 LEDs display the data traffic on the I/O bus (port 1).
The Error LED lights up if an alarm has occurred.

Pin position of X1

1	10	21	30	41	50
11	20	31	40	51	60



Jumper settings according to the sensor type

		Jp n°	Pos.1-2	Pos.2-3
Analog inputs	A-IN 1	2	4-20 mA	0-10 V
	A-IN 2	3		
	A-IN 3	4		
	A-IN 4	5		
	A-IN 5	6	not usable*	

*Exception: for PT1000/100 on existing systems

Jumper for software download

Jp n°	Pos. 1-2	Pos. 2-3
7	Operation	Download

For further information, see page 12.

EBUS activation

Jp n°	Function, when set
8	EBUS port 2 deactivated
9	EBUS port 3 deactivated

Jp8 and Jp9 have to be set if there is no EBUS expansion board. On the contrary, they have to be removed to activate the RS485 expansion buses on the plugged EBUS expansion board.

3.1.1 PIN assignment - I/O controller

The assignment depends on the unit type (DX1, DX2, CW, EC tower, EC tower 2). A DX1 unit is an air conditioning unit with a refrigerant circuit; a DX2 unit is an air conditioning unit with two refrigerant circuits. A CW unit is an air conditioning unit with one or two water circuits (CW/CW2 designs). An EC tower is an air conditioning unit with an inverter-regulated outdoor unit of Mitsubishi Heavy Industries.

e.g. ALD 371 GE -> DX1, ASU 462 ACW -> DX2, ASD 950 CW -> CW

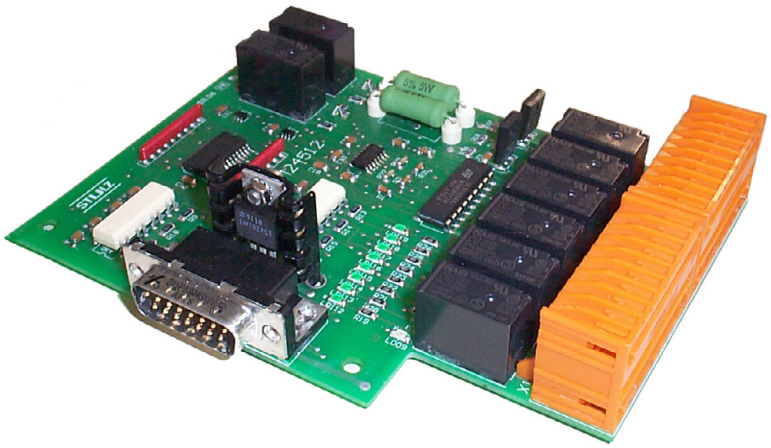
Pin	Designation	EC Tower/EC Tower 2
1	24 VAC	Electrical supply
2	GND	
3	GND	–
4	D-IN 1	Fan malfunction
5	D-IN 2	Status signal Compressor 1
6	D-IN 3	–/ Status signal Compressor 2
7	D-IN 4	Electric heater malfunction 1-3
8	D-IN 5	Filter alarm
9	D-IN 6	Humidifier malfunction
10	D-IN 7	Water detector
11	D-IN 8	Outdoor unit malfunction 1
12	D-IN 9	– / Outdoor unit 2 malfunction
13	D-IN 10	Remote on/off
14	D-IN 11	Fire
15	D-OUT 1 (NO)	Fan enable
16	D-OUT 1 (COM)	
17	D-OUT 1 (NC)	
18	D-OUT 2 (NO)	Not assigned
19	D-OUT 2 (COM)	
20	D-OUT 2 (NC)	
21	D-OUT 3 (NO)	Electric heater 1
22	D-OUT 3 (COM)	
23	D-OUT 3 (NC)	
24	D-OUT 4 (NO)	Electric heater 2
25	D-OUT 4 (COM)	
26	D-OUT 4 (NC)	
27	D-OUT 5 (NO)	Dehumidification or hot-gas bypass
28	D-OUT 5 (COM)	
29	D-OUT 5 (NC)	
30	D-OUT 6 (NO)	Common alarm 1
31	D-OUT 6 (COM)	
32	D-OUT 6 (NC)	
33	D-OUT 7 (NO)	–
34	D-OUT 7 (COM)	
35	D-OUT 7 (NC)	

Pin	Designation	EC Tower/EC Tower 2
36	+15 V	Active sensor 1
37	GND	
38	A-IN 1	Room/return air temp.
39	A-IN 2	Room/return air humidity
40	+15 V	–
41	GND	
42	A-IN 3	Supply air temperature sensor
43	A-IN 4	Supply air humidity sensor
44	+Ub	No function
45	GND	
46	A-IN 5	
47	GND	
48	A-OUT 1	Fan
49	GND	
50	A-OUT 2	– / Compressor speed 2
51	GND	
52	A-OUT 3	Humidifier or actual value humidity
53	GND	
54	A-OUT 4	Compressor speed 1
55	GND	
56	Port 1-H	RS485 I/O bus
57	Port 1-L	
58	Port 1-H	RS485 I/O bus
59	Port 1-L	
60	+15 V	–
X10	SUB-D 15	Bus 3 IIC (socket1)
X11	SUB-D 15	Bus 3 IIC (socket2)
X12	SUB-D 15	Bus 3 IIC (socket3)
X13	SUB-D 15	Bus 3 IIC (socket 4)
X14	SUB-D 15	Exp. EBUS (plug)
X15	SUB-D 9	RS232 service port (plug)

3.2 EDIO -Expansion card for digital inputs and outputs

The EDIO expansion card is only used in the following EC towers:

- ECU/D 502 (size 3) as of version 02.

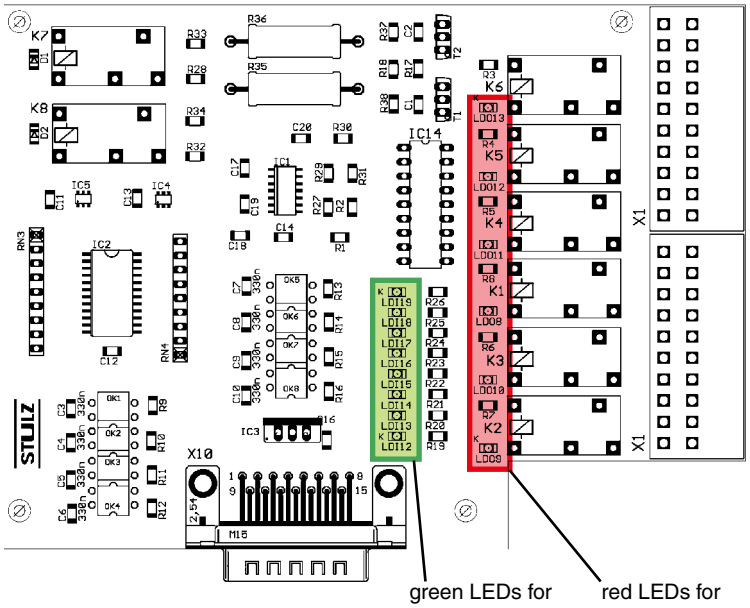


Technical Data:

Power consumption:	10,1 VA
Operating temp.:	5°C...40°C
Storage temp.:	-30°C...60°C

Pin position of X1

1	10	21	30
11	20	31 not assigned	40



Onboard LEDs

The function of the digital inputs is displayed by green LEDs:

ON: voltage present

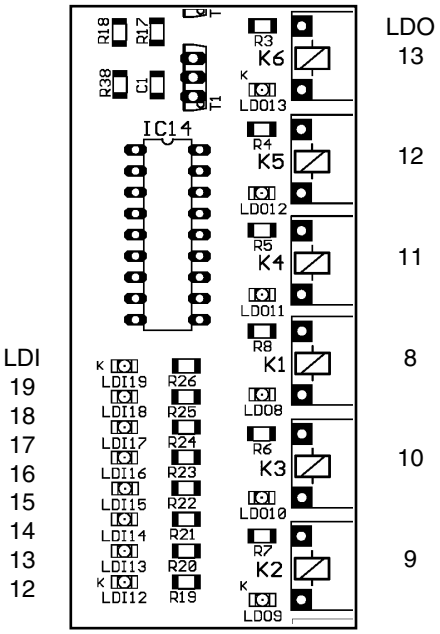
OFF: no voltage (alarm, failure)

The function of the digital outputs is displayed by red LEDs:

ON: relay active

OFF: relay passive

enlarged section for onboard LEDs



The EDIO is an expansion board for digital inputs and outputs. It can be plugged on the I/O controller board at each of the 4 sockets and will be recognized by the IOC due to a self test.

Assignment - EDIO

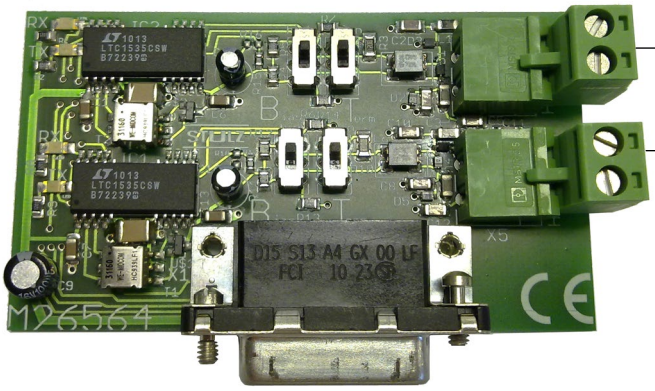
The assignment depends on the unit version (DX1, DX2, CW, EC Tower 2). Explanation see page 7.
If several EDIO boards exist, the EDIO board on the lowest socket is detected as the first EDIO board and the in- and outputs are assigned correspondingly when using the "loaddefault" command. The IOC board features four sockets for this purpose: X10, X11, X12 and X13. X10 represents the lowest socket.

Pin	Designation	EC Tower 2
1	Din 12	free
2	Din 13	free
3	Din 14	free
4	Din 15	free
5	Din 16	free
6	Din 17	free
7	Din 18	free
8	Din 19	free
9	Dout 8 (NO)	free
10	Dout 8 (COM)	
11	Dout 8 (NC)	
12	Dout 9 (NO)	free
13	Dout 9 (COM)	
14	Dout 9 (NC)	
15	Dout 10 (NO)	free
16	Dout 10 (COM)	free
17	Dout 10 (NC)	free
18	Dout 11 (NO)	free
19	Dout 11 (COM)	
20	Dout 11 (NC)	
21	Dout 12 (NO)	free
22	Dout 12 (COM)	
23	Dout 12 (NC)	
24	Dout 13 (NO)	free
25	Dout 13 (COM)	
26	Dout 13 (NC)	
27	PWM1	free
28	GND	
29	PWM2	E-reheat 1 (proportional)
30	GND	
X10	SUB-D 15	free

Pins 31 to 40 are not assigned.

3.3 EBUS expansion board for RS485 bus

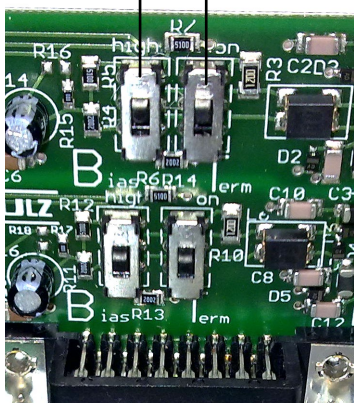
Circuit board design



Technical data:

Power consumption:	11.3 VA
Operating temperature:	5 °C to 40 °C
Storage temperature:	-30 °C to 60 °C

Switch for adjusting the bias and the bus termination



Setting at the end of the bus for port 2: (Example)
Bias high
Bus termination: on

Setting in the middle of the bus for port 3: (Example)
Bias: low
Bus termination: off

Assignment - EBUS board

Pin	Designation	Function
1	Port 2-H	RS485 BMS bus
2	Port 2-L	
3	Port 3-H	RS485 components bus
4	Port 3-L	
X10	SUB-D 15	to X14 on IO controller

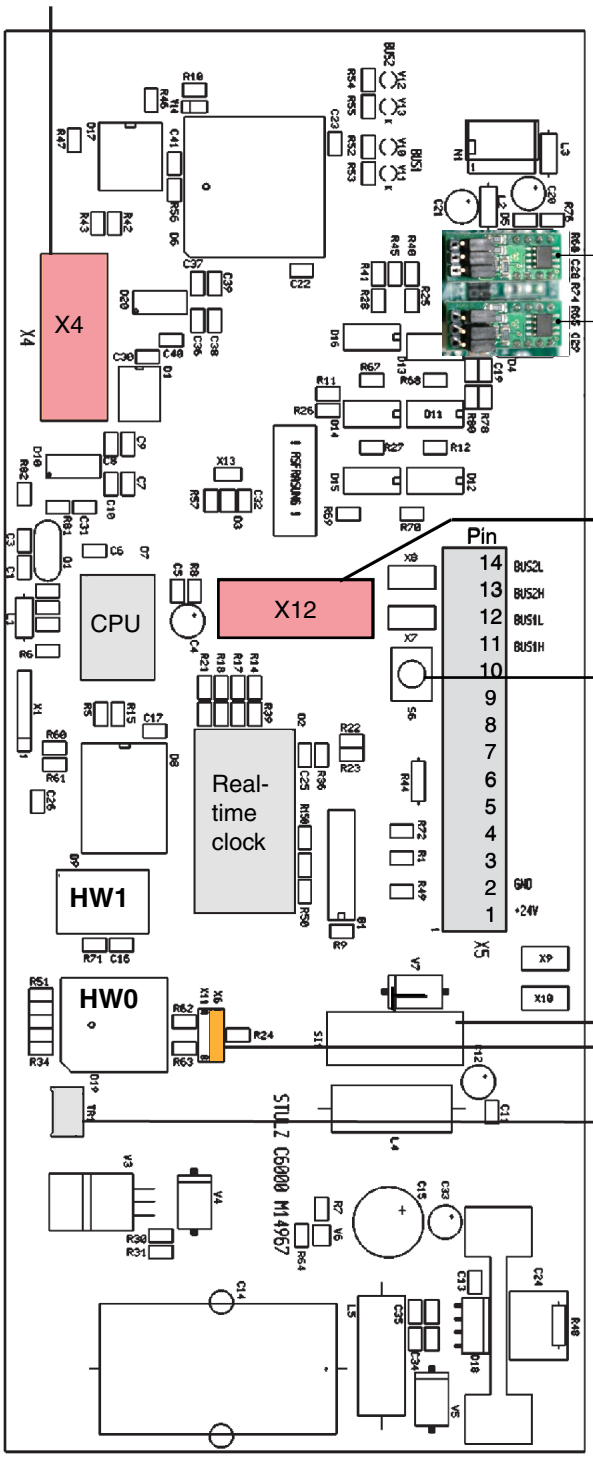
EBUS activation

Jp no.	Function, if open
8	EBUS port 2 activated
9	EBUS port 3 activated

Note:
If an optional EBUS expansion card is used, jumper 8 and jumper 9 have to be removed.
If no EBUS expansion card is used, jumper 8 and jumper 9 have to be set.

3.4 C7000 Advanced - Terminal (C7000AT)

RS232 - service port (SUB-D 9)



Technical data:

Dimensions:	270 x 110 x 40 mm
Electrical supply:	24(±15 %) VAC
Power consumption:	14 VA
Fuse:	2 A inactive
Operating temperature:	5 °C to 40 °C
Storage temperature:	-30 °C to 60 °C

Driver module for RS485-2 (BMS bus)

Driver module for RS485-1 (IO bus)

The pictures shows the position of the jumper if the circuit board is located at the end of the bus.
Details on the driver module, see next page.

RS232 - BMS port (SUB-D 9)

Pin	Designation	Function
14	Port 2-L	RS485 BMS bus*
13	Port 2-H	
12	Port 1-L	RS485 I/O bus
11	Port 1-H	
10-3	Free terminal	None
2	GND	Electrical supply
1	+24 VAC	

* for “SDC/MIB” protocol, the Stulz bus has to be connected here.

Reset button

Fuse T2A

Jumper X6: Pos. A: Circuit board in download mode

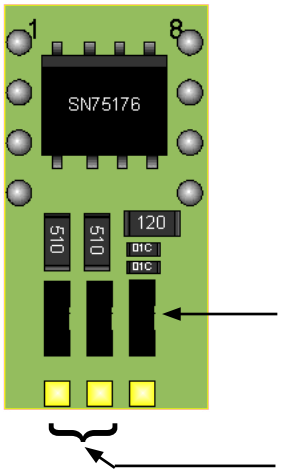
Contrast settings for the display

3.5 Driver module

The driver module has the following features:
1. A static bus termination (120 Ohm) that can be activated via a jumper.
2. A circuit to set the bias for the bus: using two jumpers, either a low bias (bus center) or a high bias (bus end) can be set.
3. Protection against ESD impulses on the data lines

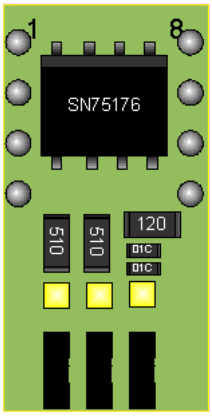
The interference immunity of the bus is increased by the driver module.
When it comes to setting the jumpers, only the two depicted settings are permitted. The jumpers are implemented blockwise. Other settings lead to unstable bus connections.

Participants on the end of the RS485 bus



The picture shows the position of the jumper if the participant is located at the end of the bus. The rightmost jumper activates the termination resistor in the depicted position. The remaining jumpers set a high bias.

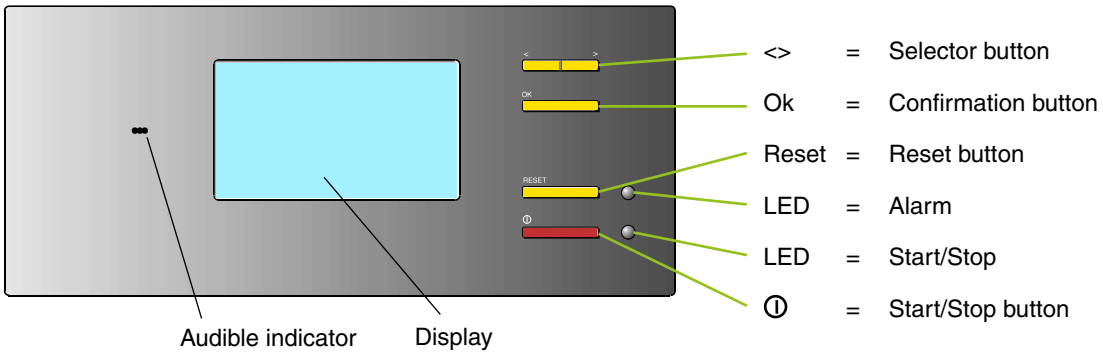
Participants in the center of the RS485 bus



The picture shows the position of the jumpers if the participant is located in the center of the bus.
The rightmost jumper deactivates the termination resistor in the depicted position. The remaining jumpers set a low bias.

4. C7000 Advanced user interface

4.1 Operational controls



Selector button	Using this button, you can select menus and change parameters.
Confirmation button	Using this button, you can acknowledge functions and parameters that were selected with the selector button.
Reset button	Alarm signals are acknowledged using the reset button. When first pressed, the alarm sound disappears. When pressed a second time, the alarm signal disappears (as long as the cause has been rectified).
Alarm LED	This LED flashes when an alarm has occurred and lights up after the reset button is pressed for the first time.
Start/Stop LED	This LED lights up when at least one IOC within the bus is switched on.
Start/Stop button	The control of the selected unit is switched on and off using this button. If the On/Off protection is activated, the control is switched on/off with a delay or only after a password has been entered (For details, see section “Passwords” on page 17).
Audible indicator	The audible indicator issues an alarm sound when alarms have been reported.
Display	The display presents the parameters, operation states and information on the user guidance.

Operation - Navigation through the menus

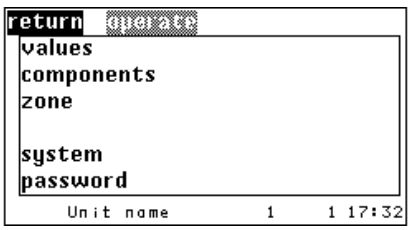
The essential buttons for navigating in and between the menus are the selector button and the confirmation button, which act like a mouse on a PC. To use the PC analogy again, the cursor is shown by inverting the display of a field’s contents. This field can contain a term, a number or a symbol.

There are two types of menu: Selection menus and parameter menus. In the **selection menus**, you can select a menu item using the selector button and go to the next submenu after pressing the confirmation button. To get back to a higher menu level, there is a “Return” field in the upper left corner of each menu.

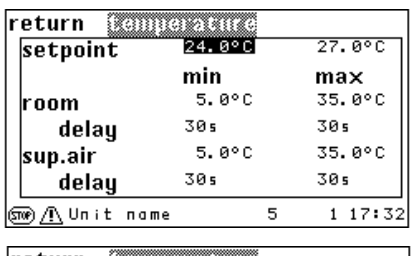
In the **parameter menus**, which are located at the end of a menu branch, you can select parameters using the selector button. If you then press the confirmation button, a frame appears around the parameter and the change mode is displayed. Using the selector button, you can now change the value and conclude by pressing the confirmation button. The left arrow symbol appears below the smallest value. If you select this arrow and confirm using the confirmation button, the parameter entry will be left without changes.
In some parameter menus, there is a “further” option at the bottom that indicates that after going through the parameters using “>”, another window will appear. You can reach this window if you press the “<” selector button when on the “Return” field.

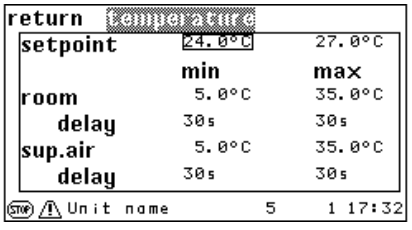
Note:
If the C7000AT has displayed a submenu on an IOC for 10 minutes without a button operation, it goes back to the main menu of the corresponding unit.

Selection menu



Parameter menu





5. Controller start

After switching on the electrical supply of the C7000 Advanced, the **bus overview** appears.
Using the selector button, you can select the unit that you want to control. A symbol/ unit that is selected is inverted.
Empty bus positions are skipped.
When selecting a C7000IOC and confirming using the OK button, you reach the main menu for the C7000IOC.
When selecting a C7000AT and confirming using the OK button, you reach the main menu for the C7000AT (after the 0000 password has been requested and entered).

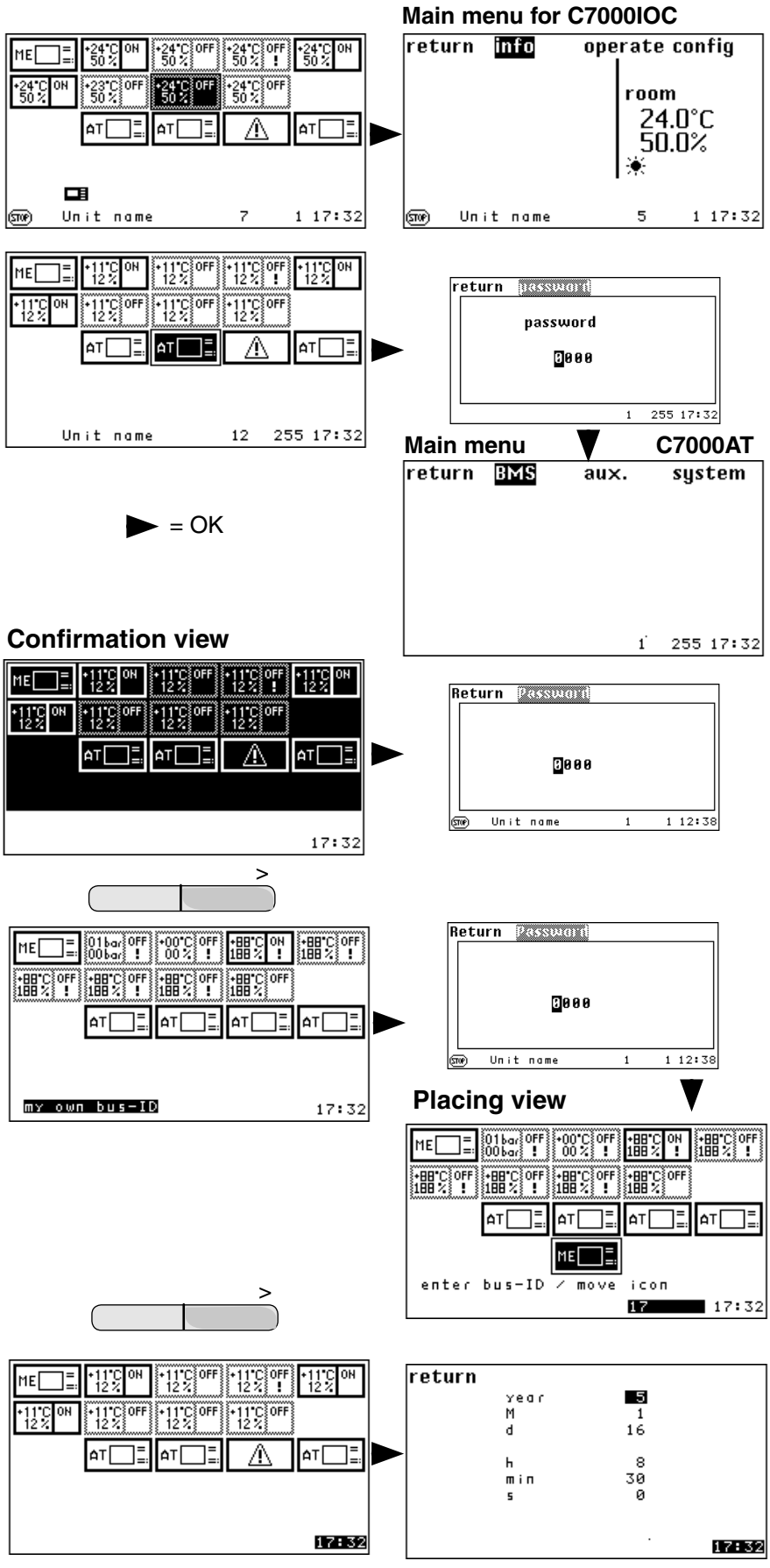
After the last bus participant position (in this example, bus address 14), using ">", you jump to a display in which all units are highlighted. This means that you can switch all units on/off with the local start/ stop button of the AT. If the individual units are in operation, all units are switched off when the button is pressed for the first time. (For details, see the On/Off protection on the following page)
If you press the OK button in this state (where all the units are highlighted), the present configuration is confirmed (after the "0000" password has been requested and entered).

After confirming this window using "OK" and after entering the password 0000, you reach the **placing view**. Here, you can move the C7000AT from which you perform actions (ME) to another position using the selector button. This changes the bus address. (ME_{old} at position 0 and ME_{new} at position 17)

By selecting the time, you can change the time and date.
The following things can be adjusted in this order:

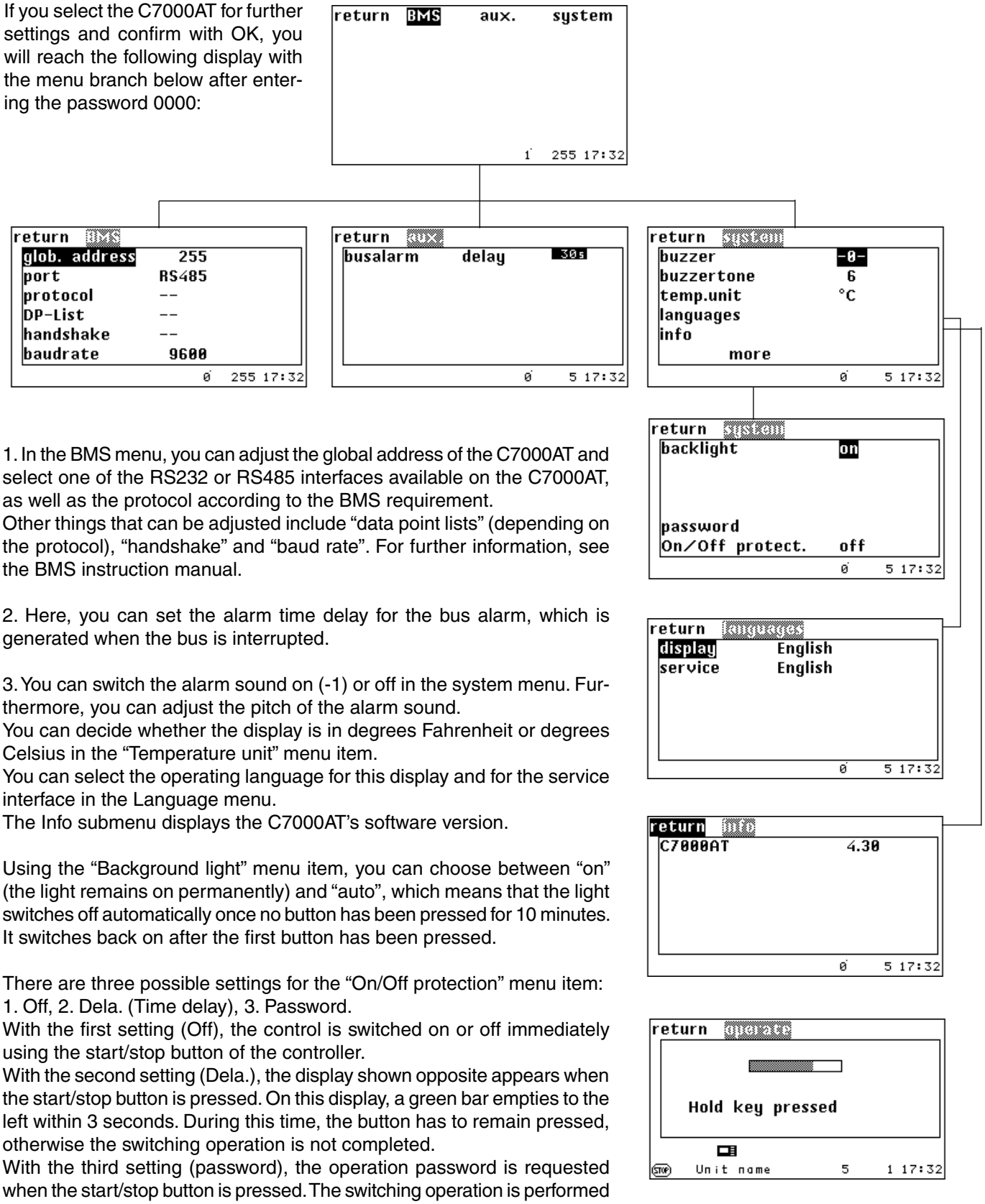
- Year, month, day, hour, minute, second.

All active bus participants apply this time setting.
If there is a WIB8000, on which time synchronization is activated, located in the Stulz bus, all connected C7000ATs and C7000IOCs (via the e-bus board) apply the date and time from the WIB. This also applies to C7000ATs that are connected via an IO bus to an IOC, which in turn is connected to the WIB via an e-bus board.



Main menu for a C7000AT

If you select the C7000AT for further settings and confirm with OK, you will reach the following display with the menu branch below after entering the password 0000:



1. In the BMS menu, you can adjust the global address of the C7000AT and select one of the RS232 or RS485 interfaces available on the C7000AT, as well as the protocol according to the BMS requirement.
Other things that can be adjusted include “data point lists” (depending on the protocol), “handshake” and “baud rate”. For further information, see the BMS instruction manual.

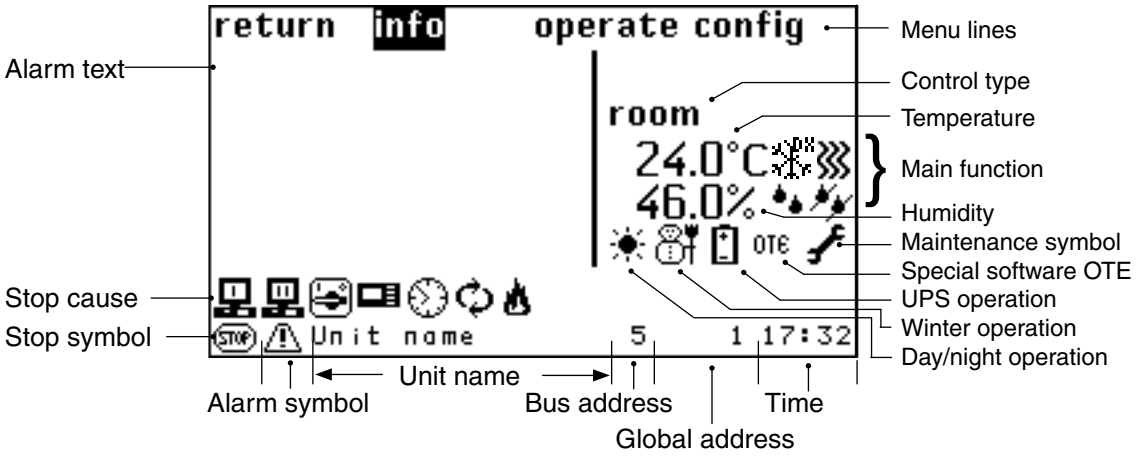
2. Here, you can set the alarm time delay for the bus alarm, which is generated when the bus is interrupted.

3. You can switch the alarm sound on (-1) or off in the system menu. Furthermore, you can adjust the pitch of the alarm sound.
You can decide whether the display is in degrees Fahrenheit or degrees Celsius in the “Temperature unit” menu item.
You can select the operating language for this display and for the service interface in the Language menu.
The Info submenu displays the C7000AT’s software version.

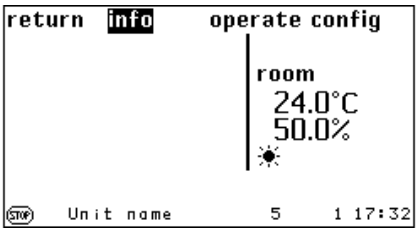
Using the “Background light” menu item, you can choose between “on” (the light remains on permanently) and “auto”, which means that the light switches off automatically once no button has been pressed for 10 minutes. It switches back on after the first button has been pressed.

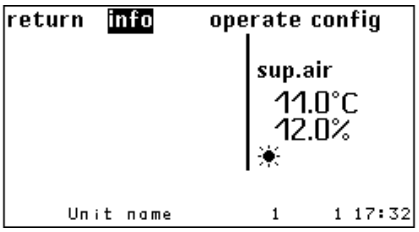
There are three possible settings for the “On/Off protection” menu item:
1. Off, 2. Dela. (Time delay), 3. Password.
With the first setting (Off), the control is switched on or off immediately using the start/stop button of the controller.
With the second setting (Dela.), the display shown opposite appears when the start/stop button is pressed. On this display, a green bar empties to the left within 3 seconds. During this time, the button has to remain pressed, otherwise the switching operation is not completed.
With the third setting (password), the operation password is requested when the start/stop button is pressed. The switching operation is performed once the password has been entered.

Main menu (for a C7000 IOC)



If you select and confirm an I/O controller, you will reach the standard window, as shown on the right. You have the option of choosing one of three submenus: “Info”, “Operate” or “Config”.





The control type (room or supply air) is displayed in the center of the window and underneath, the corresponding actual values (room or supply air) are given. Under the actual values there is a symbol that indicates day or night operation. Day operation corresponds to operation with the first setpoint temperature. Night operation corresponds to operation with the second setpoint temperature.

Day operation Night operation

Other symbols

This symbol is shown if the controller has been switched to winter operation. The symbol goes out during operation in summer.

This symbol is displayed if voltage is present at the input for the UPS operation or UPS operation is requested via a BMS.

OTE This symbol is displayed if the OTE special software is activated and the unit is in OTE mode.

This symbol is displayed if the maintenance interval, which can be adjusted in the Config menu, has elapsed.

Stop cause

The I/O controller can be stopped via several functions or devices that are indicated by symbols on the AT.

This symbol indicates that the IOC has been stopped.
The following symbols indicate the cause of the unit being stopped.

stopped via Remote ON/OFF (Remote control switch at digital input)

stopped by BMS/WIB

if necessary, stopped by the WIB sequencing function (depending on the settings in the WIB)

stopped via the internal timer (week program)

stopped via the ON/OFF button on the C7000AT or by the “status stop” command via the IOC service port.

stopped by the sequencing function (standby unit)

stopped by the fire alarm

Symbols for main functions

If the control is in operation, the following symbols indicate the unit functions in the main menu. These symbols are not displayed in the submenus.

Cooling, the cooling operating mode (DX, CW, FC, EFC, MIX) is shown on the top right.

Heating

Humidification

Dehumidification

Parameter values

Two other displays are available instead of numerical values:

1. ??? - Value requested at IOC, no answer up to now
2. ~~XXX~~ - Components not configured

Symbol for alarm signal

This symbol is displayed in the bottom left corner when an alarm occurs.

Passwords

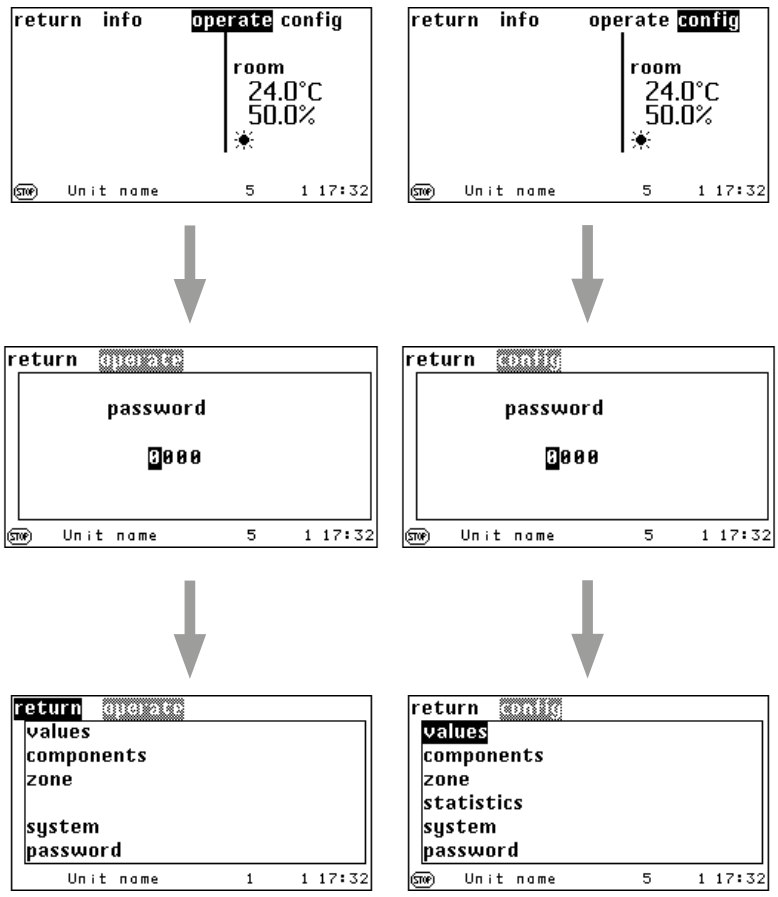
A password is needed to access the Operate level, the Config level and the AT main menu.

There are 4 passwords in total: one user-specific password each for the Operate level and the Config level and a master password each. The user-specific password can be changed and, on delivery, it is “0000” for the Operate and Config level.
The master passwords are reserved for the service staff and cannot be changed.

Entering the password

The individual digits can be changed using the selector button after you have reached the change mode using the confirmation button. After the change has been executed, confirm with the confirmation button and get to the next digit using the “>” selector button.
Once you have got to the last digit and after pressing the “>” selector button, you can enter the main menu of the Operate and Config level, provided that the password is correct.

There are no limits to the number of attempts. The passwords for the Operate and Config menu are stored on the IOC circuit board. Therefore, it is possible to set the Operate password “1234” for the IOC with address 3 and the Operate password “5678” for the IOC with address 5, for example.



6. Info menus

6.1. Info and Operate menus of the operation interface C7000AT

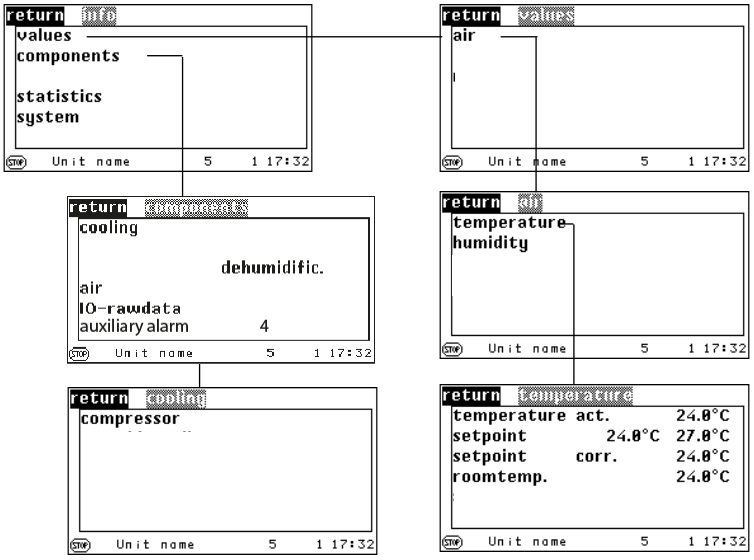
Menu structure of the Info main menu
The menu structure of the Info main menu is pictured in chapter “12. Menu structure of the main menu for operating the EC tower” on page 74.

The depicted menus show the maximum configuration of the C7000AT operation interface.
In the following, menus will only be described if they are relevant for the EC tower.

The info main menu has the following selection menus: Values, components, zone, statistics and system. There is a parameter menu at the end of a menu branch in the Info main menu. Relevant values are only displayed in the parameter menu. The values cannot be changed in the parameter menu.
The following describes the Info main menu’s selection menus and parameter menus (values). The Operate main menu and the Config main menu are described when the relevant selection menu is described.
The Info and Operate menus only display components, sensors, unit alarms and auxiliary alarms that are configured in the Config menu. This also has an effect on the selection menus. If, for example, no heater is configured, the “Heating” function is omitted in the “Info/Components” menu and the “Operate/Components” menu. If no zone is configured, this menu item is also omitted in the “Info” and “Operate” menus. The runtime menus under “Info/Statistics/Runtime” are also reduced accordingly.

The Info menus for an air conditioning unit of design A with a room air T/H sensor and an auxiliary alarm, which is not in a zone, then shorten as shown opposite.

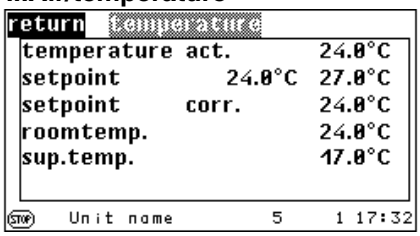
Subsequently, the menus appear in full size so that all menu items can be clarified.



C7000 Advanced

Info

...Air/temperature



Values

This window shows the following temperatures:

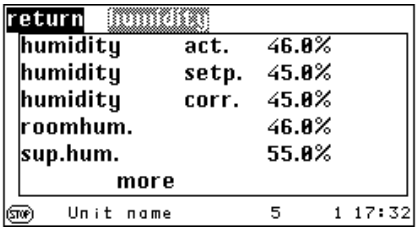
1. The value that is used for the control, can also be the zone temperature.
   The zone values represent an average value that is calculated from all unit sensors that are assigned to the same zone.
2. The adjusted setpoint (setpoint 1, setpoint 2)
3. The setpoint corrected by the controller, is controlled only according to this value.
   Usually, this value matches the adjusted setpoint.
   In the following circumstances, it can be different due to:
   - Week program
   - Backup operation
   - Integral factor
   - External setpoint shifting
   - Limiting control
4. The actual value of the room temperature sensor.
5. The actual value of the supply air temperature sensor.
6. The outside temperature.

C7000 Advanced

Info

Values

...Air/humidity



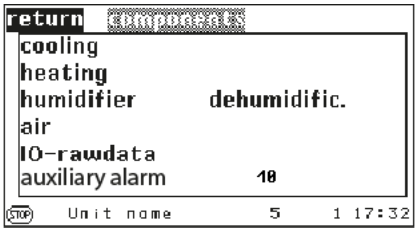
The corresponding humidity values are displayed in the same order in this window.

1. Value that is used for the control, can also be the zone humidity.
2. Setpoint
3. Shifted setpoint (caused by external setpoint setting or limiting control)
4. Actual value of the room humidity sensor.
5. Actual value of the supply air humidity sensor (if available).
6. Actual value of the outside humidity content sensor (if available).

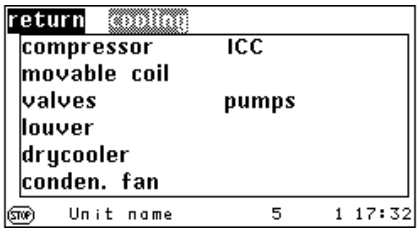
C7000 Advanced

Info

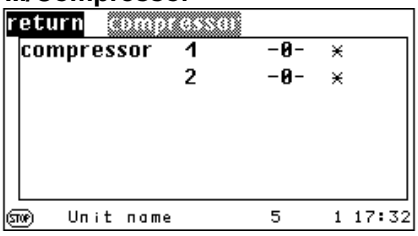
Components/Cooling



The C7000 Advanced gives a detailed presentation of the components' operating conditions. In the window opposite, the top five menu items lead to submenus. In the last menu item, you can read off the number of configured external alarms.



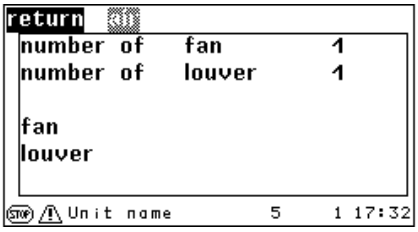
.../Compressor



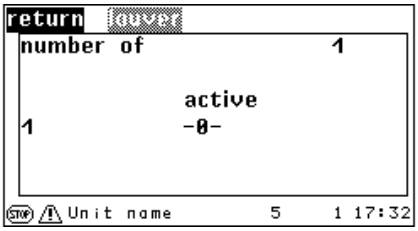
In the following windows, you can see the operating state of each component:
-0- means component is switched off.
-1- means component is switched on.
~~xxx~~ means components is not available.

Operating state of the compressors.

.../Air damper



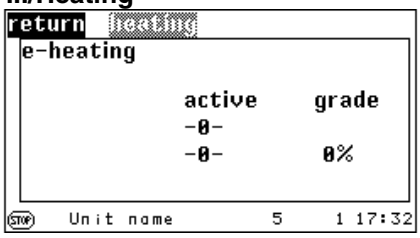
This menu displays the degree of openness of different configurable louvre dampers. The degree of openness of the fresh air and exhaust air damper with activated EcoCool function is displayed in the first line.
The degree of openness of the air dampers for the DFC² control are displayed in the following lines. If digital actuation has been selected for the exhaust air damper, there are only two positions: "open" (1) and "closed" (0).



C7000 Advanced

Components

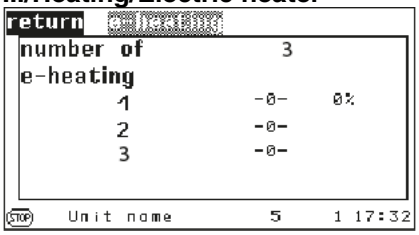
.../Heating



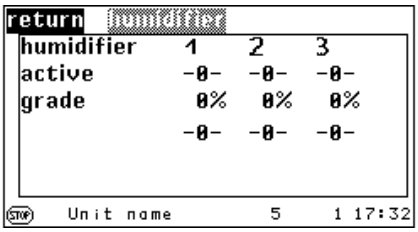
Info

If the unit is equipped with a heater, the operating state of the heaters is displayed in this window. For heaters with constant control, the capacity is displayed from 0-100 %.
For the warm water heater, the capacity is specified in the form of the degree of openness of the valve.
The number of configured electric heaters and their operating state is displayed in the submenu for the electric heater. The first heater can be actuated via the pulse width modulation quasi proportionately.

.../Heating/Electric heater

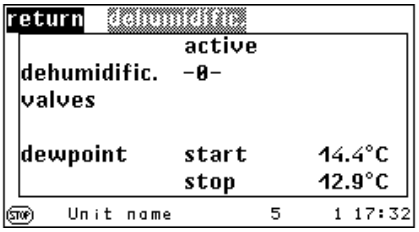


.../Humidifiers

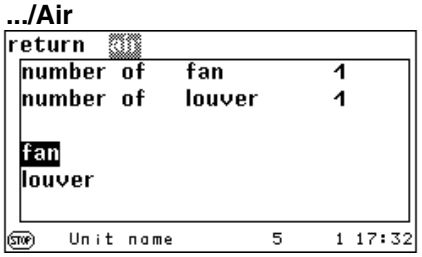


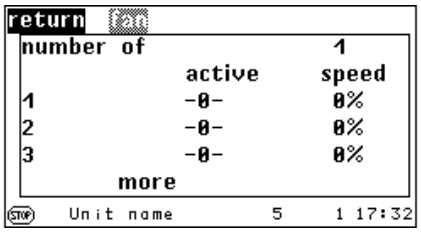
If the unit is equipped with a humidifier, the operating state of the humidifier and the degree of steam generation is displayed here from 0 to 100 %.
The Dehumidification menu shows whether the dehumidification is switched on and whether the dehumidification valve is open. A switched-on dehumidification with a closed valve shows that the fans are dehumidified via the speed reduction.

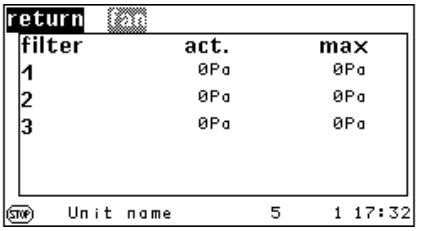
.../Dehumidification

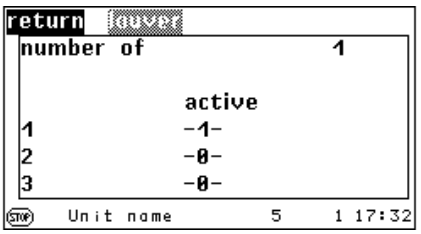


.../Air





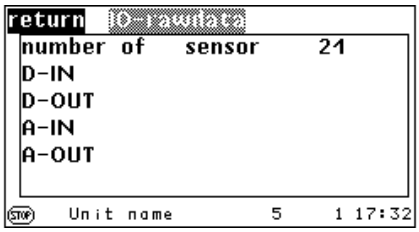




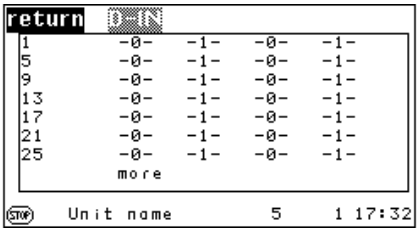
The number of configured fans and air dampers is shown in this window. Additional menus can be opened from the “Fan” and “Air damper” menu items. These additional menus display the operating status of the fans including the speed from 0-100 %.
In an additional menu about the fan, the filter’s pressure drops, measured by analog pressure sensors, are compared with the maximum permissible adjustable pressure drops.
If the air dampers are configured, -1- indicates that the air damper is open.

C7000 Advanced

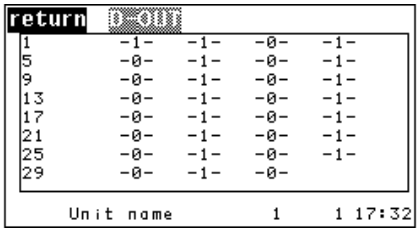
.../EA raw data



.../EA raw data/D-ON



.../EA raw data/D-OUT



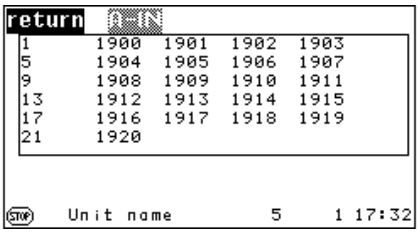
Info

The "**.../EA raw data**" menu displays the number of configured sensors.
The "D-IN", "D-OUT", "A-IN", "A-OUT" submenus have diagnostic purposes and display the state of each digital and analog in and outputs.
Inputs 1 to 4 are shown in the first line, inputs 5 to 8 are shown in the second line, etc.
The table below indicates what the displayed values mean.

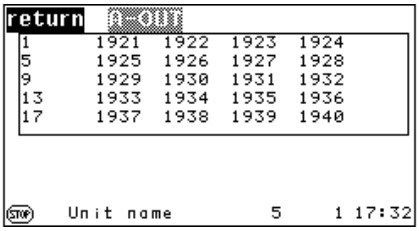
	Display	Meaning
D-IN	1	Voltage present -> no alarm
D-OUT	1	Relay energized* -> Components in operation
A-IN	0-4095	0-20 mA, 0-10 V corresponding to sensor type
A-OUT	0-4095	0-10 V

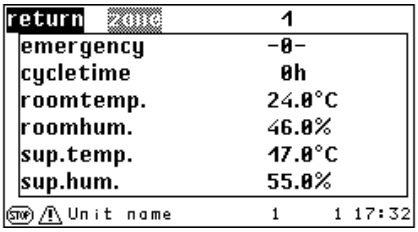
*Exception: When the "dehumidification" function is carried out, the relay is not energized.

.../EA raw data/A-IN



.../EA raw data/A-OUT

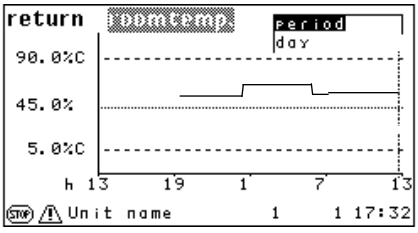




Zone

If the unit is assigned to a zone, the values of the zone that the unit is in are displayed here. The first line indicates whether backup operation is activated for this zone as well as the sequencing time of the zone, room temperature, room humidity, supply air temperature and supply air humidity of the zone.
If the average value calculation function is deselected, these values correspond to the measured unit values.

Statistics/data logger

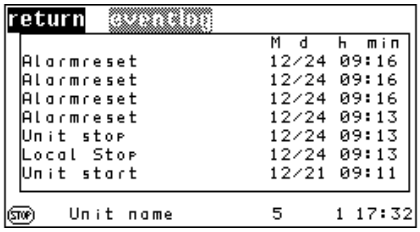


Using the data logger, it is possible to save measured values or average values (zone values) calculated by the controller and have them displayed in the form of a graphical curve so as to show the time course of these values.
Two different values can be recorded at the same time.
In this window, you can set the period of time which will be displayed. Further information (type of measured value and clock rate) can be defined in the Config menu.
You can choose from 5 different periods of time: hours (this setting displays the last 3 hours), day, week, month and year.
The time period is displayed horizontally; a vertical dashed line marks the actual time. Vertically, the range of the measured variables within the limit values (if this exists for this type of value) is displayed. Two exterior dashed lines mark the limit values. An interior dotted line marks the setpoint, if this is present. The course of the measured value is displayed by a continuous line.

Note:
Before these values can be displayed, the recording must be activated in the Config menu. If the unit is de-energized, the values of both data loggers are deleted. (However, the control can be switched off by using the start/stop button without deleting the data loggers.)

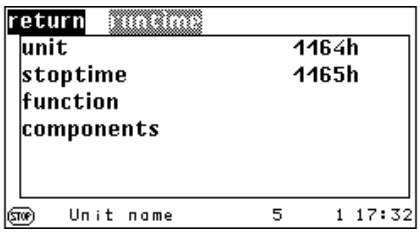
C7000 Advanced

Info



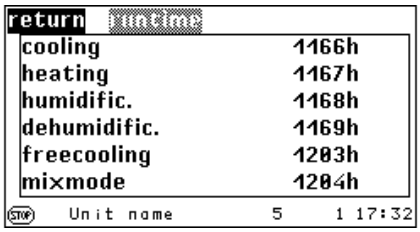
Statistics/Events

All alarm signals and events (Unit on/off, watchdog (WD) restart) of one unit are displayed in this window. The signals contain the following information:
Alarm text, day and time.
Up to 200 signals can be stored.

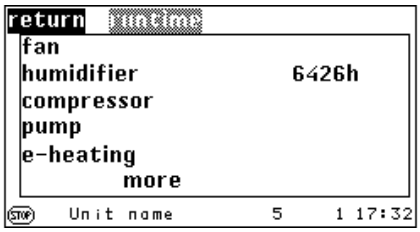


Statistics/Runtimes

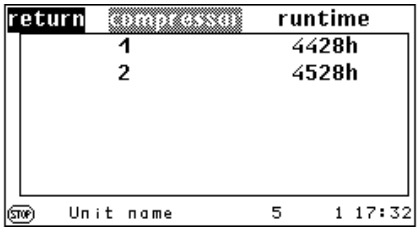
The runtimes are shown in hours.
The unit runtime comprises all times when the unit is not in a stop/standby mode.
The stop time is counted, when the unit is in a stop/standby mode.
Stop mode means: Unit is supplied with power, but the control is switched off.

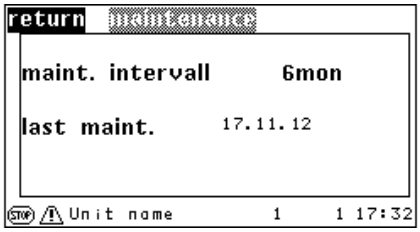


The runtimes of the functions are displayed in a submenu.
The cooling runtime is counted when cooling is requested. The heating runtime is counted when heating is requested. The humidification runtime is the time in which the unit has humidified. The dehumidification runtime is counted when dehumidification is requested. The runtime for Free Cooling is counted when the opening degree of the GE valve is bigger than 0, when no compressor request exists and when the GE valve is not heating. The runtime for the mixed mode is counted when the degree of openness of the GE valve is bigger than 0, when a compressor request exists and when the GE valve is not heating.



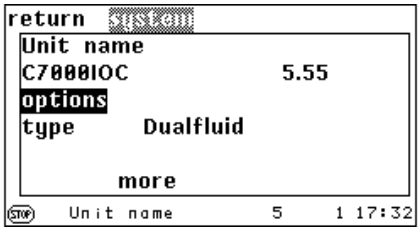
The runtimes of the components are displayed in another submenu.
The fan and humidifier runtimes are displayed here.
For the compressor, pump, electric heater and dry cooler components, more submenus exist of the kind shown on the right.





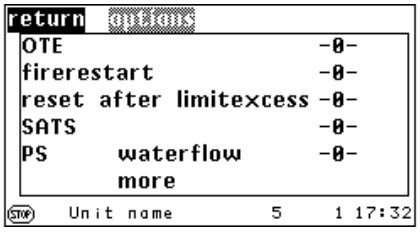
Statistics/Maintenance

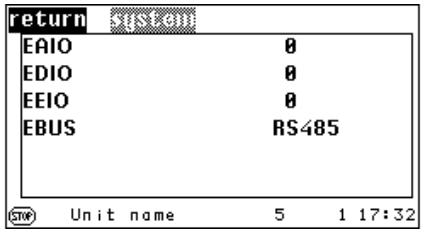
In this window, the adjusted maintenance interval and the date of the most recent maintenance are displayed.



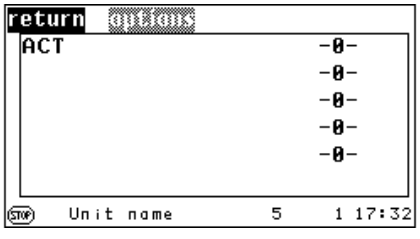
System

In this menu, the software version and the unit type are displayed.
The "Option" menu item leads to a submenu, which displays which special software options are active.





The number of connected EAIO, EDIO, EEIO and EBUS boards is indicated here.



7. Configuration

First steps

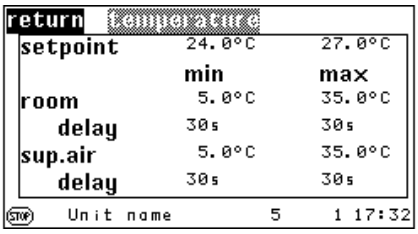
1. When several units are present that are supposed to work in the bus network: Perform bus wiring and configure bus.
2. Check the equipment in the Config level.
3. Configure or deactivate additional components, e.g. air damper, water warning system or humidifiers.
   For the C7000AT you can do this in the Config level in the submenus of the “Components” menu item. Activating the component, allocating an output for the component control, assigning an alarm input and setting the start value/ hysteresis are part of the configuration.
4. Perform sensor adjustment with reference instruments (Operate/Components/Sensor menu).
5. Adjust setpoints.
6. Adjust the special operating modes such as the week program, zone operation.
7. possible BMS configuration.

7.1 Values

Menu structure of the Info, Operate and Config main menus
The menu structure of the Info, Operate and Config main menus is depicted in chapter “12. Menu structure of the main menu for operating the EC tower” on page 74.

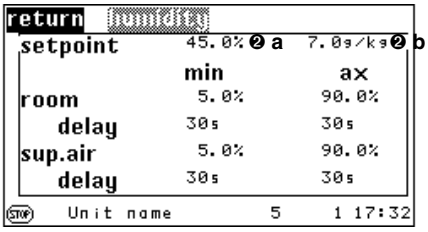
Operate **Values/Air/...**

...Temperature



The first line of the menu concerns the adjustment of temperature setpoints. The following lines serve to adjust the temperature limit values, which are decisive for the “Temperature/ humidity too high/low” alarms.
Two temperature setpoints can be defined. Setpoint 1 concerns day operation while setpoint 2 concerns night operation. The distinction of when the unit should run in day or night operation is established in the week program (see Page 47).
The limit values for the room air sensor follow this. The "MIN" column contains the values for the lower temperature limit and the "MAX" column relates to the upper temperature limit accordingly.
If, for example, the measured value undershoots the lower room air temperature limit, the “Room temperature too low” alarm is displayed.
Below this, you can enter the alarm time delay in seconds.
The values for the supply air sensor can be adjusted in the same way.

...Humidity

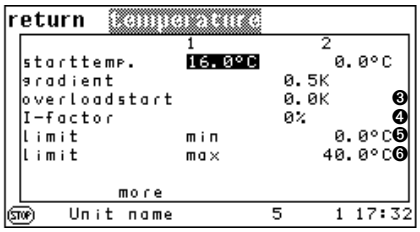


You can set the same parameters for the relative humidity. However
no distinction is made between day and night setpoint values here. ❷**a**
The setpoint for the specific humidity ❷**b** is required for the control according to the specific
humidity.
The limit values for humidity are only valid for the humidity control of relative humidity.

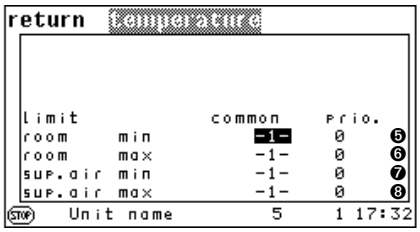
Values

Air/temperature

Config

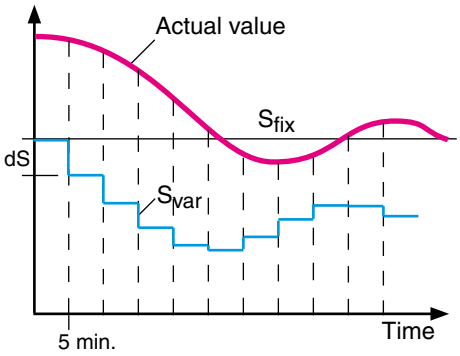


It is possible to have a standby unit start when an adjustable positive temperature difference to the air temperature setpoint is reached. This temperature difference can be adjusted by the "Load start" parameter ❸. The adjustment 0.0K deselects this function. When the temperature difference is reached, the unit starts as long as it is defined as a standby unit. The sequencing is not influenced by this.
In order to use this function, a zone must be defined.



You can determine an integral part ❹ for the air temperature control to avoid a control discrepancy which is characteristic for P-controllers. In this case, the variable setpoint S_{var}, which is recalculated every 5 minutes according to an integration interval, is decisive for the control. This variable setpoint is created by adding a setpoint alteration dS to the previous setpoint.
The values for the integration factor can be between 0 and 10 %. In principle, you should start at a low value in order to prevent the system from oscillating because of a value that is too large. 2 % is recommended and is increased slowly until the system is regulated.

You can adjust the following for the "Room temperature too low ❺/too high ❻" and "Supply air temperature too low ❼/too high ❽" limit value alarms:
a. Common alarm actuation (1 = yes).
b. Alarm priority

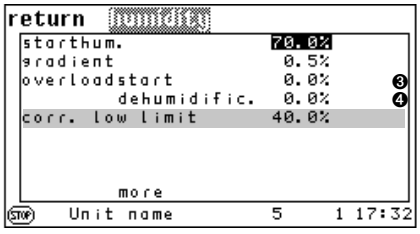


$Svar_{n+1} = Svar_n + dS$ with

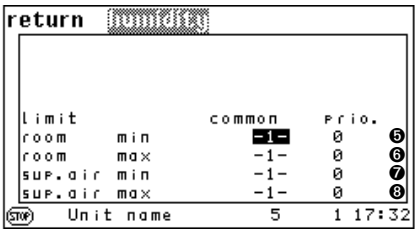
$dS = (S_{fix} - \text{Actual value}) \times \text{Integration factor}$

s_{fix} represents the fixed setpoint that is set in the **Config/Values/Air/Temperature** menu.

Air/humidity

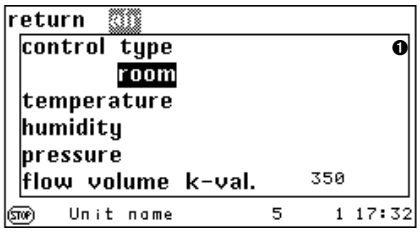


A standby unit can be started when an adjustable negative humidity difference to the air humidity setpoint is reached. This humidity difference can be adjusted using the "Load start" parameter ❸. The adjustment 0.0 % deactivates this function.
A standby unit can be also started when an adjustable positive humidity difference to the air humidity setpoint is reached. This humidity difference can be adjusted using the "Dehumidification load start" parameter ❹.
When the humidity difference is reached, the unit starts as long as it is defined as a standby unit. The sequencing is not influenced by this.



You can adjust the following for the "Room humidity too low ❺/too high ❻" and "Supply air humidity too low ❼/too high ❽" limit value alarms:
a. Common alarm actuation (1 = yes).
b. Alarm priority

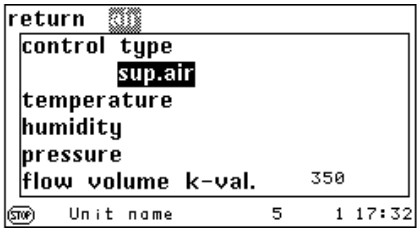
Air/Control type (Part 1)



Here, you select the control type. The actual values display changes depending on the set control type (room/supply air). ❶

The following control types are available:

- **Room** Room air control
- **Supply air** Supply air control
- **Room, supply-air limited** Room air control with supply air limit
- **Supply air, room limited** Supply air control with room air limit

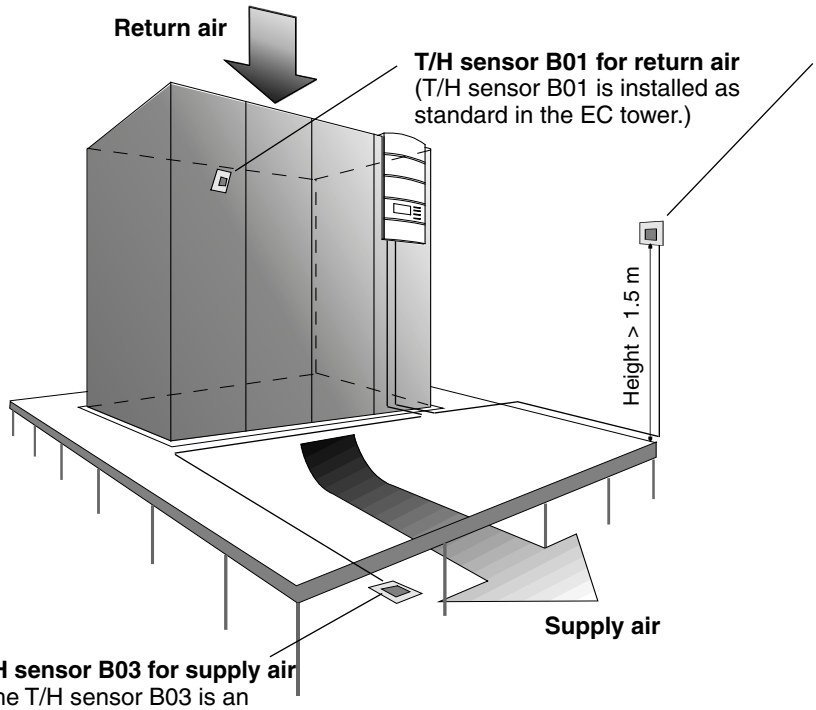


Room air control

Room air control is the standard control. The temperature/humidity sensor is placed in the return air intake or in the room and the C7000 controls according to the adjusted setpoints in the **Config/Values/Air/Temperature**or **Humidity** menus.

Supply air control

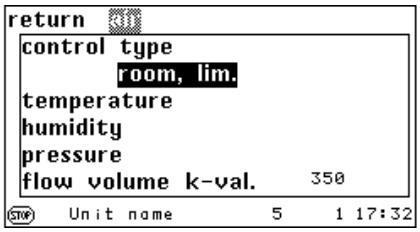
An external T/H sensor is required for the supply air control. Like with the room air control, it is controlled according to the adjusted setpoint values.



T/H sensor B01 for room air
The T/H sensor B01 can alternatively be installed outside of the EC tower.

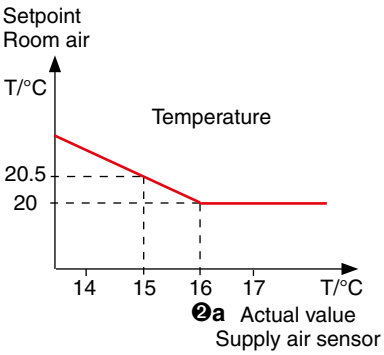
The T/H sensor B01 for room air must be positioned depending on the spatial conditions, heat load distribution and selected control type.
The maximum distance from the C7000 IOC is 20 m.

Air/Control type (Part 2)



Room air control with supply air limit

The room control with supply air limit is controlled via the T/H sensor in the return air intake and via a second T/H sensor in the supply air. Primarily it is controlled like the room air control; only if the measured supply air temperature is lower than the start temperature ❷**a**, the setpoint increased. The extent of the setpoint increase is determined by a factor which you enter as a gradient ❸. The graph opposite clarifies the relationship that this follows. A steep gradient drastically corrects the supply air temperature shortfall, but risks the control circuit starting to oscillate.
With humidity control, the setpoint shifts in the opposite direction. If the adjusted start humidity ❹ is exceeded by the measured supply air humidity, the setpoint lowers. You can also enter a gradient factor ❺ for this. The relationship is shown in the graph opposite.

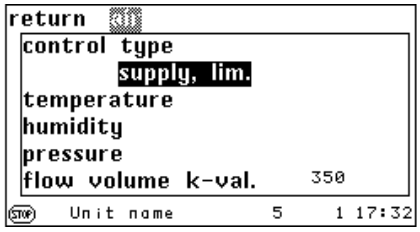


new setpoint = old setpoint + gradient • (start value - actual value)

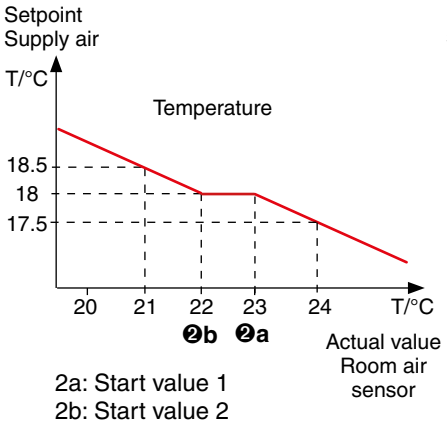
Example (temperature):
20.5 = 20 + 0.5 • (16 - 15)

Supply air control with room air limit

The supply air control with room air limit is based on the same control principle as the supply-air limited room air control. Yet in this situation, the setpoint shifts in the opposite direction because it works on the basis that the supply air is colder than the return air.
If the room temperature exceeds start temperature 1 ❷**a** the supply air temperature setpoint is lowered.
When entering a second start value ❷**b**, the supply air setpoint is increased if the room air temperature falls due to a lower heat load. This means that the cooling capacity is lowered and energy is saved.
If the room humidity falls short of the entered start humidity ❹, the supply air humidity setpoint is increased.



Start value 1 > Start value 2

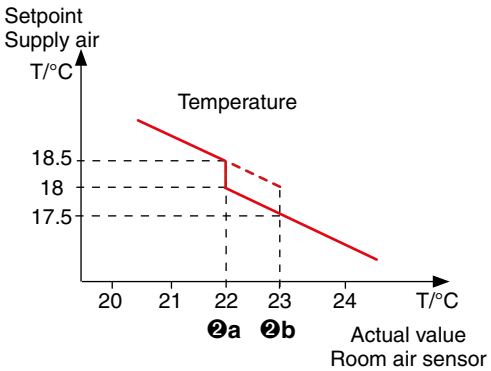


2a: Start value 1
2b: Start value 2

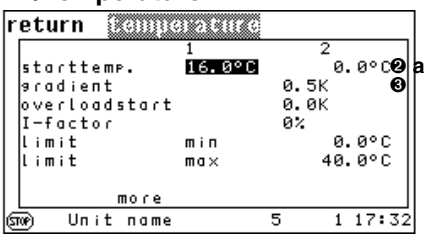
Example:
With T_{room} > 2a: 17.5 = 18 + 0.5 • (23 - 24)
With T_{room}< 2b: 18.5 = 18 + 0.5 • (22 - 21)

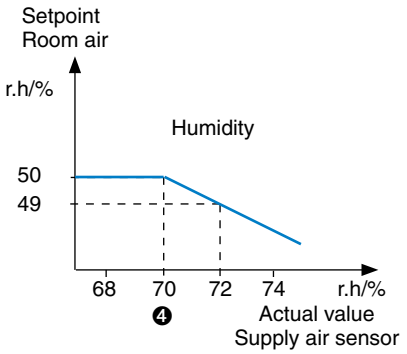
If start value 1 is lower than start value 2, it is controlled according to start value 1 in the range between both start values.

Start value 1< Start value 2



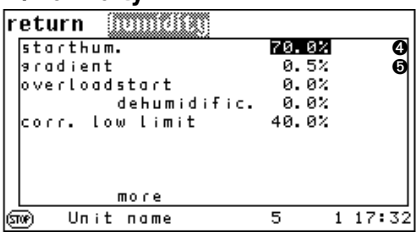
.../Temperature

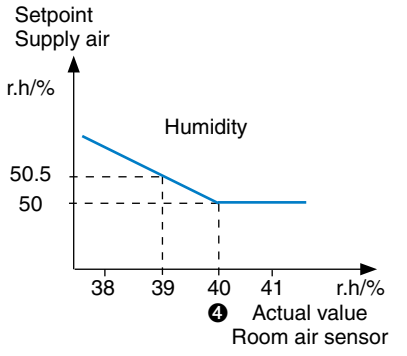




Example (humidity):
49 = 50 + 0.5 • (70 - 72)

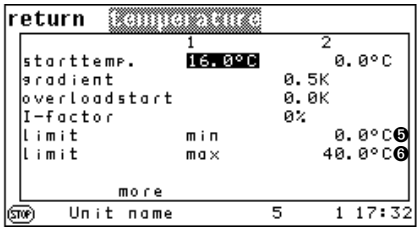
.../Humidity





Example:
50.5 = 50 + 0.5 • (40 - 39)

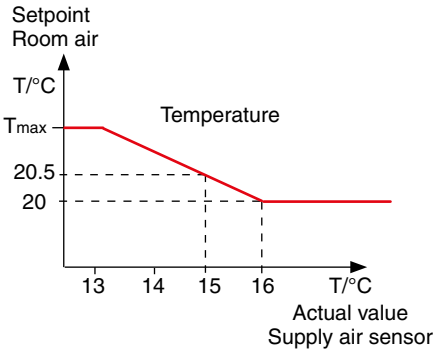
Config — Air/Control type (Part 3)



You can set temperature limit values for the room control with supply-air limit and for the supply air control with room-air limit.
Above/below the limit value, the raised/reduced temperature setpoint stays at the limit value.

Lower limit value (T_{min}): ❺
Upper limit value (T_{max}): ❻

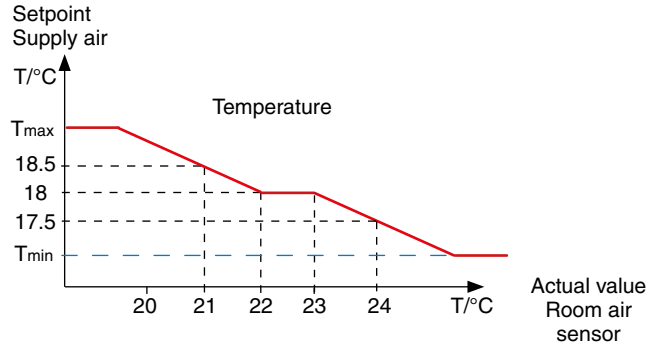
Room, supply-air limited



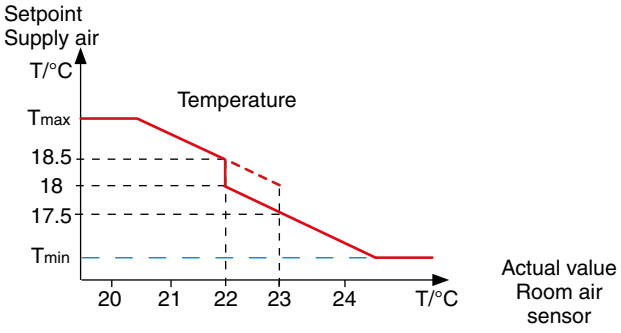
The control diagrams are changed by the adjusted temperature limit values as shown opposite (room, supply-air limited) or below (supply air, room limited).

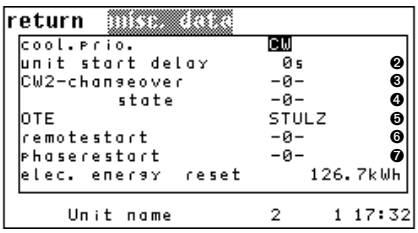
Supply air, room limited

Start value 1 > Start value 2

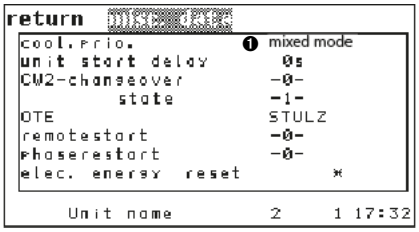


Start value 1< Start value 2





About the meaning and settings of the cooling priority Config/Values/Miscellaneous/Cooling priority.
You can set a unit start delay ❷ in the second line. Different start delays for different units prevents the most current consuming components starting simultaneously and prevents the power supply of the building becoming overloaded.
Using the parameter in the third line, you can implement a change-over between both CW valves. The parameter in the fourth line indicates the state of the change-over.
The "OTE" parameter ❺ in the fifth line is customer specific; for normal units the setting is "STULZ". This parameter is set to “OTE” for activation of the OTE software.
Via parameter ❻ in the sixth line, you can determine whether the unit may be started by a remote on/off signal. (0 = not possible, 1 = possible, all other stop causes (timer, BMS, local stop, sequencing) are deleted. The remote on/off signal has priority).
Via the parameter ❼ in the last line, you can determine whether the unit starts automatically during a power supply return after a phase failure. (0 = not possible, the unit has to be restarted locally with this setting, 1 = possible).



The figure shows the parameters for the EC tower

The cooling priority ❶ determines which system has priority in units with two different cooling systems (dual-fluid units). The mixed mode, CW, DX (EC tower) parameters are possible for EC towers.

Mixed mode means that the system automatically chooses between cooling priority CW and DX (EC tower).
Note on the mixed mode parameter:
The mixed mode parameter is activated as standard for the EC tower. Because the CW setting is not permitted for the EC tower, the compressor cooling (DX) has priority in mixed mode.

CW means that the cold water cooling has priority for ACW/GCW units.
The CW setting is not permissible for the EC tower.

DX (EC tower) means that the compressor cooling has priority for ACW/GCW units.

7.2 Components

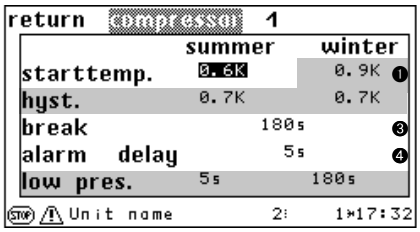
7.2.1 Refrigerant circuit, standard

Compressor

The compressor is usually installed in the air conditioning unit. However, it is also possible to actuate an external compressor. If this is the case, no installed compressor can be actuated.
Set the compressor type using the following command: comp 1 type 1 (installed compressor)
or: comp 1 type 2 (external compressor/ EC tower)
Establishing the compressor type determines which parameters of the compressor menu are effective.
The parameters for the external compressor/EC tower are explained in the following.

Menu structure of the Info, Operate and Config main menus
The menu structure of the Info, Operate and Config main menus is depicted in chapter “12. Menu structure of the main menu for operating the EC tower” on page 74.

Compressor, external EC tower **Operate** **Components/Cooling** **Compressor**



The parameters that are not effective for the external compressor are highlighted gray in the menu views of the C7000AT shown here.
Adjust the start temperature ❶ for the compressor as a positive difference to the setpoint. The compressor starts with the value in the menu opposite, e.g. if the room temperature is 0.6 kelvin over the setpoint.

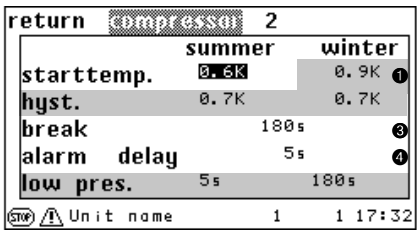
The compressor pause ❸ is entered in seconds and delays the restart by the set time. This reduces the number of possible compressor starts per time interval and has a positive effect on the compressor’s service life.

Alarm parameters:
Compressor alarm time delay ❹

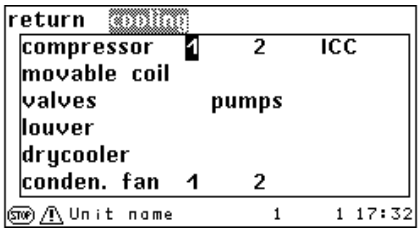
Activate basic settings for the EC tower
Activate the basic settings on the C7000AT operating interface as follows:
- Select “EC tower” to load the basic settings for ECD/U 091, 181 or 251.
- Select “EC tower 2” to load the basic settings for ECD/U 502.

Basic settings “EC tower” or “EC tower 2” load compressor type 2 (EC tower) at the same time.

Note on the basic settings “EC tower” and “EC tower 2”
The basic setting “EC Tower” is valid for ECD/U 091, 181 or 251. These units have a compressor each, which has to be parametrized in the “Compressor 1” menu.



The basic setting “EC Tower 2” is valid for ECD/U 502. These units have 2 compressors each, which have to be parametrized in the “Compressor 1” and “Compressor 2” menus.



Config

Components/Cooling

For ECD/U 091, 181 and 251

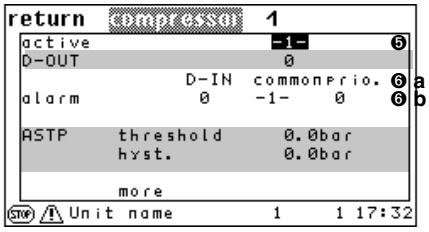
Select compressor 1 in the “Config/Components/Cooling” menu. This opens a new menu.

For ECD/U 502

Select compressor 1 and compressor 2 in the “Config/Components/Cooling” menu.

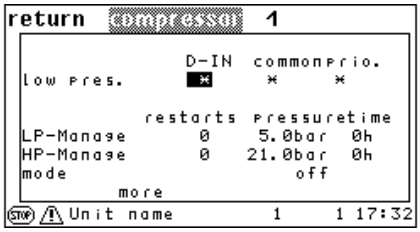
Components/Cooling

Compressor



In the first line, you can add a compressor to the configuration by entering a “1”. By entering “0”, you deactivate the compressor, whereby all settings related to the compressor are stored. ❺

The alarm parameters for the compressor alarm in the fourth line:
- Digital input ❻
- Common alarm actuation ❻a
- Alarm priority ❻b

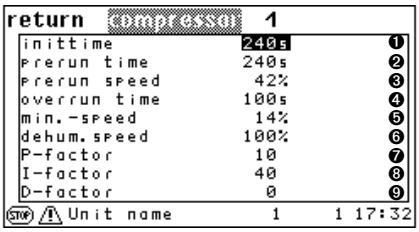


Note
The values in the figure opposite are not relevant for the EC tower.

Components/Cooling

Config

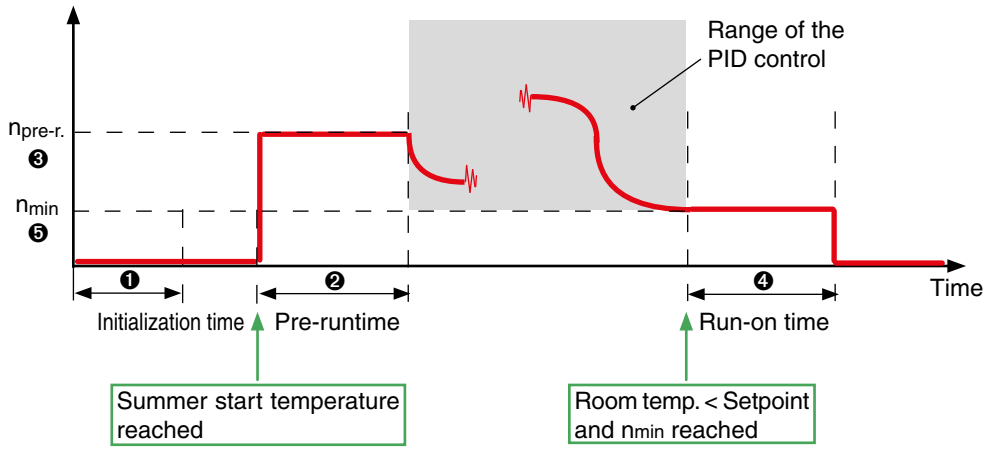
Compressor/more/more



The initialization time ❶, which you can adjust in the first line, serves to await the initialization phase of the outdoor unit. The initialization time begins as soon as the controller is supplied with voltage. During the initialization time, no alarms are monitored. For the initialization time to function properly, it is important that the outdoor unit is supplied with voltage at the same time as the controller.
You can adjust the pre-runtime ❷ in the second line. The pre-runtime must be adjusted depending on the compressor type. The pre-runtime begins as soon as there is a cooling request as a result of the summer start temperature being reached.
The pre-runtime speed ❸, which you can adjust in the third line, is the speed at which the compressor is operated during the pre-runtime.
The run-on time ❹, which you can adjust in the fourth line, can be used to achieve a minimum running time between two compressor starts.
If the room temperature is under the setpoint and if the compressor is operated at the set minimum speed, the run-on time begins. After the run-on time has elapsed, the compressor is switched off.

You can adjust the minimum speed ❺ of the compressor in the fifth line.
Adjust the dehumidification speed ❻ of the compressor in the sixth line.
You can adjust the proportional factor ❼, the integral factor ❽ and the differential factor ❾ in lines 7 to 9.

Compressor speed



The following parameters can only be adjusted using commands:
❿ Establishing an analog output for the control signal.
⓫ Establishing a digital input for the operating state signal from the external compressor.

Note
When there are low heat loads in the room, the dehumidification speed ❻ has to be reduced in order to achieve a suitable control behavior. If the value for the dehumidification speed is selected too low, there is no dehumidification.

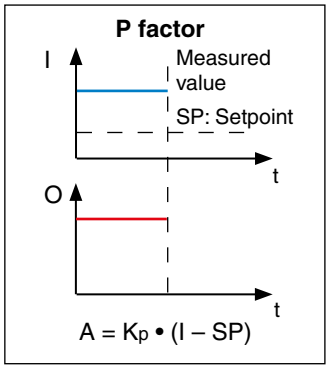
PID control

For the following components, a PID control can be set, consisting of a P factor, I factor and D factor:

- ICC
- HGBP valve
- G valve
- GE/CW valve
- EC tower
- Pump for CPP units
- Fan for differential temperature control
- Air dampers for DFC² control
- Condenser fan for DFC² control
- Variable-speed compressor

P factor

Via the P factor, you can set the ratio of the output variable to the input variable difference (measured value minus setpoint).
For each deviation from the setpoint, there is a fixed output value for the component, which should counteract the deviation.
A characteristic of the proportional regulation is a permanent deviation of the input variable from the setpoint as long as there is a disturbance variable.
As an example, the individual parts (P, I, and D part) shall be calculated for a setpoint deviation of $\Delta T = 0.3$ K for the GE/CW valve.



I: Input variable, return air temperature/supply air temperature, in general, condensation pressure for G valve.
O: Output variable, speed, for valves of the degree of openness

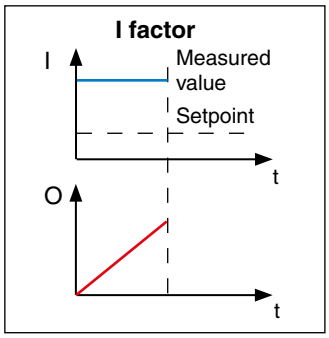
Example: $T_{setp} = 24$ °C
$T_{actual} = 24.3$ °C
$\Delta T = T_{actual} - T_{setp}$
$\Delta T = 0.3$ K

P factor: $K_P = 10$
Component-dependent constants: $k_{KP} = 1$

$\varphi_P = K_P \bullet \Delta T \bullet k_{KP}$
$\varphi_P = 10 \bullet 0.3 \bullet 1$
$\varphi_P = 3$ (degree of openness in %)

I factor

The integral part of the control is adjusted with the I factor. The integral part reacts to a difference between the measured value and setpoint with an output variable that is constantly rising. The larger the difference, the faster the output variable increases. The I part helps to avoid a constant setpoint deviation.
The sooner the control takes effect, the larger the chosen I factor can be.
Example: for ICC, if the supply air control has been set.
The more storage elements (e.g. such as big room volumes in the case of return air control) there are in the control circuit, the smaller the chosen I-factor has to be in to prevent the control circuit from oscillating.



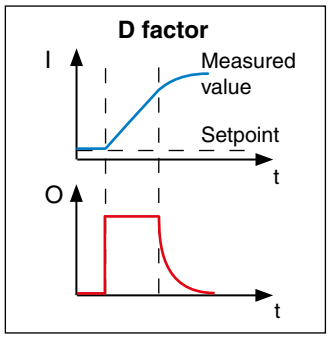
Example: $\varphi_I = K_I \bullet \Delta T \bullet t \bullet k_{KI}$
$\varphi_I = 10 \bullet 0.3 \bullet 1 \bullet 0.333$
$\varphi_I = 1$ (degree of openness in %)
After 5 sec.:
$\varphi_I = 5\%$

$\Delta T = 0.3$ K
$t = 1$ sec.

I factor: $K_I = 10$
Component-dependent constants: $k_{KI} = 0.333$

D factor

The differential part of the control is adjusted with the D factor. The change of the setpoint deviation is detected using the differential part. This allows a rapid change to the input variable to be counteracted quickly.
The size of the D factor should be adjusted depending on the possibility of a sudden change in the input variable. If the input variable is the return air temperature, a D factor does not make much sense because there are not usually any rapid changes in the return air temperature. On the contrary, setting a D factor for the G valve (input variable is the condensation pressure) or for the supply air control can lead to better control behavior.



To clarify the principle influence of the I/D part, an open control circuit is depicted here.
In reality, the control circuit is closed and the change to the output variable influences the input variable (measured value).

Example: $\varphi_D = K_D \bullet (\Delta T_n - \Delta T_{n-1}) \bullet k_{KD}$
$\varphi_D = 10 \bullet -0.1 \bullet 2$
$\varphi_D = -2$ (degree of openness in %)

Setpoint deviation
from time t_1 $\Delta T_{n-1} = 0.4$ K
from time t_2 $\Delta T_n = 0.3$ K

To determine the output variable, individual parts are added:

$\varphi = \varphi_P + \varphi_I + \varphi_D$
$\varphi = 3 + 5 + (-2)$
$\varphi = 6\%$

D factor: $K_D = 10$
Component-dependent constants: $k_{KD} = 2$

Instructions for adjusting a PID controller

These instructions answer the following questions, using a G valve as an example. However, the measures can also be transferred to other components that are controlled by a PID controller:

1.) Why is the G valve too fast?
2.) Why is the G valve too slow?
3.) Why does the G valve oscillate?

1.) PID controller too fast -> I part too large or P part too large
2.) PID controller too low -> I part too small or P part too small
3.) PID controller oscillates -> There are resonances between the PID controller and the system that has to be controlled. This usually happens when: 1.) the PID controller is too fast.

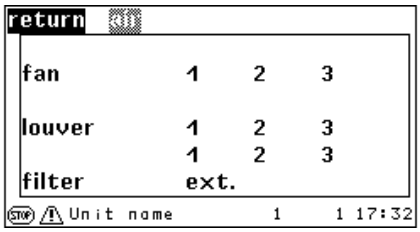
Adjusting a PID controller:

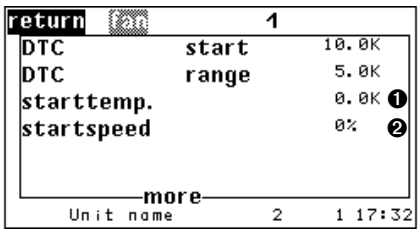
P part on 1
I part on 1
D part on 0

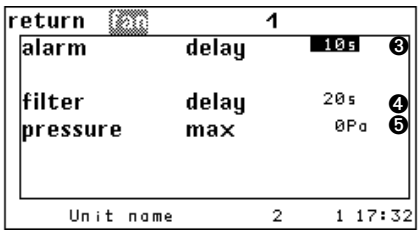
- increase the P part very slowly until the system begins to oscillate or behaves strangely in another way.
- now reset the P part to 50 % to 70 % of the value that was set before.
- increase the I part very slowly until the actual value is quickly adjusted to the exact setpoint but without oscillations.
- always leave the D part set to 0.

Not only the control parameters have an influence on the control characteristics. The actual water temperature and the actual compressor speed also have a very significant influence on the G valve.
Therefore, the G valve tends to oscillate with the basic settings when the water is very cold or when the compressor is running slowly or react a little slowly when the water is very warm and the compressor speed is high.
The basic settings of the G valve are selected so that they work satisfactorily for as many operating states as possible. Optimizations on one end (control speed) can easily cause significantly worse behavior at the other end (control stability, control accuracy).

7.2.2 Air circuit, internal standard components







Operate **Components/Air**

Fans

On the EC tower, a fan can be individually controlled.

The parameters “DTC start” and “DTC range” are related to the differential temperature control. The differential temperature control is not active for the EC tower.

Reduction according to temperature
Enter the start temperature as a negative difference to the air temperature setpoint. ❶
Enter the start speed as a percentage of reduction of the maximum speed. ❷

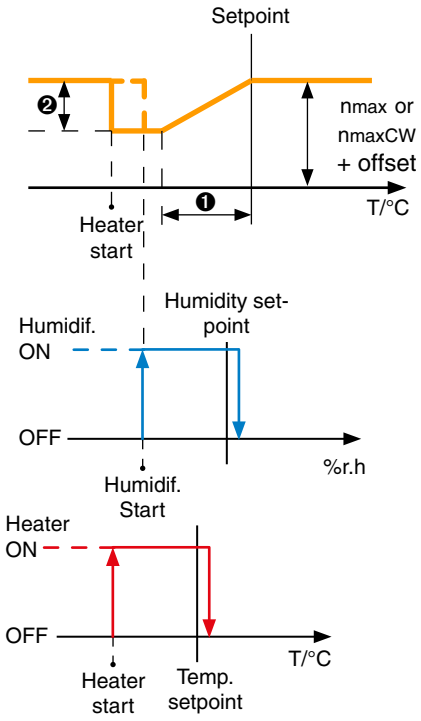
The speed lowers proportionately with a sinking air temperature up to the start speed if the set temperature difference ❶ under the temperature setpoint is reached. However, if the heater or humidification is requested, the speed is raised to its original value.

Alarm parameters:
Airflow alarm time delay ❸
Filter alarm time delay ❹

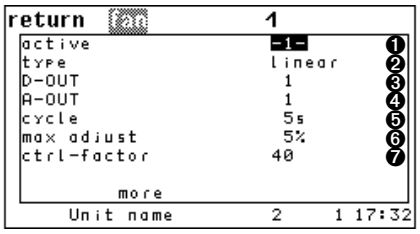
Monitoring the pressure drop of an internal air filter

You can set a maximum value ❺ for an analog differential pressure monitor, which monitors the pressure loss via the prefilter. An alarm is generated if the value is exceeded.
To correctly assign the differential pressure monitor, you must configure the sensor with the sensor purpose 24, 25 or 26.

Fan speed



.../general



The figure shows the parameters for the EC tower

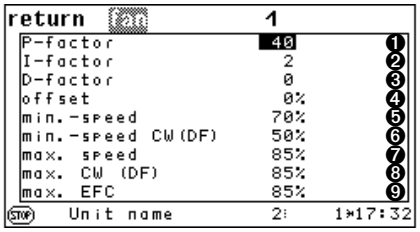
You add a fan to the configuration by setting the “ACTIVE” parameter to 1. You deactivate the fan with “0”. ❶
You define the fan type in the following lines (2 step: fan with on/off control, linear: EC fan with proportional speed regulation). ❷
You determine the digital output for an on/off fan using the “D-OUT” parameter ❸. The approval signal is outputted via this output in the case of a fan with proportional regulation.
You determine the analog output of the proportional signal for the EC fan using the “A-OUT” parameter. ❹

The parameters:
- control interval (CYCLE) ❺
- max. control change ❻
- control factor ❼

Fan type:
Type 1: On/Off control
Type 2: Proportional regulation

are required for the DFC control and for the differential pressure control. Using this parameter, the behavior of an integral control can be reproduced. For the DFC control, see the “GE systems” instruction manual.

.../general/more



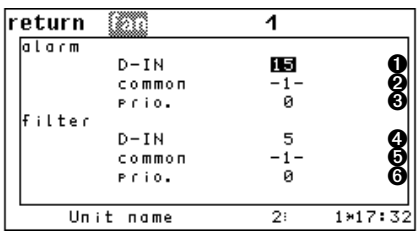
The figure shows the parameters for the EC tower

The P factor ❶, I factor ❷ and D factor ❸ for the control behavior can be adjusted in the first lines of the subsequent menu. These three parameters exclusively apply to the differential temperature control (Differential temperature control is not active on the EC tower).
The offset is used to adapt the cooling air pattern to unexpected conditions on the site (lower/higher pressure drop).❹
The minimum speeds, which you can adjust in lines 5 and 6, can only be bypassed using the setting under “REDUCE SPEED”. The maximum speeds should be adjusted according to the required layout air flow.
The minimum speed ❺ in line 5 and the maximum speed ❼ in line 7 apply to all units except for CW operation in dual-fluid units.
The minimum speed CW(DF) ❻ in line 6 and the maximum speed ❽ in line 8 apply to CW operation in dual-fluid units.
For dual-fluid units, the speed selection depends on the cooling priority. If there is a fault change-over, the other speed is chosen. See page 28 for an exact description of the conditions for a fault change-over.
The “max. EFC” parameter❾ is only required for the DFC control and not for the EC tower.

Note on the maximum speed ❼
Entering the maximum speed ❼ of the fan is necessary in order to establish the necessary airflow.
The maximum speed ❼ is meant for reaching the speed required for reaching the nominal airflow. This depends on the external pressure. Find the standard values on the wiring diagram data sheet.

Example:
U_S = 7.9 V corresponds with a maximum speed of 79 %.
(U_S: voltage of the control signal)

.../Alarm



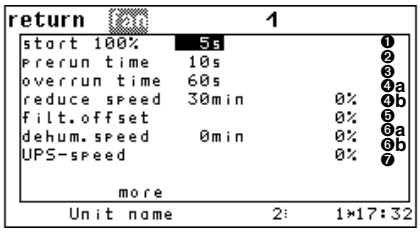
Alarm parameters:
Airflow alarm digital input ❶
Common alarm actuation ❷
Alarm priority ❸

Filter alarm digital input ❹
Common alarm actuation ❺
Alarm priority ❻

The alarms are handled in a special way in units that have 3 fans configured. The speed of the two remaining fans is increased to 100 % when one fan malfunctions. The third fan is switched off if two fans malfunction.

Components/Air
Fan/... (Part 2)

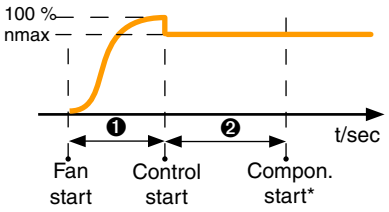
.../special



Config

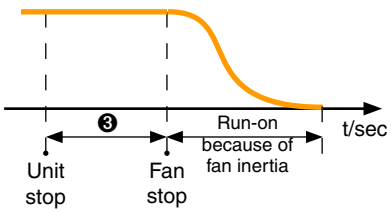
Using the “START 100 %” parameter ❶, you set a time that has to elapse before the fan control begins. This prevents an airflow alarm that could occur due to the fan rotor inertia. During this time, the fan runs at 100 % speed.
Using the “PRE-RUNTIME” ❷ parameter, you set the start delay of all other components in relation to the beginning of the control with alarm monitoring, with the exception of the glycol pump, which can also be started beforehand.
Different pre-runtimes for different units prevents the most current consuming components starting simultaneously and prevents the power supply of the building becoming overloaded.
The run-on time ❸ serves to dissipate hot or cold air in the unit and to avoid a build-up of heat at the heater or a build-up of cold at the evaporator.
If no functions (cooling, heating, humidifying, dehumidifying) have been requested during a period of time that you define in the fourth line ❹**a**, the speed decreases by the percentage that you adjust with “RED. SPEED.” ❹**b**.
The “FILTER OFFS.” ❺ is entered as a positive difference to the maximum speed. If a filter alarm is triggered, the maximum speed is increased by the filter offset value in order to overcome the higher air resistance of a clogged filter.
If there is a dehumidification request during the time up to the dehumidification reduction ❻**a** and beyond, the dehumidification is introduced by reducing the fan speed. This time gives the unit the opportunity to regulate the humidity via dehumidification through the expansion valve. This parameter should be at 0 for units without an electronic expansion valve.
The “DEHU. SPEED” ❻**b** is entered as a negative difference in % to the maximum speed. This is the speed for the first dehumidification method.
The “UPS SPEED” ❼b is also entered as a negative difference in % to the maximum speed. If the controller receives a UPS signal, it uses this speed to carry out a backup operation.

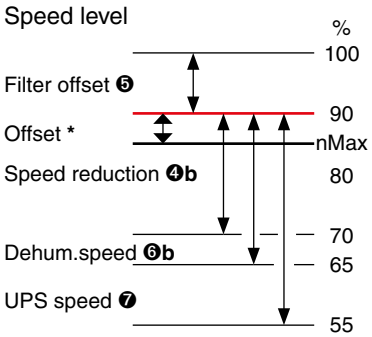
Fan start phase



*Start all control-relevant components except for the glycol pump that can be started beforehand.

Fan stop phase





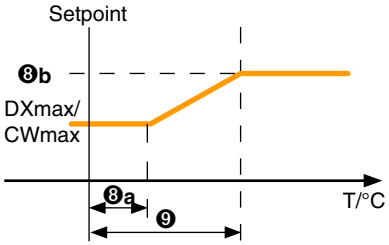
* The meaning of the offset is explained on the previous page.

If the unit is operated in nominal operation at a low airflow rate, the fan speed can be raised when the temperature setpoint is exceeded depending on the temperature difference to the setpoint.
For this you set a positive temperature difference (EMERGENCY START) ❽**a** to the setpoint, which represents the start point of the speed increase.
In addition, you set a maximum speed (EMERGENCY SPE.) ❽**b** for overload operation and a temperature difference (EMERGENCY END) ❾ to the setpoint, which marks the end point of the proportional speed increase. When reaching this second temperature difference, the fan is operated with the maximum speed for the overload operation. This speed is also kept when the temperature rises again.

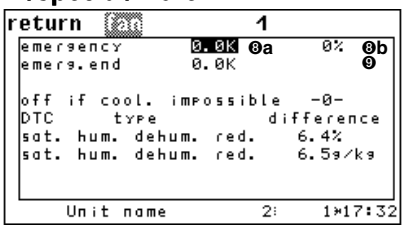
In the last line, you can stop the fan operation by setting a “1” if cooling is not possible because the compressor is in an alarm state.

The type of differential temperature control is set using the parameter “DTC type”.
The “DTC type” parameter is not relevant for the EC tower.

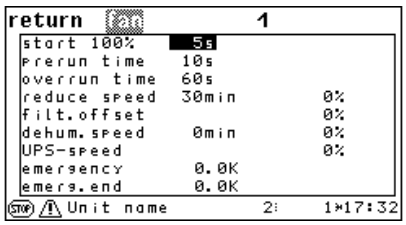
Fan speed



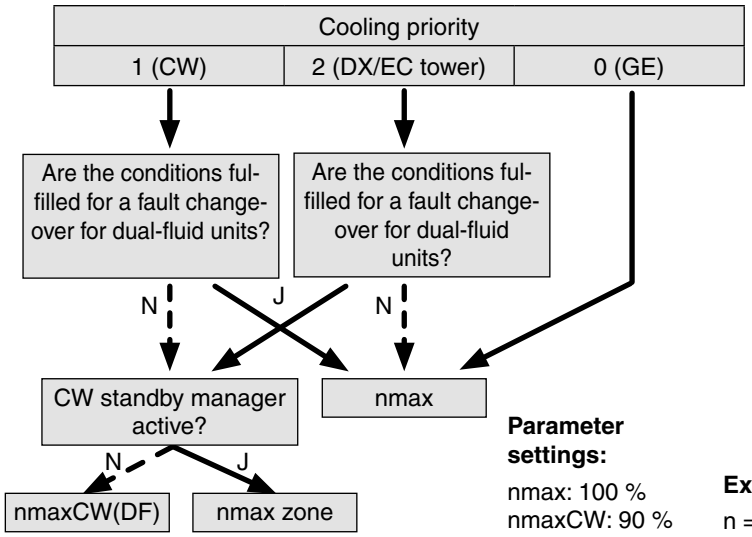
.../special/more



EC tower:
Recommended values in the Config main menu Components/Air/Fan:



Components/fans (part 3) - Determining the speed



The following decision processes are ran through by the controller when calculating the speed.
The output speed nmax or possibly nmaxCW(DF) for dual-fluid units is chosen according to the cooling priority and the conditions for a fault change-over. (For details on cooling priority, see page 28)
Afterwards, 4 queries are performed, which result in successive speed reductions (or increases) being carried out. To conclude, checks are carried out into whether the minimum speed is adhered to and whether the conditions for the RED. SPEED are fulfilled, which can bypass the minimum speed as an individual reduction.

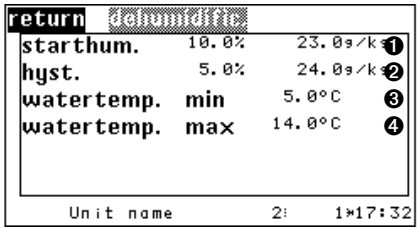
	Parameter settings:	**Example 1:**	**Example 2:**
	nmax: 100 % nmaxCW: 90 %	n = nmax	n = nmaxCW(DF)
Actual $T_{air} \geq T_{setpoint}$ + EMERGENCY START? (Overload function)		Assumption: Condition not OK n = nmax =100 %	Assumption: Condition not OK n = nmaxCW 90 %
Are the conditions for START SPEED fulfilled?	10 %	Assumption: Condition OK n = 100 % - 10 % n = 90 %	Assumption: Condition OK n = 90 % - 10 % n = 80 %
Is there a dehumidification request with DEH.SPEED speed reduction?	20 %	Assumption: Condition OK n = 90 % - 20 % * 90 % n = 72 %	Assumption: Condition not OK n = 80 %
Does the unit run with UPS SPEED speed reduction in UPS operation?	30 %	Assumption: Condition OK n = 72 % - 30 % n = 42 %	Assumption: Condition not OK n = 80 %
Is a filter alarm pending and must the speed be increased by the filter offset?	10 %	Assumption: Condition OK n = 42 % + 10 % n = 52 %	Assumption: Condition OK n = 80 % + 10 % n = 90 %
Is the minimum speed kept?	60 %	Condition not OK because n $\leq$ 60 % so n = 60 %	Condition OK so n = 90 %
Can a RED. SPEED speed reduction be performed due to the non-request of air conditioning technology functions within the RED. TIME?	50 %	Condition not OK because of dehumidification n = 60 %	Assumption: Condition OK n = 90 % - 50 % * 90 % n = 45 %

Key: Yes, No, Next step

Operate

Components/humidity

Dehumidification

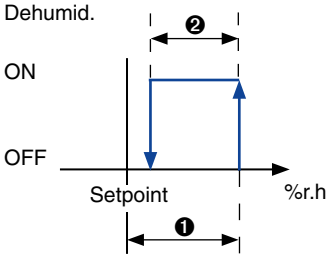


The start humidity for the dehumidification is entered as a positive difference to the room humidity setpoint. ❶
To fundamentally block the dehumidifying function, the start humidity has to be set to 100 %.
The hysteresis for the dehumidification step is entered in the second line.❷

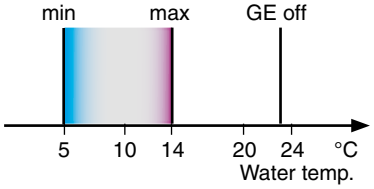
Adjusting the water temperature limits for the dehumidification relates to the possibility of dehumidifying the air via a GE register using fan speed reduction. ❸❹
If the water temperature limits are exceeded, the controller switches to dehumidification using the compressor operation.

Note:
The dehumidification speed is set in the Air/Fan menu.

On/Off control



Dehumidification range

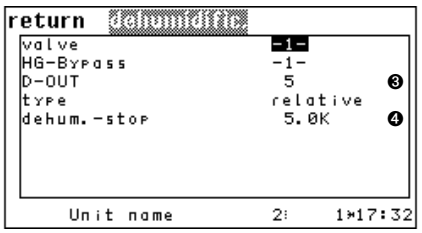


Config

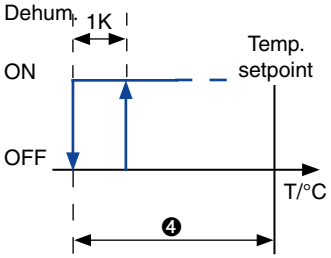
Dehumidification

When there is a dehumidification request with compressor operation, the full refrigerant mass flow is required by the partial admission flow of the evaporator or by the airflow reduction due to the drops below dew-point.
This also applies during compressor operation and speed reduction.
You determine the digital output for the dehumidification using the “D-OUT” parameter. ❸

In order to avoid a feedback circle of dehumidification and cooling, where the sinking temperature causes an increased rel. humidity which then leads to a new dehumidification request, you can enter a stop temperature ❹ which is set as a negative difference to the air temperature setpoint and avoids dehumidification during a shortfall.
The dehumidification is switched on with a fixed hysteresis of 1 Kelvin as soon as the room temperature rises above the stop temperature (+ 1 Kelvin) again.



Dehumidification stop



Process of dehumidification for the EC tower (Size 1 and 2):
During a dehumidification request, the speed of the fan is reduced and the compressor operation is converted to the nominal speed (100 %) (see “Config/Compressor/Dehumid. speed” on page 28).

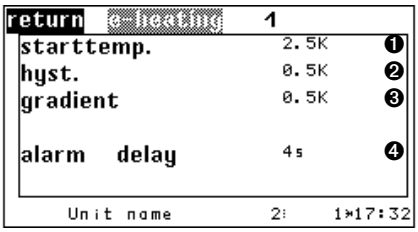
Process of dehumidification for the EC tower (Size 3):
During a dehumidification request, both compressors are converted to the nominal speed (60 %).

7.2.3 Air circuit, internal components

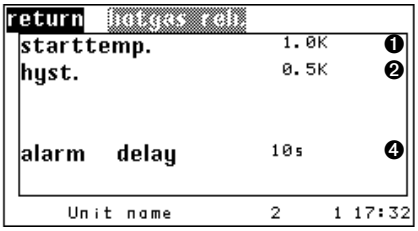
Operate

Components/Heating

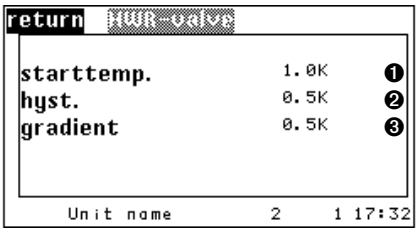
Electric heater/KM heater/PWW heater

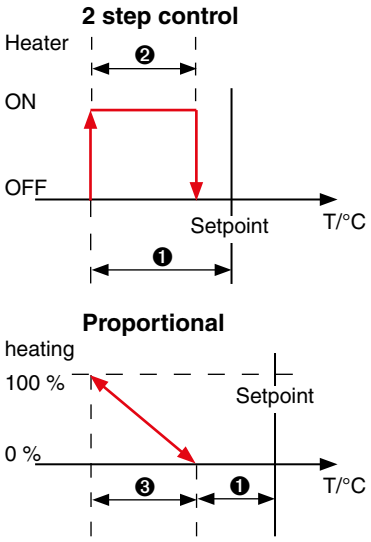


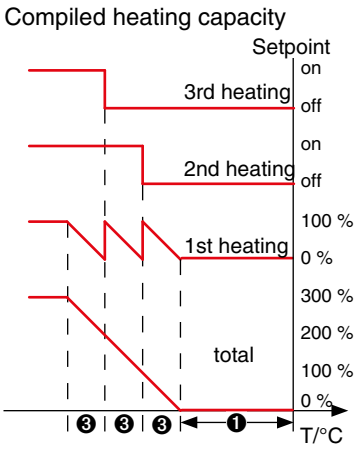
Depending on the configured heating type, different parameters are decisive.
The start temperature for the heater is entered as a negative difference to the room temperature setpoint. ❶
The corresponding hysteresis for the heating stop is only valid for heaters with 2 step control.❷
For proportional electric heaters/PWW heaters, you can adjust a gradient, which determines the temperature range in which the heating capacity increases from 0 to 100 %.❸
Alarm parameters:
Electric heater alarm time delay ❹



Only the first electric heater can be controlled proportionately. If this is the case and several heaters are present (max. 3), then only the start value and the gradient of the first heater are decisive for the control.
Every time the proportional heater reaches 100 % heating capacity, a further heater is switched on and the capacity of the first heater is reduced to 0 %. Therefore, 3 separate heaters work like an overall heater. (see below)



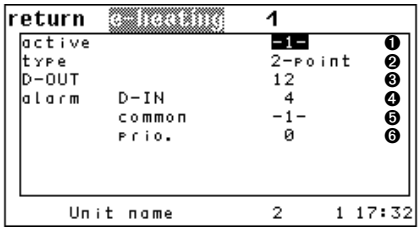




The electric heater(s) is/are switched off if at least one fan runs under the minimum speed or is switched off.

Components/heater

Electric heater

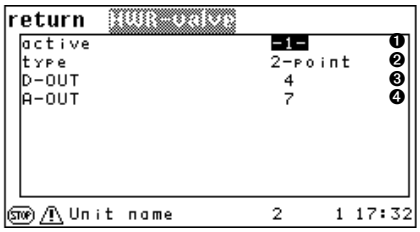


The PIN assignment of the electric heater is described in chapter “3.1.1 PIN assignment - I/O controller” on page 7.
You add an electric heater to the configuration by setting the “ACTIVE” parameter to 1. You deactivate the heater with “0”. ❶
You define the heater type in the following line (2 step: heater with on/off control, linear: heater with proportional regulation). ❷
You determine the digital output ❸ for the heater using the “D-OUT” parameter.
The proportionally-regulated electric heater is controlled via the pulse width modulation and receives the control signal via a determined PWM output. A digital output does not need to be determined for the proportionally-regulated electric heater.

Alarm parameters:
Digital input ❹
Common alarm actuation ❺
Alarm priority ❻

Electric heater type:
Type 1: On/Off control
Type 2: Proportional regulation

PWW heater



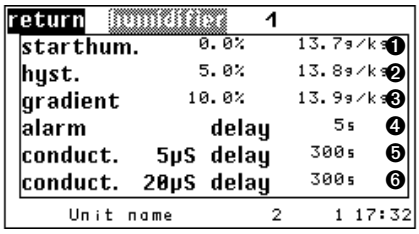
You add a PWW valve to the configuration by setting the “ACTIVE” parameter to 1. You deactivate the valve with “0”. ❶
You define the valve type in the following line (2 step: solenoid valve with on/off control, linear: 3-way valve with proportional regulation). ❷
You determine the digital output for the solenoid valve using the “D-OUT” parameter. ❸
You determine the analog output of the proportional signal for the PWW valve of the PWW heater with the “A-OUT” parameter. ❹

Valve type:
Type 1: On/Off control
Type 2: Proportional regulation

Operate

Components/humidity

Humidifiers

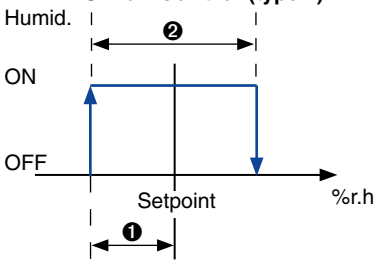


Depending on the configured humidifier type, different parameters are decisive.
The start humidity for the humidifier is entered as a negative difference to the room humidity setpoint. ❶
The corresponding hysteresis for the humidifier stop is only valid for humidifiers with 2 step control.❷
For proportional humidifiers, you can set a gradient, which determines the humidity range in which the humidifying output increases from 0 to 100 %.❸

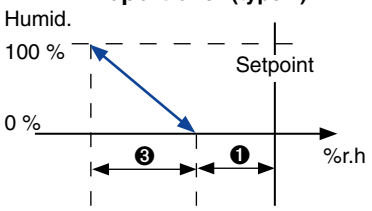
Alarm parameters:
Humidifier alarm time delay ❹
Conductivity alarm time delay at 5µS ❺ and at 20µS ❻

The conductivity alarms are available when conductivity measuring equipment is used, which is required for monitoring the water conductivity for ultrasonic humidifiers.

On-off control (type 1)

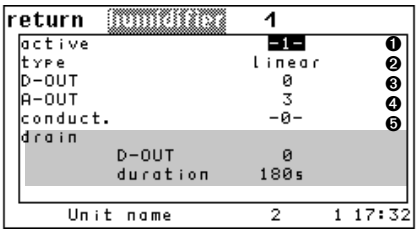


Proportional (type 2)

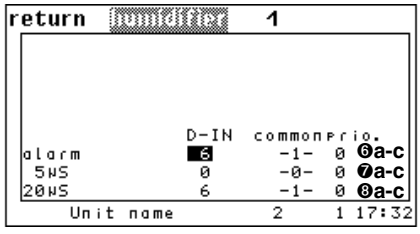


Config

Humidifiers

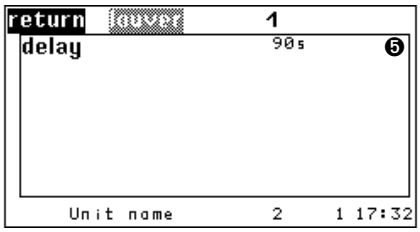


You add a humidifier to the configuration by setting the “ACTIVE” parameter to 1. You deactivate the humidifier with “0”. ❶
You define the humidifier type in the following lines (2 step: humidifier with on/off control, linear: humidifier with proportional regulation). ❷
You determine the digital output for a 2 step humidifier using the “D-OUT” parameter. ❸
You determine the analog output of the proportional signal for the humidifier using the “A-OUT” parameter. ❹
You can configure conductivity measuring equipment ❺ in the fifth line. This is necessary for monitoring the water conductivity for ultrasonic humidifiers.



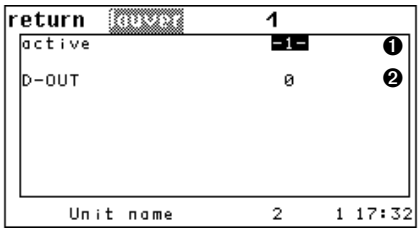
Alarm parameters of the humidifier alarm in the sixth line:
Digital input ❻**a**, common alarm actuation ❻**b**, alarm priority ❻**c**.
In the seventh line, these parameters can be adjusted for the conductivity alarm at 5µS ❼**a-c** and in the eighth line for the conductivity alarm at 20µS ❽**a-c**.
These alarms are available when conductivity measuring equipment is used.

7.2.4 Air circuit, external optional components



Operate → **Components/Air** → **Air damper**

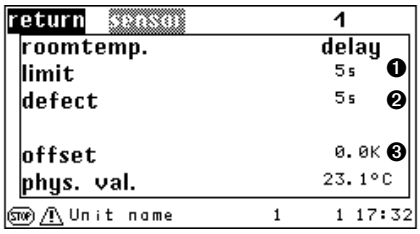
As long as one air damper is configured, this is opened after the control of the unit has been switched on using the start/stop button.
The adjustable pre-runtime serves to open the air damper before the fan starts. This prevents the fan blowing against a closed air damper. ❺
If the control of the air conditioning unit is switched off, the air damper is closed after the fan's run-on time has elapsed.



Config → **Air damper**

You add an air damper to the configuration by setting the "ACTIVE" parameter to 1.
You deactivate the air damper with "0". ❶
You determine the digital output for the air damper using the "D-OUT" parameter. ❷

7.2.5 Sensors



Operate → **Components/Sensors**

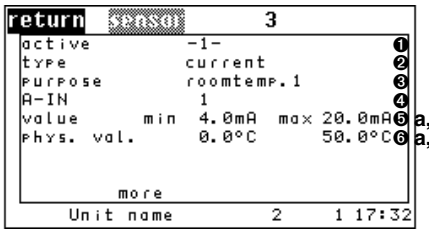
After selecting the sensor, you can enter the time delay for the limit value alarm ❶ and the time delay for the sensor fracture alarm ❷ in seconds into the subsequent window.
Using the sensor adjustment (OFFSET), you can calibrate the sensor with help from a reference measuring instrument. ❸
Compare the physical value display with the value of the reference measuring instrument and modify the "Offset" parameter until the displayed value "Phys. value" matches the value of the reference measuring instrument. Enter the value of the reference measuring equipment directly.

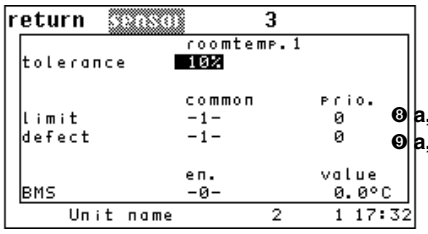
If the phrase "reset" is entered instead of a temperature, the sensor adjustment is removed.

Components

Sensor

Config





You add a sensor to the configuration by setting the “ACTIVE parameter” to 1. You deactivate the sensor with “0”. ❶
You can determine the sensor type in the next line (1: current, 2: voltage). ❷
Using the “PURPOSE” parameter, you can specify what the sensor is used for ❸.
You determine the analog input for the proportional sensor signal using the “A-IN” parameter. ❹
See the table below: Sensor parameters “Purpose” and “A-IN” for the EC tower.

The following five points are about calibrating the sensor. The minimum measuring value (phys. value) **❻a** is assigned to the minimum output value (value). **❺a**
The minimum measuring value (phys. value) **❻b** is assigned to the maximum output value (value). **❺b**
The set measuring value’s unit depends on the intended use of the sensor (1-35). The set output value's unit depends on the sensor type (current, voltage).
If more than one sensor has the same purpose, an average value is calculated. In the first line of the subsequent menu, you can set a maximum deviation from the average value ❼, which triggers the “Sensor ## error” alarm when the value is exceeded. At least 3 sensors with the same purpose are required to utilize this alarm.

Alarm parameters:
Sensor errors in the second line
Common alarm actuation **❽a**
Alarm priority **❽b**

Sensor fracture alarm in the third line
Common alarm actuation **❾a**
Alarm priority **❾b**

External setpoint:
An external setpoint can be specified using sensor purposes 17 and 18. This setpoint has priority over the internal setpoint.

The last line indicates whether the measured value is delivered by a BMS (e.g. by an external sensor). If this is the case, the value is automatically enabled and accepted as the actual value for this sensor. The value in the “en.” column will then be -1-. The measurement value itself is displayed in the “value” column.
This external measurement value can be deactivated by setting “0” as the value in the “en.” column ❿. Then the value that is measured at the corresponding analog input is taken as the actual value.

Table: Sensor parameters “Purpose” and “A-IN” for the EC tower

No.	Parameter	Description			
❸	Purpose	Room/return air temperature sensor	Room/return air humidity sensor	Supply air temperature sensor	Supply air moisture sensor
❹	A-IN	A-IN 1	A-IN 2	A-IN 3	A-IN 4

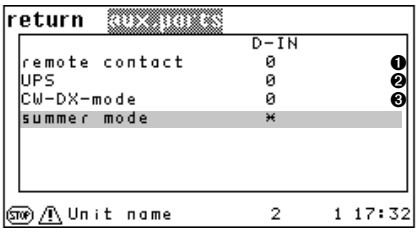
7.2.6 Contacts

Components

Config

Contacts/...

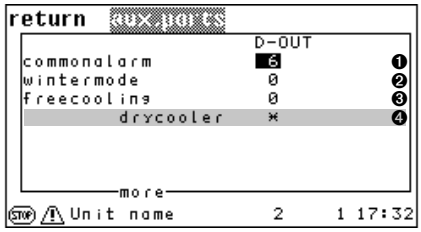
.../ D-IN

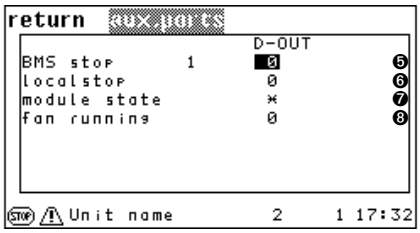


In this menu, you can assign digital inputs to external signals.
Furthermore, you can determine digital inputs for the remote on/off contact ❶, for the UPS operation ❷ and for the external cooling priority provision ❸ .

The summer operation setting is only relevant for DFC² control.

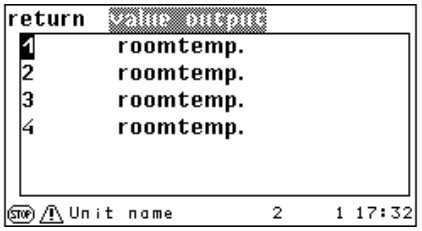
.../D-OUT

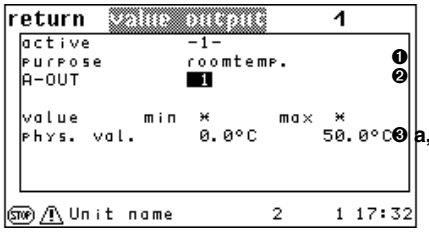




In this menu, you can assign digital outputs to unit-related alarms and signals.
More specifically, you can determine the digital output for the common alarm ❶ and for winter operation (= approved Free Cooling) ❷. The winter operation signal can be forwarded to the BMS. Furthermore, the status of the Free Cooling operating type ❸ (Free Cooling also means mixed mode here), of Free Cooling with a dry cooler ❹ (only for chiller software), of the BMS stop 1 (control has been switched off via BMS) ❺ and of the local stop ❻ (control switched off via the start/stop button) can be outputted on a digital output.
Using the “module status” parameter, you can adjust the digital output ❼ which is used to display whether the unit is in operation or is in some kind of stopped condition.
In the last line, you can adjust the digital output ❽ that is used to show whether a fan is running.

Contacts/A-OUT

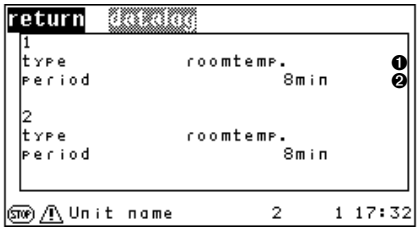




In this menu, you can output analog measurement values via analog outputs so that these can be recorded by a BMS, for example.
Choose one of 4 value outputs that are set as standard with the “Room temp.” sensor purpose.
This opens a window that allows you to apply settings for this value output. You can activate the value output in the first line. This means that you can place the settings in lines 2 to 4 beforehand and save them without the value output occurring. The value output only begins once you set the parameter in the first line to “1”. If there are several sensors with the same purpose, an average value is calculated.
The actual value that is outputted is determined in line 2. Using purpose ❶ (as shown on the previous page), the sensor that has this purpose is selected. If you select a purpose that has no sensor configured to it, the outputted value is 0V. Specify the analog output ❷ in the third line.
The parameters in line 5 serve to calibrate the output. For example, if you have chosen a sensor with the purpose Water temperature inlet 2 and have entered the value 5.0°C in line 5 for the “min” parameter ❸**a**, you have thus specified in the lower limit. 0V is outputted at 5.0°C. 0V is also outputted at 4.0°C. Determine the upper limit, at which 10V is outputted, using the “max” parameter ❸**b**.

7.3 Statistics

Config → **Statistics** → **Data loggers**



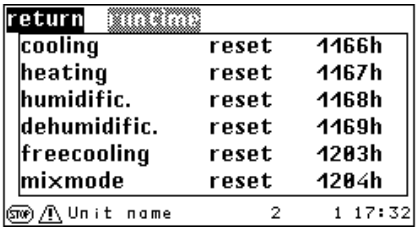
Here, you can adjust the basic conditions for both data loggers.
This includes sensor type ❶ and cycle rate (periods) ❷, giving the intervals at which measured values of the corresponding sensor are stored.
Each data logger can store a maximum of 1440 data points. The 1441st data point deletes the first data point, etc. If you set 1 minute as the cycle rate, you will receive a graphic over a period of 1440 minutes, which is exactly 24 hours. If you set 2 minutes as the cycle rate, data points will be stored over a period of 2 days, etc.
Considering that a pixel width of only 180 is displayed in the graphic, we recommend choosing the cycle rate depending on the period of time that is going to be displayed (Info menu).

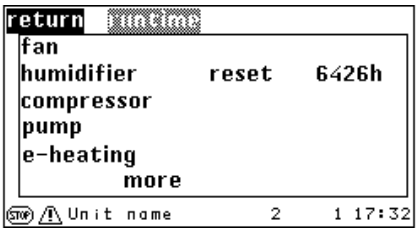
Time period (info menu)	Cycle rate
- Hour	1 min.
- Day	8 min.
- Week	60 min.
- Month	240 min.
- Year	2880 min.

TYPE (for C7000 command) :
1 - unit - room temperature
2 - unit - room humidity
3 - unit - supply air temperature
4 - unit - supply air humidity
5 - water temperature, inlet 1
6 - outside temperature
7 - outdoor humidity
8 - condensation pressure 1
9 - hot-gas temp. 1
10 - evaporation pressure 1
11 - suction gas temp. 1
12 - zone room temperature
13 - zone room humidity
14 - zone supply air temperature
15 - zone supply air humidity
16 - zone outdoor temperature
17 - water temperature, inlet 2
18 - water temperature, outlet 1
19 - water temperature, outlet 2

When changing a parameter (type or cycle rate (period)) or if the controller is de-energized, all previous data of the corresponding data logger is deleted.

Statistics → **Runtimes**



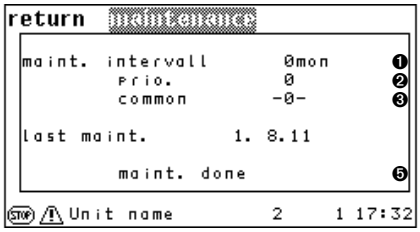


This compilation of runtimes only exists in the C7000 Advanced. The runtime menus are an exact copy of the menu branch with the same name in the Info menu. However, they also allow runtimes to be reset.
Unlike the settings options in the C7000 I/O controller, in the C7000 Advanced you can also reset the runtimes of superordinate unit functions.

Operation:
1. Select functions (cooling, heating, etc.) with the arrow keys
2. Confirm using the OK button
3. The cursor is now located in the center column on the “Return” field. Using the arrow keys, you can choose between the “Delete” and “Return” options.
4. Confirm the chosen function using the OK button.

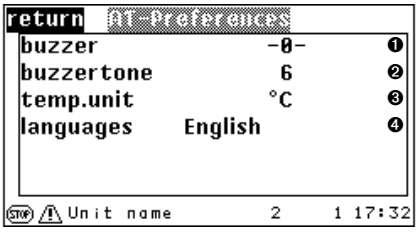
Config — Statistics

Maintenance



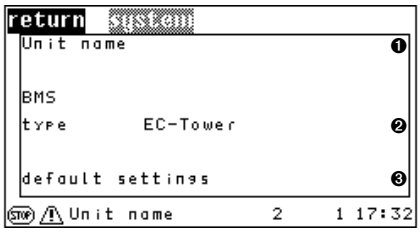
This function supports you by monitoring the service intervals when the unit is commissioned.
If the service intervall has elapsed, the symbol appears in the main menu.
You enter the service interval that you think is appropriate into the first line. It is possible to enter 0-24 months. You circumvent the monitoring function ❶by entering “0”.
You can assign the maintenance alarm to an alarm relay ❷ in the second line. If there is a maintenance alarm, this appears when the internal IOC clock displays 8:00 o’clock.
You can decide whether the maintenance alarm should trigger a common alarm ❸ (1-yes, 0-no) in line three.
If you are on the “MAINTENANCE DONE” field and you press the OK button, you confirm the maintenance has been performed ❺. The controller then sets today’s date in the fourth line and stores it.

Operate — System



You can switch the alarm sound ❶ on (-1-) or off in the System menu. Furthermore, you can adjust the pitch ❷ of the alarm sound.
In the “Temperature unit” menu item ❸ , you can choose between a display in degrees Fahrenheit and in degrees Celsius.
You can select the operating language for this display and for the service interface in the Language menu ❹ .
The Info submenu displays the C7000AT’s software version.

Config — System/...

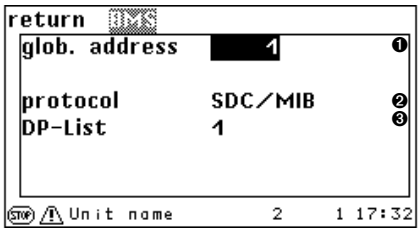


In the first line of the menu, you can enter a unit name ❶ with up to 16 characters. This entry is not possible via the C7000IOC.
The unit type ❷ is displayed in the third line. You can adjust it via the “Basic settings” submenu ❸. Several pre-configurations are stored in the I/O controller for different unit designs.

Activate basic settings for the EC tower

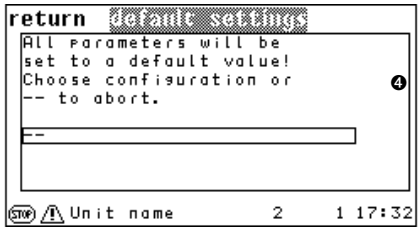
- Select “EC tower” to load the basic settings for ECD/U 091, 181 or 251.
- Select “EC tower 2” to load the basic settings for ECD/U 502.

.../BMS



In this window, you can adjust the unit’s global address ❶ in the first line. This address is so that the unit can be detected for building services management systems.
In the second line, you can adjust the protocol ❷ for communicating with a BMS.
In the third line, you can select the datapoint list ❸ if the “Modbus” protocol has been set.

.../Basic settings



By selecting a pre-configuration ❹, settings that are tailored to the unit type are put into effect. These settings are compiled in the table on page 69.

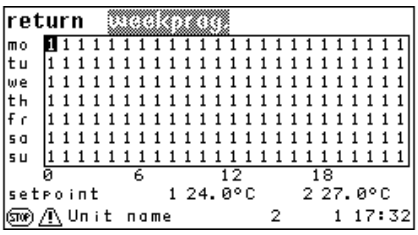
8. Special operating modes

8.1 Week program

Config

Values

Week program



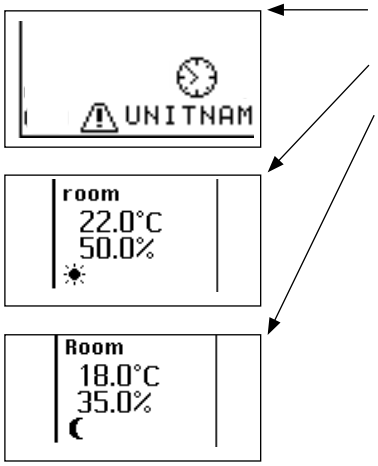
The week program is based on two different temperature setpoints that you have already set in the **Operate/Values/Air/Temperature** menu. Setpoint 1 is represented by a “1”, setpoint 2 by a “2”.
The setting is designed in a user-friendly way. Each digit represents an hour of the day. The week day is represented by the line. Using the **selector button** you can move forward and backward between the hours of the day. When you get to the end of a line, the cursor jumps to the beginning of the next line.

Using the **OK button** you can change the value of the position where the cursor is. There are three values that can be used: 0, 1 and 2. By pressing the OK button, these values appear in ascending order and then begin at “0” again.

By pressing the **button combination selector button + OK button**, the value where the cursor is placed is copied to the next position (according to the direction chosen by the selector button). This means that several hours or days can be adjusted quickly.

You can choose between three settings for each hour of each weekday:

Display in the main menu when executing the week program:



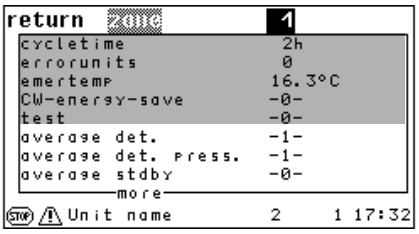
	Display:
1. Unit off	0
2. Unit on with setpoint 1	1
3. Unit on with setpoint 2	2

8.2 Zone control

The zone concept is based on the idea of keeping a homogeneous room climate within a spatial area by spatially distributing the chilling.
Up to 20 zones can be defined within an I/O bus. A zone is defined if at least one unit is allocated to that zone. A unit is allocated to a zone by setting a zone number in the title line of the menu **Z1**.
This has to be carried out for each unit (each IOC) separately.
The setpoints are set individually for each unit but should only deviate very slightly from one another, if at all.

Setting zone numbers 1-20

Config/Zone (Z1)



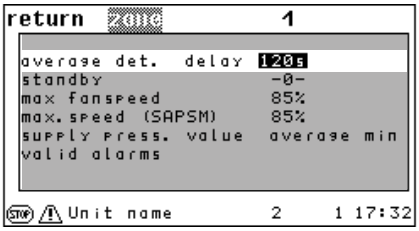
Average value calculation

Calculating the average of the measurement values is a basic principle of the zone control. According to this, there is only one room temperature within a zone. It is calculated by averaging the values of all connected room temperature sensors. The same applies for the room humidity, supply air temperature, supply air humidity, outside temperature, water inlet temperature 1 and the differential pressure, if applicable.
The average value calculation for all of the parameters mentioned above can be issued using the parameters in the sixth line of the **Z1** menu (0 = off, 1 = on). The average value calculation for the air differential pressure during differential pressure control can be enabled or canceled in the seventh line. Using the parameter in the eighth line of the same menu, you can define whether the standby units should be included in the average value calculation (0=no, 1=yes). Units that have been switched off locally (e.g. via the start/stop button on the C7000AT) are part of the average value calculation.

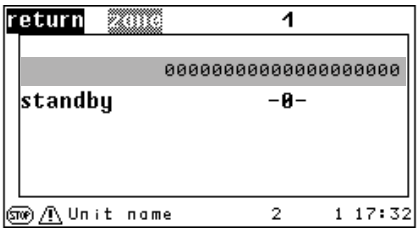
If the following prerequisites are fulfilled:
- zone contains a few units only;
- a standby unit, which was out of operation for a long time, is switched-in;
- the average value calculation for temp./humid is switched on;
- the units are equipped with Free Cooling;
- Free Cooling is enabled,

the calculated average value may be so high, because of the accumulation of heat at the standby unit (the water in the standby unit cooling water lines takes on the room temperature), that Free Cooling is disabled (GEoff parameter), even though the system's water temperature is actually appropriate for it. To circumvent this problem, you can set a time delay for evaluating the average value. During this time the accumulation of heat at the standby unit can dissipate.

Config/Zone/more/more(Z2a)



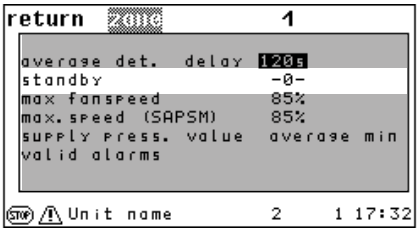
Operate/Zone (Z0)



Standby units

In menus **Z0** and **Z2a**, the unit can be set as a standby unit by adjusting the parameter in the third line to "1".
The presence of standby units in a zone increases the operational reliability of the air conditioning technology and allows unit capacity losses to be replaced by standby capacities.

Config/Zone/more/more(Z2a)



Alarm change-over

So that there is a change-over when alarms occur, alarms can be defined as valid in menus **Z3a, Z3b, Z3c** and **Z3d** by adjusting the parameter to “1”. If this type of alarm (which is defined as valid) occurs, the defective unit is switched off and the standby unit with the next highest bus address is switched on. If another unit with a valid alarm in the zone fails, a further standby unit is switched on if there is one available.

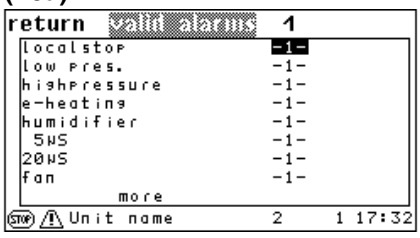
Some alarms lead to the defective unit being switched off or to certain functions being deactivated even if the alarm has not been defined as valid (for details, see chapter “11.4 Alarm texts” on page 72).

The “Unit not reachable” alarm cannot be left out of the configuration and so always remains valid. This alarm also occurs if the unit is de-energized.

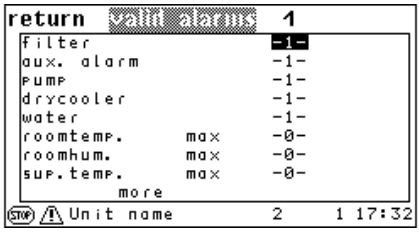
Valid alarms:

--.Not reachable	01.Switched off manually
02.Replaced by 30, 31, 32	03.Replaced by 30, 31, 32
04.Heater error	05.Humidifier error
06.Humidifier 5uS	07.Humidifier 20uS
08.Airflow failure	09.Filter contaminated
10.External alarm	11.Pumps error
12.Dry cooler error	13.Water detector
14.Return air temp. too high	15.Return air humidity too high
16.Supply air temp. too high	17.Supply air humidity too high
18.Return air temp. too low	19.Return air humidity too low
20.Supply air temp. too low	21.Supply air humidity too low
22.Replaced by 37, 38, 39	23.Replaced by 40, 41, 42
24.Fire/smoke detector	25.Sensor error
26.Sensor fracture	27.Refrigerant heater failure
28.Phase failure	29.BMS stop 1
30.Refrigerant circuit 1	31.Refrigerant circuit 2
32.Refrigerant circuits 1&2	33.Reserved for CyberCool2
34.Reserved for CyberCool2	35.Reserved for CyberCool2
36.Reserved for CyberCool2	37.Water temp. in 1 high
38.Water temp. in 2 high	39.Water temp. in 1 & 2 high
40.Water temp. in 1 low	41.Water temp. in 2 low
42.Water temp. in 1&2 low	

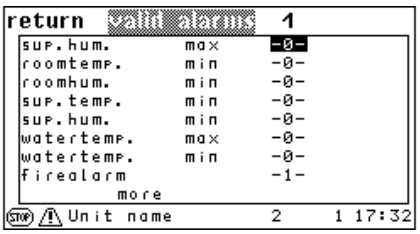
Config/Zone/More/Valid alarms (Z3a)



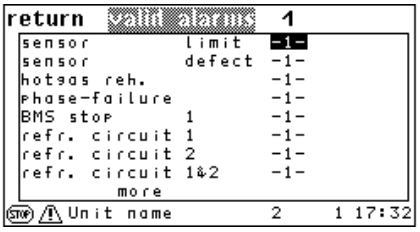
.../Valid alarms (Z3b)



.../Valid alarms (Z3c)



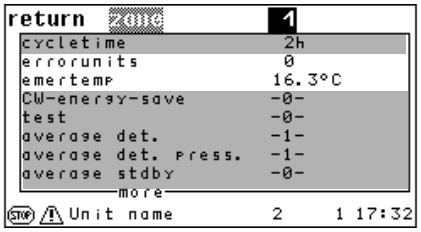
.../Valid alarms (Z3d)



Backup operation

It is possible to set a backup operation using the parameter in the second line of the **Z1** menu. If this parameter is set to “0”, the backup operation is deactivated. Using this parameter you can adjust the number of defective units that leads to the backup operation being introduced.
During backup operation, all units of an IO bus take on the zone-specific emergency temperature as the setpoint. The emergency temperature is adjusted per zone by means of the parameter in the third line of the **Z1** menu.

(Z1)



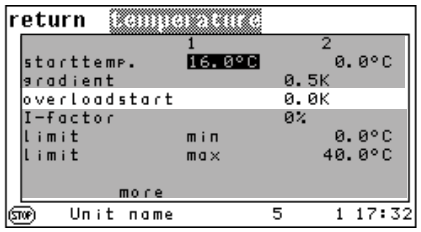
Function of the standby units

The failed units are registered as defective units even if the failed unit capacity of a zone is completely compensated for by the standby units being started.
In order for a backup operation to start once the full function unit capacity of a zone is no longer reached, the set number of defective units should be higher than the number of a standby units in a zone.

Additional capacity - Cooling (previously: temperature)

It is possible to have a standby unit start when the air temperature setpoint is exceeded by the zone temperature (average value or unit temperature, if the average value calculation is deactivated).
The setpoint exceedance can be set as a temperature difference using the parameter in the third line of the **T** menu. The setting “0” deactivates the additional capacity function.
When the temperature drops, the additional capacity unit is switched off with a hysteresis of 1K.

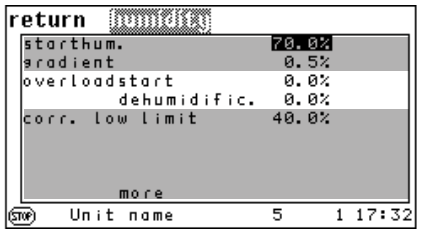
Config/Values/Air/Temperature (T)



Additional capacity - Humidification (previously: humidity)

A standby unit can be started when the zone humidity (average value or unit humidity, if the average value calculation is deactivated) falls short of the air humidity setpoint.
The setpoint shortfall can be set as a humidity difference using the parameter in the third line of the **H** menu. The setting “0” deactivates the additional capacity function.
When the humidity rises, the additional capacity unit is switched off with a hysteresis of 3 % rel. h.

Config/Values/Air/Humidity (H)



Additional capacity - Dehumidification

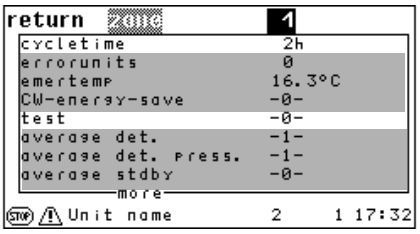
A standby unit can be started when the zone humidity (average value or unit humidity, if the average value calculation is deactivated) exceeds the air humidity setpoint.
The setpoint exceedance can be set as a humidity difference. The setting “0” deactivates the additional capacity function.
When the humidity lowers, the additional capacity unit is switched off with a hysteresis of 3 % rel. h.

Prerequisite:
The additional capacity unit must be defined as a standby unit and allocated to a zone. Furthermore, the corresponding (temperature or humidity) “load start” parameter must include a value different from “0”.

A special function exists for the zone control:

- Sequencing.

(Z1)



8.2.1 Sequencing

A time-dependent unit change-over is realized using sequencing. With help from standby units, a high level of operational reliability and an even unit utilization is achieved.
The sequencing time (parameter in the first line of menu Z1) sets the time for periodic change-overs. This means that the standby unit(s) is (are) changed over one by one. No sequencing takes place if the setting is 0 (hrs).
Sequencing starts when the zone parameter is allocated.

The functioning of the sequence can be checked by activating the test sequencing (Parameter in the fifth line of the Z1 menu) with a fixed sequencing time of 5 minutes.

All of the zone's basic functions that have been described on the previous pages are also possible in sequencing mode.

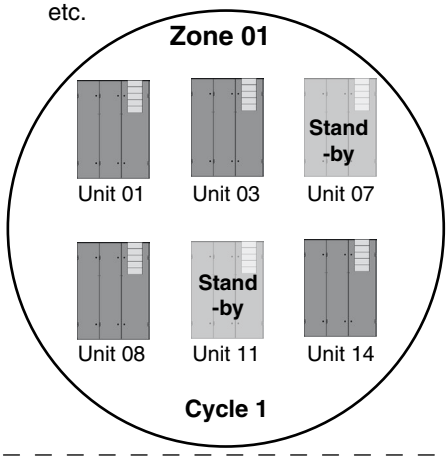
a. Medium value calculation or deactivation
b. Alarm change-over
c. Backup operation
d. Additional capacity

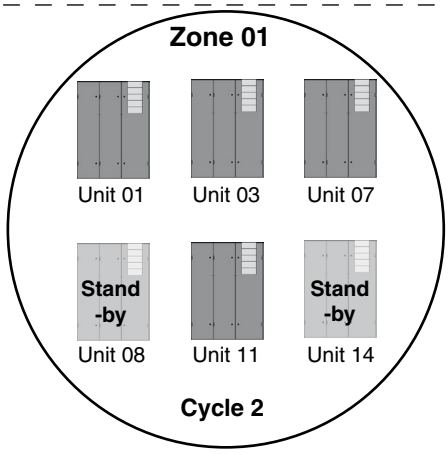
Sequencing runs irrespective of additional capacity and irrespective of defective units.
Even a defective unit can be set in standby mode by sequencing. It is only discovered that the unit has an error and remains switched off when the unit should be switched on as a result of the change-over. As a result, the standby unit with the next highest bus address is switched on.

The unit that is intended for additional capacity can only be switched on during cycles in which it is in standby mode.

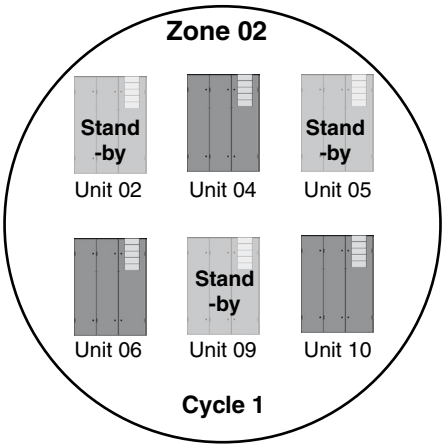
Time-dependent change-over

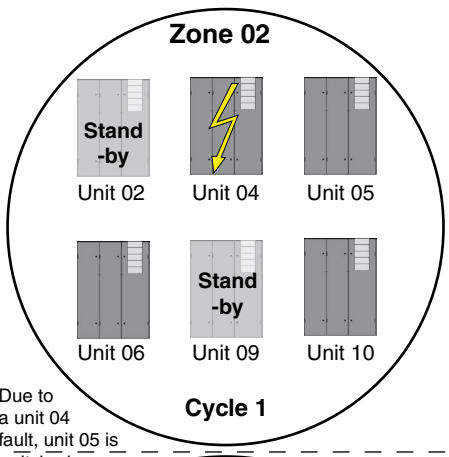
(normal sequencing)
e.g. with 2 standby units:
1. Cycle Unit 07, 11 standby
2. Cycle Unit 08, 14 standby
3. Cycle Unit 11, 01 standby
etc.



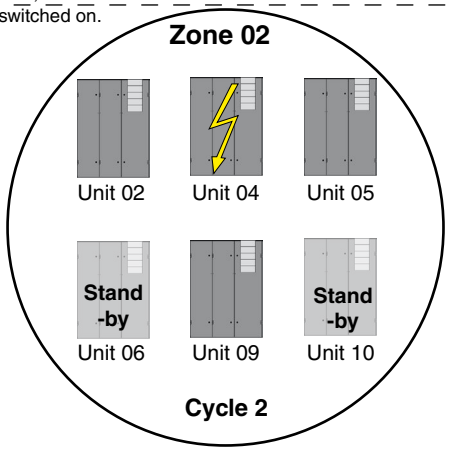


Change-over as a result of a fault





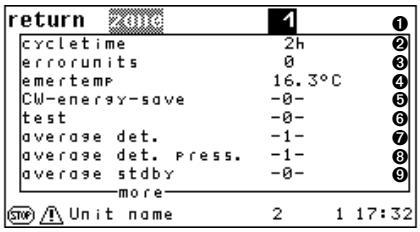
Due to a unit 04 fault, unit 05 is switched on.



C7000 Advanced

Summary of the menu items

Config — Zone



Here you can see an overview of the adjustable parameters. Zone parameters only have to be set on one unit of the zone. Unit parameters must be set individually for each unit.

❶. **Unit assignment** (unit parameter)
A zone is defined in terms of the units assigned to it. A maximum of 20 zones can be defined with settings from 1 to 20. Zone 0 means that the unit is not assigned to a zone. Each unit is assigned to a zone separately.

❷. **Sequencing time** (zone parameter)
The sequencing time is used to set the time when a change-over is periodically performed. No sequencing takes place if the setting is “0”.

❸. **Number of defective units** (zone parameter)
This entry is optional. If the number entered here is reached, the system is switched to backup operation. No backup operation takes place if the setting is “0”.

❹. **Emergency temperature** (zone parameter)
This is the temperature that is the new setpoint during the backup operation.

❺. **CW standby manager** (zone parameter)
The CW standby manager is switched on by setting “1”.

❻. **Sequencing test** (zone parameter)
The sequencing test is switched on with a fixed sequencing time of 5 minutes by setting “1”.

❼. **Average value calculation** (zone parameter)
The average value calculation for all parameters* except for the differential pressure is switched on by setting “1”.

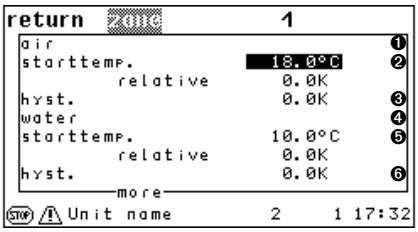
* Room temperature
Room humidity
Supply air temperature
Supply air humidity
Outside temperature
Water inlet temperature 1

❽. **Pressure average value calculation** (zone parameter)
The average value calculation for the differential pressure is switched on by setting “1”.

❾. **Average value calculation with standby units** (zone parameter)
By setting “1”, sensors of units that are in standby mode are also included in the average value calculation.

C7000 Advanced

Config/Zone



The DFC control is activated by entering a value that is different to zero for one of the two following parameters or the "Water start temperature or water hysteresis" parameter.

❶. **Air start temperature** (zone parameter)
The operating modes FC, EFC and MIX are enabled below the outside air temperature that is set as the start temperature.

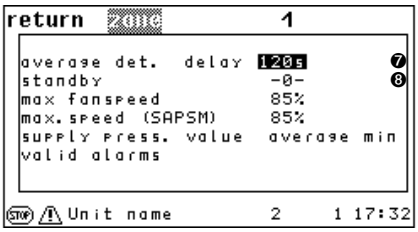
❷. **Relative air start temperature** (zone parameter)
The operating modes FC, EFC and MIX are enabled below the return air temperature reduced by the relative start temperature.

❸. **Hysteresis** (zone parameter)
The operating modes FC, EFC and MIX are blocked with this hysteresis. Cooling can then only take place in the DX operating mode.

❹. **Water start temperature** (zone parameter)
The operating modes FC, EFC and MIX are enabled below the water temperature that is set as the start temperature.

❺. **Relative water start temperature** (zone parameter)
The operating modes FC, EFC and MIX are enabled below the return air temperature reduced by the relative start temperature.

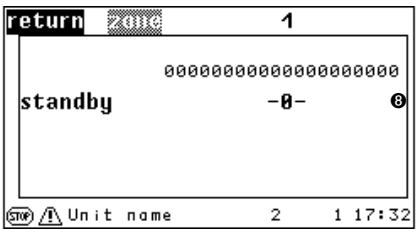
❻. **Water hysteresis** (zone parameter)
The operating modes FC, EFC and MIX are blocked with this hysteresis. Cooling can then only take place in the DX operating mode.



❼. **Delay time** (zone parameter)
The evaluation of the average value is delayed by this time.

❽. **Standby units** (unit parameter)
A zone must contain at least one standby unit if sequencing is supposed to take place in it. The current unit is declared as a standby unit with setting "1". This setting defines the starting status of the sequencing and changes according to the current sequencing status.

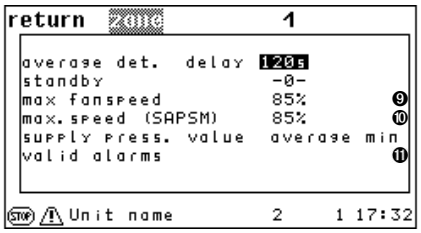
Operate/Zone

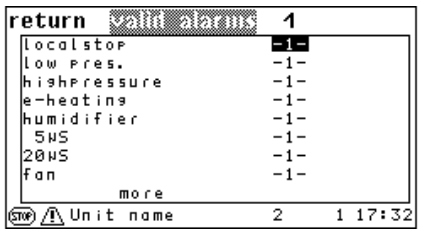


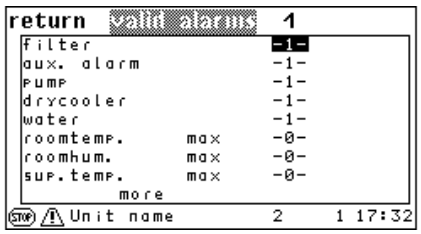
The upper line shows the operating state of all units that are assigned to zone 1. The operating states of the units with the bus address 19 to 0 are displayed from left to right. 0 stands for normal operation, 1 stands for standby mode.
In the line below, you can specify the operating state of the unit.
0 means normal operation, 1 means standby mode, like above point ❽

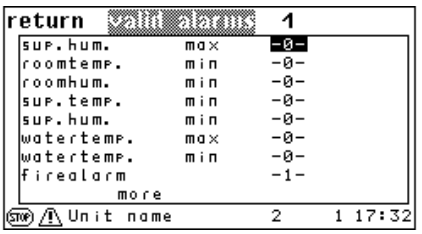
Config/Zone

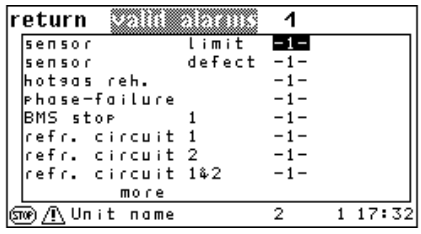
Config

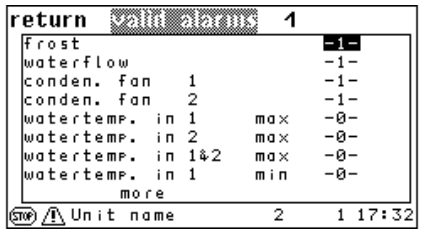












❾. **Maximum fan speed** (nMaxZone) (zone parameter)
This value is not active for the EC tower.
The set speed applies for each unit in the zone if the CW standby manager is activated and if all units are running. If a unit fails, the remaining units increase their speed so that the entire airflow rate remains the same. During DFC control or an activated Ecocool function, this speed nMaxZone is valid in FC operation and is the starting speed in EFC operation.

❿. **Maximum fan speed (SAPSM)** (zone parameter)
This value is not active for the EC tower.

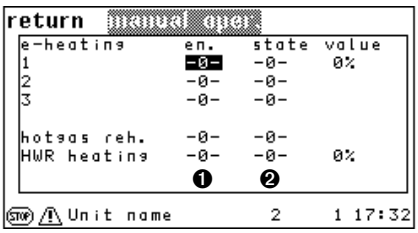
⓫. **Valid alarms** (zone parameter)
With setting “1”, the affected alarm is defined as a valid alarm for the zone, which leads to the unit being switched off and it being marked as faulty.

8.3 Manual mode

Components

Manual mode

Config



When manual mode is used, the C7000 control is suspended.
The manual mode menu consists of two columns of parameters which are decisive for its operation.
In the first column (entitled en.), you activate manual mode for the listed component by setting the parameter to “1”. ❶
The second column (entitled STATE) displays the actual state of the component. Once you have activated manual mode in the first column, you can switch the component on and off here. ❷
For proportionally-regulated components, you can enter a percentage in the second column (entitled VALUE) which corresponds to a degree of openness for a valve or a capacity/speed for other components.
Components that can have either proportional or on/off control have both columns (STATE and VALUE). But only the applicable parameter takes effect.

For test purposes, sensors and auxiliary alarms can also be simulated in manual mode. You specify the values for this so that you can test the controller’s behavior.

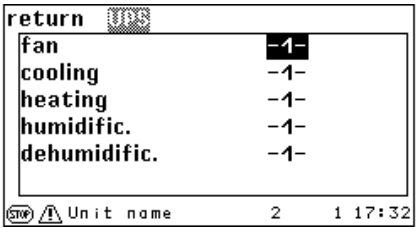
When leaving the manual mode level (if the “Components” menu is reached again), manual mode is terminated for each component and the controller takes over control.

If the fan is switched off, all other components are locked electrically and cannot be started.
If the unit is de-energized, all manual operations are reset. However, the set proportional values remain in place.

8.4 UPS operation

Components

UPS



In this window, you can set the air conditioning technology functions for operation with an uninterruptible power supply (UPS).
If the controller receives a signal for UPS operation at the corresponding digital input, all functions that have been activated in the window using “1” are approved. On the contrary, functions marked with “0” are deactivated.
Ensure that the fan speed can also been reduced to a preset value during UPS operation.

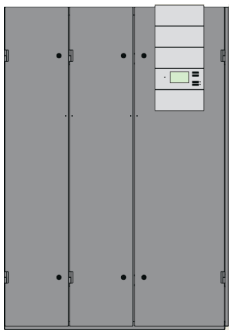
Deactivated function	Blocked components
Fans	Fans and all other components except control
Cooling	HGBP, ICC, compressor, suction valve, dry cooler
Heating	Electric heater, coolant heater, PWW heater
Humidification	Humidifiers
Dehumidification	Dehumidifier (Dehumidification request is suppressed.)

9. Bus communication on the EC tower

9.1 System examples with the C7000 Advanced

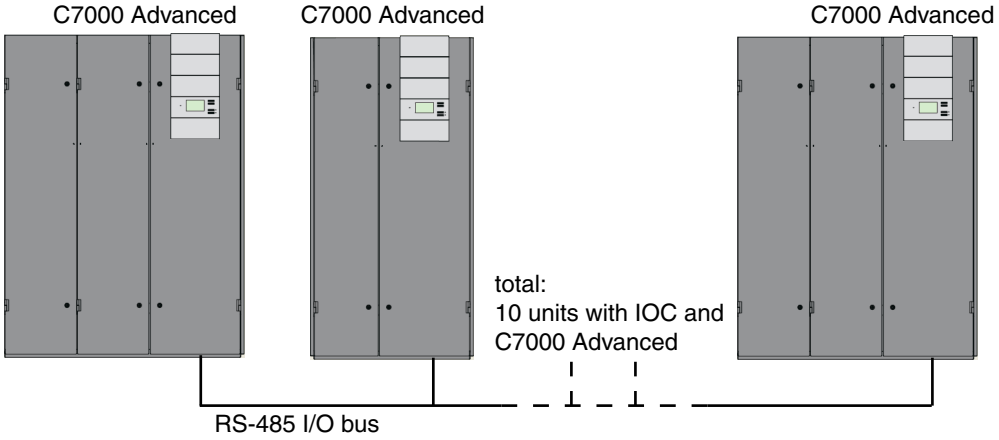
Minimum configuration

C7000 Advanced



The minimum configuration consists of one unit with C7000 Advanced and I/O controller.

Maximum configuration (concerning the operational possibilities and the number of units)



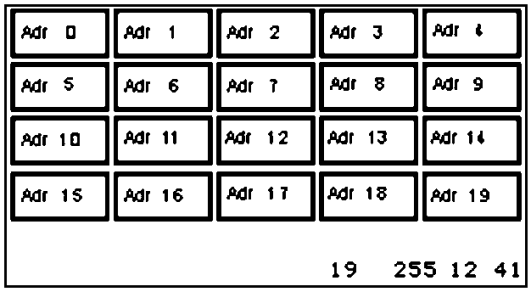
The maximum configuration, in terms of operational possibilities and the number of units, consists of 10 units with an I/O controller and C7000 Advanced, which also results in a total of 20 bus participants.

9.2 Bus set-up

9.2.1 General

The IO bus consists of a maximum of 20 participants. On the C7000 system, only C7000 IOC or C7000AT participants can be in the IO bus.
Each bus participant has its own IO bus address which must only appear once in the data bus.
The IO bus addresses range from 0 to 19.

The display of the C7000AT shows the IO bus addresses in the bus overview (start up window) as follows.



9.2.2 Setting up an IO bus

The bus is set up automatically, meaning that all connected bus participants “register” themselves to the bus and automatically deregister themselves in the case of a fault.

The following prerequisites have to be fulfilled for this:

1. Each bus participant has a bus address, which may only appear once in the bus.
2. There must be no bus addresses larger than 19.
3. All bus participants are correctly connected with bus cables according to the requirements (see next page).
4. The bus must be terminated at the start and at the end.

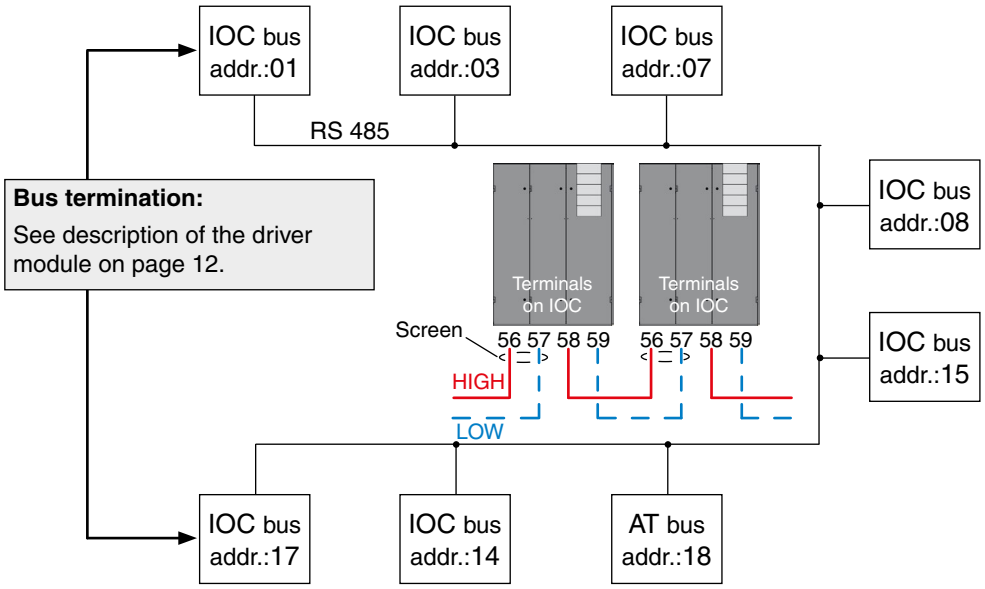
Each bus participant saves the last bus configuration known to it when it is switched off. It also expects this when it is switched back on.
If it detects that new units have been registered to the bus whilst it was switched off when it is switched back on, these are entered immediately into the bus configuration without a signal or an alarm being outputted.
If it detects that a unit that was an active bus participant before it was switched off has disappeared from the bus, a bus error is issued for it once the alarm time delay has elapsed.

The same happens if a bus participant (IOC or C7000AT) is de-energized during operation.

A bus error is detected automatically by all units connected to the bus and is therefore displayed on all ATs and IOCs.

9.2.3 Manual preparations

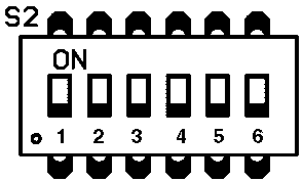
You need a shielded cable with lines twisted in pairs and a characteristic impedance of 120 Ω (recommendation Belden 9841), which you guide from unit to unit and connect at terminals 56-59 on each I/O controller (IOC). In the example below, the bus termination must be carried out for both units which form the end (IOC 01 and IOC 17).
The example shows a typical application with 7 IOCs and 1 C7000 Advanced (AT).



Bus addr.	Dipswitch				
	1	2	3	4	5
0	0	0	0	0	0
1	1	0	0	0	0
2	0	1	0	0	0
3	1	1	0	0	0
4	0	0	1	0	0
5	1	0	1	0	0
6	0	1	1	0	0
7	1	1	1	0	0
8	0	0	0	1	0
9	1	0	0	1	0
10	0	1	0	1	0
11	1	1	0	1	0
12	0	0	1	1	0
13	1	0	1	1	0
14	0	1	1	1	0
15	1	1	1	1	0
16	0	0	0	0	1
17	1	0	0	0	1
18	0	1	0	0	1
19	1	1	0	0	1

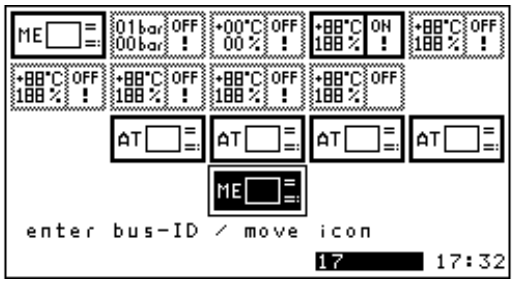
9.2.4 Adjusting the bus addresses

The bus addresses is adjusted with the dipswitches on the C7000IOC circuit board. The table on the right shows the corresponding settings for all possible bus addresses. Ensure that the counting begins at 0. “1” stands for dipswitch in the “ON” position. If you set a larger address than 19 for the C7000IOC, this is reduced to 19 by the software. An IOC is delivered with the address 1 as standard; a C7000AT has the address 0 as standard.



For the C7000AT, adjust the bus address in the **placing view**.

Placing view

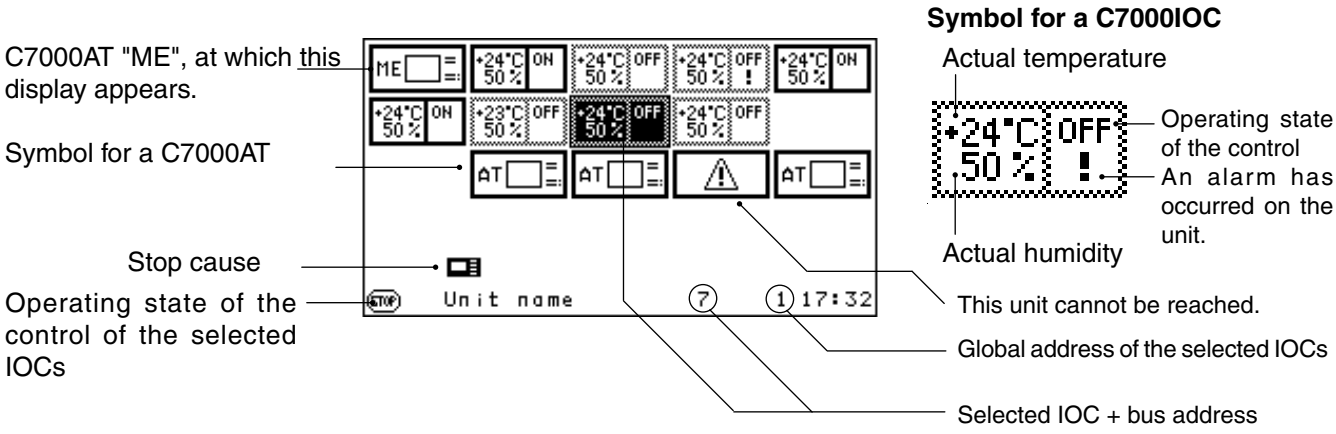


Using the selector button, you can move the C7000AT with the symbol “ME” to a new position and thus change its bus address.
In the picture: old position address 0, new position address 17.
Press the OK button to confirm the selection.
Now, the bus configuration has to be confirmed so that no error is displayed because there is no bus participant with address 0 anymore.
The address of the remaining bus participants is not changed by this.

In short:
1. Connect units with bus line
2. Set bus termination (beginning/end)
3. Adjust Bus IDs
4. Confirm bus configuration

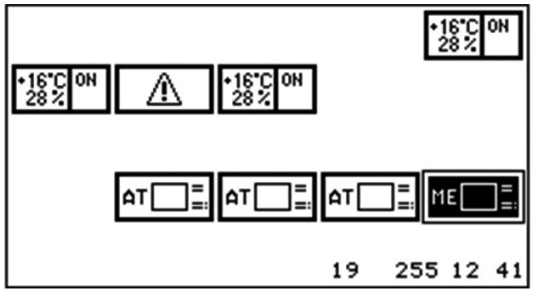
Chapter “5. Controller start” on page 14 describes how to get to the placing view and how to confirm the current configuration.

9.2.5 Bus overview

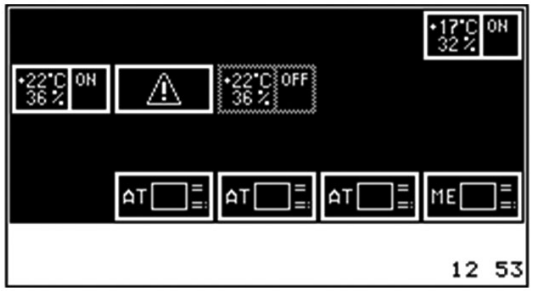


Example on de-energized IOCs or IOCS disconnected from the bus with data bus address 6

The AT with bus address 19 performs the following edits after IOC 6 is switched off:



This means that the AT 19 notices that IOC 6 was available in the bus before but cannot be reached now. If the missing unit is switched on again, the bus error is automatically removed for all bus participants. A bus error can also be deleted by entering the command "`iobusok`" on the AT or IOC.



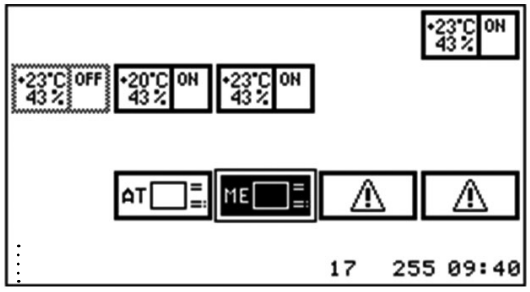
There is another way to delete a bus error on the AT and thus to apply the current bus configuration.
For this, you highlight all of the units at the same time and then press the OK button.
After entering the password (0000), the defective unit (Adr 6) is deleted from the bus. The bus error disappears.

9.2.6 Special cases

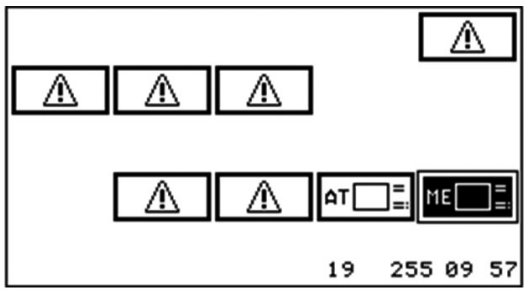
Bus disconnection

An important aspect concerning the IO bus display is that this can only happen from the view of the unit that you are currently on.
For example, if the bus is separated between bus participants 4, 5, 6, 7, 16, 17 and bus participants 18, 19, there are two completely separate running buses.
However, bus participants 4, 5, 6, 7, 16, 17 would report bus participants 18, 19 as defective while bus participants 18, 19 report bus participants 4, 5, 6, 7, 16, 17 as defective.

IO bus from the view of bus participant 17



IO bus from the view of bus participant 19



The bus error has an adjustable alarm time delay that waits for the bus error to be issued. This can be adjusted separately for each bus participant.

Address conflict

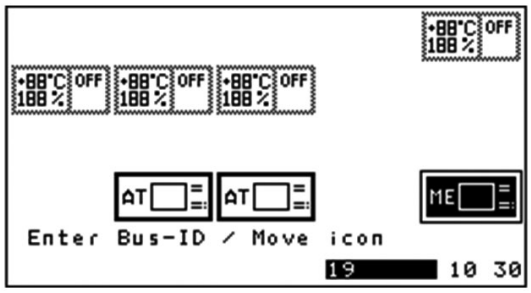
The address conflict is the second error relating to the bus. An address conflict occurs when several bus participants have the same bus address.
This means that the bus participants with the same address always send data on the bus at the same time, which destroys data on the bus.
This results in only limited communication being possible via the bus.

In order to avoid this, the bus participants that receive a data package mute themselves. The data package carries its own bus address as a sender.
This means that the bus participants eliminate themselves from communicating on the bus by not sending anything.

An address conflict is displayed immediately for unit that have deactivated themselves.

In our example, we have two ATs with bus address 19.
If communication begins on the bus, an AT will be the first to notice that address 19 has been assigned twice and deactivate itself.
This then means that, after a short period of time, only one bus participant with the bus address is active with the bus address that was given out more than once.

The user is asked to choose another bus address on the C7000AT which has determined the address conflict. The placing view below is displayed.



The other AT with bus address 19 runs without impairment.

An address conflict resolves itself once the bus addresses have been assigned correctly.
An address conflict can only ever be shown on the unit that has the address conflict because it immediately eliminates itself from bus traffic. If this concerns a C7000AT, this is shown on the display. (An address conflict can only be shown on the unit “ME”.) On a C7000IOC, the error LED on the circuit board flashes and the state of the bus configuration can be queried via the service port.

10. Basic settings

Unit parameter	Range	Value
Unit name	16 characters	Unit name
Bus address	0 - 19	0
Global address	0 - 32767	1
Local stop	0 - 1	1
Monitoring stop	0 - 1	0
Sequencing stop	0 - 1	0
Terminal language	0: English 1: German	0
Temperature unit	0: °C 1: °F	0
Temperature setpoint	5 - 50 °C	24°C
Temperature setpoint, night	5 - 50 °C	27 °C
Humidity setpoint	5 - 90 % r.h	45% r.h
Water pressure setpoint	0 - 6 bar	1.5 bar
Supply air pressure setpoint	0 - 327.67 Pa	0.00 Pa
Condensation pressure DX 1/2	0 - 40 bar	18/18 bar
Condensation pressure Mix 1/2	0 - 40 bar	12/12 bar
SAPSM time delay	0 - 65535 s	0 s
Winter start time delay	0 - 300 s	180 s
Summer/winter change-over	5 - 35 °C	16 °C
Summer/winter hysteresis	1 - 9.9 K	2 K
Cooling priority	0: GE 1: CW 2: DX	0
Additional capacity - Cooling	0 - 9.9 K	0.0 K
Additional capacity - Humidification	0 - 20 % r.h	0 % r.h
Additional capacity - Dehumidification	0 - 20 % r.h	0 % r.h
Integral factor	0 - 10 %	0 %
Output D-OUT common alarm	0 - 31	6
Output D-OUT Winter operation	0 - 31	0
Input D-IN remote on/off	0 - 43	10
Output D-OUT local stop	0 - 31	0
Input D-IN CW stop	0 - 43	0
Control type	1 - 5	1
Limiting control - Start temperature	0 - 40 °C	16 °C
Limiting control - Start temperature 2	0 - 40 °C	0 °C
Limiting control - Temp. increase	0 - 20 K	0.5 K
Min. temperature	0 - 40 °C	0 °C
Max. temperature	0 - 40 °C	40 °C
Limiting control - Start humidity	0 - 90 % r.h	70 % r.h
Limiting control - Humidity increase	0 - 20 % r.h	0.5 % r.h
Unit runtime	0 - 2,147,483,647*	0 h
Stop time	0 - 2,147,483,647	0 h
Cooling runtime	0 - 2,147,483,647	0 h
Heating runtime	0 - 2,147,483,647	0 h
Humidification runtime	0 - 2,147,483,647	0 h
Dehumidification runtime	0 - 2,147,483,647	0 h
Free Cooling runtime	0 - 2,147,483,647	0 h
Mixed mode runtime	0 - 2,147,483,647	0 h

D-IN - Digital input
D-OUT - Digital output
A-IN - Analog input
A-OUT - Analog output

* $2^{31} - 1 = 2,147,483,647$

Last maintenance - Day	1 - 31	1
Last maintenance - Month	1 - 12	8
Last maintenance - Year	0 - 50	4
Maintenance interval	0 - 24	0
Maintenance alarm priority	0 - 31	0
Maintenance common alarm	0 - 1	0
UPS - D-IN input	0 - 43	0
UPS - Fan approved	0 - 1	1
UPS - Cooling approved	0 - 1	1
UPS - Heating approved	0 - 1	1
UPS - Humidification approved	0 - 1	1
UPS - Dehumidification approved	0 - 1	1

Zone parameters	Range	Value
Zone	0 - 20	0
Sequencing time	0 - 65535	0 h
Test sequencing	0 - 1	0
Valid alarms	1 - 27	1-13, 24-27
No. of defective units	0 - 20	0
Emergency temperature	0 - 40	16 °C
nMax zone speed	0 - 100	85 %
CW standby manager	0 - 1	0
Standby state	0 - 1	0

The “Zone” parameter is not a zone parameter and is adjusted per unit. But because of its content reference, it is listed in this table.

Zone parameters	Range	Value
Average value calculation T/H	0 - 1	1
Pressure average value calculation	0 - 1	1
Average value T/H time delay	0 - 255 s	120 s
Average value calculation with standby unit	0 - 1	0
GE start temperature air	-100 - 100 °C	18 °C
GE start temperature air, relative	0 - 9.9 K	0 K
GE hysteresis air	0 - 9.9 K	0 K
GE water start temperature	-100 - 100 °C	10 °C
GE water start temperature, relative	0 - 9.9 K	0 K
GE water hysteresis	0 - 9.9 K	0 K
Speed nMax (SAPSM)	0 - 100 %	0 %
Supply air pressure value	0 - 3	1

General alarms

Alarms	Range	Fire	Water	Flow	Phase	Bus alarm	Address conflict
Alarm input D-IN	0 - 43	11	0	0	0	-	-
Alarm priority	0 - 31	0	0	0	0	0	0
Common alarm	0 - 1	1	1	1	1	0	0
Alarm time delay	0 - 100 s	5 s	5 s	5 s	5 s	5 s	-
New start	0 - 1				0		

Limit value alarm

	Room temperature		Supply air temperature		Water temperature	
	min	max	min	max	min	max
Value	5 °C (0-50)	35 °C (5-55)	5 °C (0-50)	35 °C (5-55)	-20 °C (-20-30)	45 °C (10-50)
Alarm time delay	30 s (0-65535)	30 s (0-65535)	30 s (0-65535)	30 s (0-65535)	30 s (0-65535)	30 s (0-65535)
Alarm priority	0 (0-31)	0 (0-31)	0 (0-31)	0 (0-31)	0 (0-31)	0 (0-31)
Common alarm	1	1	1	1	1	1

	Room humidity		Supply air humidity		Supply air pressure	
	min	max	min	max	min	max
Value	5 % r.h (0-90)	90 % r.h (5-200)	5 % r.h (0-90)	90 % r.h (5-200)	0.00 Pa (*)	100.00 Pa (*)
Alarm time delay	30 s (0-65535)	30 s (0-65535)	30 s (0-65535)	30 s (0-65535)	30 s (0-65535)	30 s (0-65535)
Alarm priority	0 (0-31)	0 (0-31)	0 (0-31)	0 (0-31)	0 (0-31)	0 (0-31)
Common alarm	1	1	1	1	1	1

The values in brackets display the range.

*(-327.68 - +327.67)

Week program

Hour	Range	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Monday	0 - 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Tuesday	0 - 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sunday	0 - 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Data loggers

	Data logger 1	Data logger 2
Data quantity	0 (0 - 1440)	0 (0 - 1440)
Interval	0 min (0 - 60000)	0 min (0 - 60000)
Type	1 (1 - 19)	1 (1 - 19)

Compressor - EC tower

The following table applies for ECU/D 091, 181 and 251.
Call up the “EC tower basic settings” menu to adjust the EC tower configuration on the controller.

	Range	Compressor 1
Start temperature	0 - 9.9 K	0.4
Break	10 - 1000 s	180
Components configured	0 - 1	1
Output A-OUT	0 - 20	4
Output D-OUT	0 - 31	0
Input D-IN	0 - 43	2
Type of compressor	1 - 2	2
Initialization time	0 - 600 s	240 s
Pre-runtime	0 - 600 s	240 s
Pre-runtime speed	10 - 100 %	42 %
Run-on time	0 - 600 s	240 s
Minimum speed	10 - 100 %	14 %
Dehumidification speed	20 - 100 %	100 %
P factor	0 - 100	40
I factor	0 - 100	4
D factor	0 - 100	0
Alarm input	0 - 43	8
Alarm priority	0 - 31	0
Common alarm	0 - 1	1
Alarm time delay	0 - 100 s	5 s
Runtime	0 - 2,147,483,647 h	0 h

Compressor - EC tower 2

The following table applies for ECU/D 502.
Call up the “EC tower 2 basic settings” menu to adjust the EC tower configuration on the controller.

	Range	Compressor 1	Compressor 2
Start temperature	0 - 9.9 K	0.4	0.6
Break	10 - 1000 s	180	180
Components configured	0 - 1	1	1
Output A-OUT	0 - 20	4	2
Output D-OUT	0 - 31	0	0
Input D-IN	0 - 43	2	3
Type of compressor	1 - 2	2	2
Initialization time	0 - 600 s	240 s	240 s
Pre-runtime	0 - 600 s	240 s	240 s
Pre-runtime speed	10 - 100 %	42 %	42 %
Run-on time	0 - 600 s	240 s	240 s
Minimum speed	10 - 100 %	14 %	14 %
Dehumidification speed	20 - 100 %	60 %	60 %
P factor	0 - 100	40	40
I factor	0 - 100	4	4
D factor	0 - 100	0	0
Alarm input	0 - 43	8	9
Alarm priority	0 - 31	0	0
Common alarm	0 - 1	1	1
Alarm time delay	0 - 100 s	5 s	5 s
Runtime	0 - 2,147,483,647 h	0 h	0 h

Heaters

	Range	Electric heater 1	Electric heater 2
Type	1 - 2	1	1 fix
Start	0 - 9.9 K	1.5 K	2 K
Stop hysteresis	0 - 9.9 K	0.5 K	0.5 K
Gradient	0.3 - 9.9 K	0.5 K	0.5 K
Comp. configured	0 - 1	0	0
Output D-OUT	0 - 31	3	4
Alarm input D-IN	0 - 43	4	4
Alarm priority	0 - 31	0	0
Common alarm	0 - 1	1	1
Alarm time delay	0 - 2550 s	4 s	4 s
Runtime	0 - 2,147,483,647	0 h	0 h

	Range	PWW heater
Type	1 - 2	1
Start	0 - 9.9 K	1.0 K
Stop hysteresis	0 - 9.9 K	0.5 K
Gradient	0.5 - 9.9 K	0.5 K
Comp. configured	0 - 1	0
Output D-OUT	0 - 31	4
Output A-OUT	0 - 20	7

Humidifiers

	Range	Humidifier 1
Type	1 - 2	2
Start, rel. humidity	0- 20 % r.h	0 % r.h
Hysteresis, rel. humidity	0- 20 % r.h	5 % r.h
Gradient, rel. humidity	0.5 - 20	10
Start, spec. humidity	0 - 20 g/kg	0 g/kg
Hysteresis, spec. humidity	0 - 20 g/kg	1 g/kg
Proportional band, spec. humidity	0.1 - 20 g/kg	2 g/kg
Comp. configured	0 - 1	0
Conductivity measuring equipment, conf.	0 - 1	0
Output D-OUT	0 - 31	13
Output A-OUT	0 - 20	3
Alarm input D-IN	0 - 43	6
Alarm priority	0 - 31	0
Common alarm	0 - 1	1
Alarm time delay	0 - 2550 s	5 s
Alarm input D-IN 5µS	0 - 43	0
Alarm priority 5µS	0 - 31	0
Common alarm 5µS	0 - 1	0
Alarm time delay 5µS	0 - 2550 s	300 s
Alarm input D-IN 20µS	0 - 43	6
Alarm priority 20µS	0 - 31	0
Common alarm 20µS	0 - 1	1
Alarm time delay 20µS	0 - 2550 s	300 s
Runtime	0 - 2,147,483,647	0 h

Fans

	Range	Fan 1
Type	1 - 2	2
Maximum speed	30 - 100 %	85 %
CW(DF) maximum speed	30 - 100 %	85 %
EFC maximum speed	30 - 100 %	85 %
Offset	-10 - 10 %	0 %
Pre-runtime	0 - 100 s	10 s
Run-on time	0 - 250 s	60 s
Start temperature	0 - 9.9 K	0 K
Start speed	0 - 100 %	0 %
100 % start time	0 - 100 s	5 s
Reduction time	1 - 120 min	30 min
Reduction speed	0 - 100 %	0 %
Humidification reduction	0 - 100 %	20 %
Humidification time	0 - 30 min	0 min
UPS reduction	0 - 20 %	0 %
Filter offset	0 - 10 %	0 %
Minimum speed	0 - 100 %	50 %
CW(DF) minimum speed	0 - 100 %	50 %
Output D-OUT	0 - 31	1
Output A-OUT	0 - 20	1
Alarm input D-IN	0 - 43	1
Alarm priority	0 - 31	0
Common alarm	0 - 1	1
Alarm time delay	0 - 100 s	10 s (standard)/30 s (recommended)
Filter alarm input D-IN	0 - 43	5
Filter max. pressure drop	0 - 1000 Pa	0 Pa
Filter alarm priority	0 - 31	0
Filter common alarm	0 - 1	1
Filter alarm time delay	0 - 100 s	20 s
Emergency start	0 - 9.9 K	0 K
End temperature	0 - 9.9 K	0 K
Emergency end speed	0 - 100 %	0 %
Control cycle	1 - 10 s	5 s
Max. control change	1 - 30 %	2 %
Control factor	1 - 100	40
Comp. configured	0 - 1	1
Start difference	0 - 25 K	10 K
Gradient difference	0 - 25 K	0 K
P factor	0 - 100	40
I factor	0 - 100	2
D factor	0 - 100	0
Stop when cooling not possible	0 - 1	0
DTC type	0 - 3	0
Continuous dehum, rel. humidity	0 - 100 %	0 %
Continuous dehum, spec. humidity	0 - 100 g/kg	0 g/kg
Runtime	0 - 2,147,483,647	0 h

Dehumidifier

	Range	Dehumidifier
Start	0- 100 % r.h	10 % r.h
Hysteresis, relative humidity	0 - 30 % r.h	5 % r.h
Start, specific humidity	0 - 30 g/kg	0 g/kg
Hysteresis, specific humidity	0 - 30 g/kg	1 g/kg
Dehumidification stop	0 - 10 K	2 K
Dehum. valve conf.	0 - 1	0
Bypass valve conf.	0 - 1	0
Output D-OUT	0 - 31	5
min. water temp.	-20 - 50°C	5°C
max. water temp.	0 - 100°C	14°C
Type, humidity control	0 - 2	0

Sensor

	Range	Temperature/humidity sensor B01	Temperature/humidity sensor B03
Purpose	1 - 51	1	2
Input, analog	1 - 4, 6 - 21	1	2
Type	1 - 5	1	1
Comp. configured	0 - 1	1	1
Min. measurement value	-50 - 100	0 °C (-50 - 100)	0 % r.h (0 - 100)
Max. measurement value	-50 - 100	50 °C (-50 - 100)	100 % r.h (0 - 100)
Min. output value	0 - 20	4 mA (0 - 20)	4 mA (0 - 20)
Max. output value	0 - 20	20 mA (0 - 20)	20 mA (0 - 20)
Max. deviation	0 - 100	10 %	10 %
Limit - Alarm priority	0 - 31	0	0
Limit - Common alarm	0 - 1	1	1
Limit - Alarm del.	0 - 100	5 s	5 s
Fracture - Alarm priority	0 - 31	0	0
Fracture - Common alarm	0 - 1	1	1
Fracture - Alarm del.	0 - 100	5 s	5 s
Offset	-50.0 - 50.0	0 °C	0 % r.h

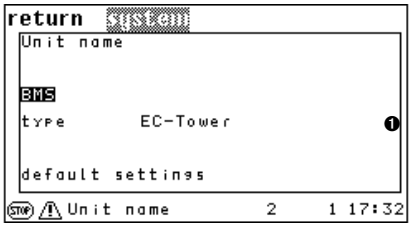
Air dampers

	Range	Air damper 1
Pre-runtime	0 - 180	90 s
Output D-OUT	0 - 31	7
Components configured	0 - 1	0

External alarms

	Range	External alarm 1
Comp. configured	0 - 1	0
Input D-IN	0 - 43	0
Alarm priority	0 - 31	0
Common alarm	0 - 1	0
Alarm time delay	0 - 250 s	5 s
Alarm text	20 characters	Externer_Alarm_in_01

10.1 Load basic settings for the EC tower



Load basic settings for EC tower of size 1 as of version 05 and size 2 as of version 06
Call up the “EC tower basic settings” menu ❶ in the Config main menu to adjust the EC tower configuration on the controller: Config > System > Basic settings.

Load basic setting for EC tower of size 3
Call up the “EC tower 2 basic settings” menu ❶ in the Config main menu to adjust the EC tower configuration on the controller: Config > System > Basic settings.

10.1.1 Basic settings of size 1 and 2

The following table displays the basic settings for the EC tower of size 1 as of version 05 and size 2 as of version 06.

Components of the EC tower	Value
Compressor 1 (Type 2: proportional, external 0-10 V signal)	1
Electric heater 1 (ON/OFF)	1
Electric heater 2 (ON/OFF)	1
Humidifier (proportional)	1
Dehumidification	1
Return air temperature sensor	1
Return air humidity sensor	1
Air damper	1
Remote ON/OFF (Digital input D-IN 10)	1
Fans	1
Fire alarm (Digital input D-IN 11)	1
Water alarm (optional) (Digital input D-IN 7)	0

Value 1: Components activated
Value 0: Components not activated

10.1.2 Basic settings of size 3

The following table displays the basic settings for the EC tower of size 3 as of version 02.

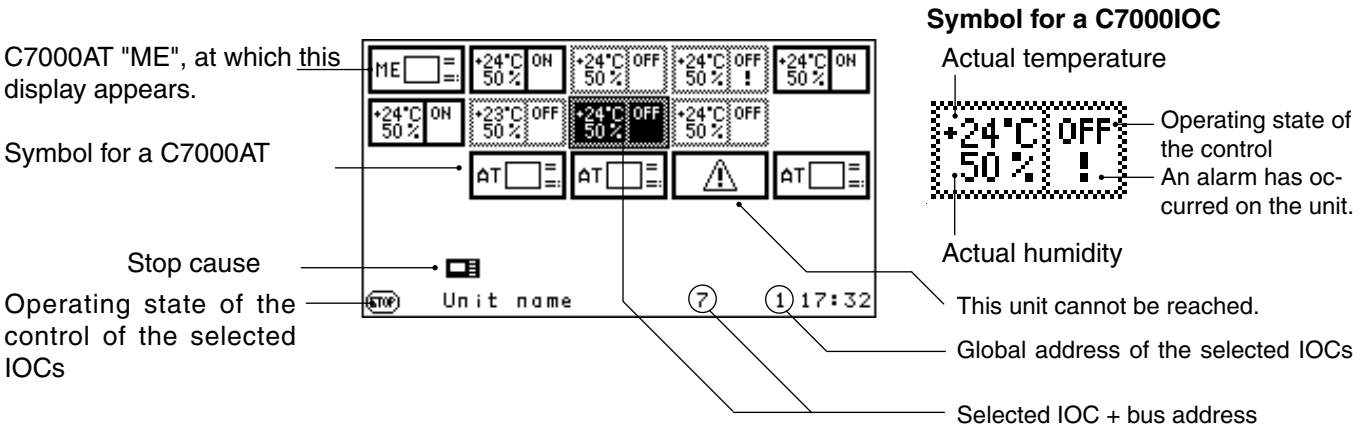
Components of the EC tower	Value
Compressor 1 (Type 2: proportional, external 0-10 V signal)	1
Compressor 2 (Type 2: proportional, external 0-10 V signal)	1
Electric heater 1 (proportional)	1
Electric heater 2 (ON/OFF)	1
Humidifier (proportional)	1
Dehumidification	1
Return air temperature sensor	1
Return air humidity sensor	1
Air damper	1
Remote ON/OFF (Digital input D-IN 10)	1
Fans	1
Fire alarm (Digital input D-IN 11)	1
Water alarm (optional) (Digital input D-IN 7)	0

Value 1: Components activated
Value 0: Components not activated

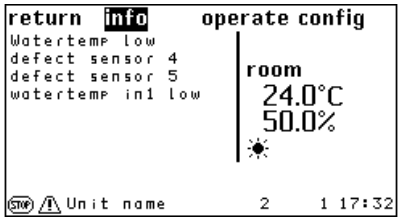
11. Alarm treatment

11.1 Event log

In the bus overview window, an alarm is indicated by a “!”. You can find out more information about this type of alarm by selecting the unit that the alarm has occurred on (in the example, unit with bus address 03) and pressing the confirmation button.



You get this view when you call up the unit with the alarm as described above.



The alarm texts are displayed in the standard window of each unit with IOC.

At the same time, the symbol ⚠ at the bottom right indicates that an alarm has occurred.

An alarm sound announces that an alarm is present.

Important: The alarm sound can be disabled.

The event log the command level is passive. This means that you have to enter the “status” command to be able to see alarms that have occurred.

11.2 Alarm configuration

Components and limit value alarms:

You can adjust the following parameters for each alarm.

You can assign the alarm to a digital input and determine whether the alarm in question should trigger a common alarm.

Adjusting the alarm priority for the alarm means assigning the alarm in question to an alarm relay with this number.

The alarm time delay can be set in seconds.

See the next page for configuring unit alarms and auxiliary alarms.

11.3 Alarm reset

C7000AT

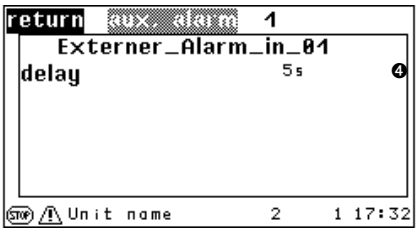
The alarms are reset by pressing the reset button. The alarm sound goes quiet when this is pressed once. When this is pressed a second time, all alarms are reset. However, if the cause of the alarm has not been rectified, the alarm reappears.

The alarms can either be reset in the standard window for each individual unit or in the bus view for all units by first highlighting all units and then pressing the reset button.

Components

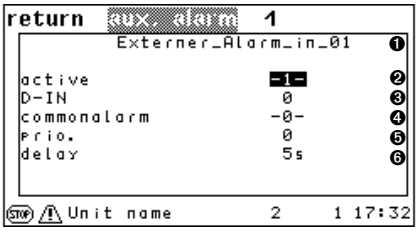
Contacts/Auxiliary alarm

Operate



Alarm parameters:
Auxiliary alarm time delay ❹

Config

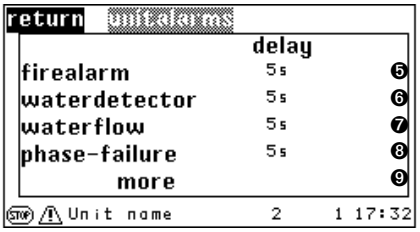


You can enter the alarm text that should be displayed in the case of an alarm in the first line. ❶
You add an external alarm to the configuration by setting the “ACTIVE” parameter to 1. You deactivate the external alarm with “0”. ❷

Alarm parameters:
Digital input ❸
Common alarm actuation ❹
Alarm priority ❺
Alarm time delay ❻

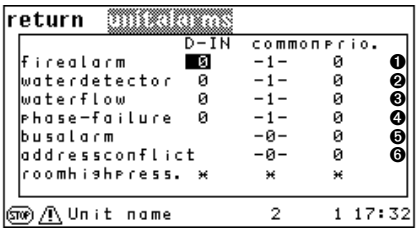
Contacts/Unit alarms

Operate



You can adjust the alarm time delay for the following unit alarms: fire alarm ❺, water alarm ❻, water flow ❼, phase error ❽ and bus alarm ❾.

Config



In this window, you can assign digital inputs **(❶-❹)a** to the unit alarms, determine whether the corresponding alarm should trigger a common alarm **(❶-❻)b** and assign the alarm to an alarm relay **(❶-❻)c**.
1. Fire ❶, via external smoke and temperature sensor
2. Water ❷ via external water detector
3. Flow failure ❸ via flow sensor
4. Phase failure ❹ via phase module
5. Bus alarm ❺,
6. Address conflict ❻, these alarms are determined by the controlled and do not need a sensor or a digital input.

11.4 Alarm texts

Cause	Alarm text	Effect
LP pressure switch/LP limit undershot	LOW PRE. 1 ERROR	Compressor 1 off
HP pressure switch/HP limit exceeded Internal compressor circuit-breaker	COMP 1 ERROR/HP	Compressor 1 off
LP pressure switch/LP limit undershot	LOW PRE. 2 ERROR	Compressor 2 off
HP pressure switch/HP limit exceeded Internal compressor circuit-breaker	COMP 2 ERROR/HP	Compressor 2 off
Temperature switch/Heat.circuit-b.	ELECTRIC HEATER #	Heating # off
Humidifier circuit-breaker	HUMIDIFIER # ERROR	Humidifier # off
Cooling air pattern differential pressure switch	COOLING AIR PATTERN FAILURE	All components off
Filter differential pressure switch	FILTER # ERROR	Fan speed increase acc. to “Filter offset” parameter
External alarm signal	EXT. ALARMINP. # **	no direct effect*
Conductivity >5µS	HUMIDIFIER # 5µS	no direct effect*
Conductivity >20µS	HUMIDIFIER # 20µS	Ultrasonic humidifier off
Pump # circuit-breaker triggered	PUMP # ERROR	Pump # off
Dry cooler # circuit-breaker trig.	DRY COOLER # ERROR	Dry cooler # off
Water detector	WATER ALARM	Humidifier off
Return air temp. > Limit value	ROOM TEMP TOO HIGH	no immediate effect
return air humidity > limit value	ROOM HUM TOO HIGH	no immediate effect
Supply air temp. > Limit value	SUPPLY AIR TEMP TOO HIGH	no immediate effect
supply air humidity > limit value	SUPPLY AIR HUM TOO HIGH	no immediate effect
Water temp. > Limit value	WATER TEMP TOO HIGH	no immediate effect
Return air temp. < Limit value	ROOM TEMP LOW	no immediate effect
return air humidity< limit value	ROOM HUM LOW	no immediate effect
Supply air temp. < Limit value	SUPPLY AIR TEMP LOW	no immediate effect
supply air humidity < limit value	SUPPLY AIR HUM LOW	no immediate effect
Water temp. < Limit value	WATER TEMP LOW	no immediate effect
Fire/smoke sensor	FIRE ALARM	All components off
Phase failure, over/undervoltage, phase asymmetry, phase sequence	PHASE ERROR	All components off
Tolerance exceeded	SENSOR # ERROR	defective sensor # excluded
measured voltage/current outside of defined range	SENSOR # DEFECT	defective sensor # excluded
Thermostat at the HG heater has triggered.	HG HEAT. DEFECT	HG heater solenoid valve closed
Pressure sensor or EEV cable defective	EEV PRESSURE SENSOR	Valve opening remains in current position
Temp.sensor or EEV cable defective	EEV TEMP.SENSOR	Valve opening remains in current position
EEV step motor defective	EEV STEP MOTOR	Valve opening remains in current position
RS485 bus connection faulty	UNRELIABLE EEV	Valve is closed after 15 seconds. An OPEN/CLOSE operation is possible with the “Manual emergency operation level” option.
Error on outdoor unit ***	OUTDOOR UNIT ERROR ****	Outdoor unit off

\# stands for a number.
* The alarm in question can be configured so that a common alarm is triggered, which can control further technical equipment via a digital output.
** The alarm text can be changed.
*** The error code can be read out at the corresponding wired remote controllers of MITSUBISHI Heavy Industries.
**** For size 3, the number (e.g. OU ERROR 1) indicates the error of the corresponding outdoor unit.

Alarm signals (µPC alarms)

Cause	Alarm text	Effect
RS485 bus connection faulty	µPC COMM.LOSS	Compressor is switched off.
Sensor fracture, analog input B3 - suction gas temperature	DEFECT SENSOR B3	Compressor is switched off.
Sensor fracture, analog input B4 - hot-gas temperature	DEFECT SENSOR B4	Compressor is switched off.
Sensor fracture, analog input B5 - condensation pressure	DEFECT SENSOR B5	Compressor is switched off.
Sensor fracture, analog input B6 - evaporation pressure	DEFECT SENSOR B6	Compressor is switched off.
max. condensation pressure exceeded (> 43.5 bar)	MAX DISCHARGE PRESS.	Compressor is switched off.
min. suction gas pressure undershot (< 3.3 bar)	MIN. SUCTION PRESSURE	Compressor is switched off.
Hot-gas temperature too high	DISCHARGE TEMP	Compressor is switched off.
Pressure difference pc-po lower than limit value (4 bar)	PRESSURE DIFF. LOW	Compressor is switched off.
Compressor does not start, poss. wiring work	COMP. START	Compressor is switched off.
Compressor exceeds max. time outside of the normal operating range (zone 1)	OPERAT. RANGE LEFT.	Compressor is switched off.
Superheating too low - EE valve	SUPERHEATING LOW	Compressor is switched off.
MOP alarm - EE valve	MOP ALARM	Compressor is switched off.
Suction gas temperature too low - EE valve	SUCTION TEMP. LOW	Compressor is switched off.
Evotunes alarm	EVOTUNES	Compressor is switched off.
EVO control alarm (LOP, MOP, low superheating, low suction gas temperature)	EVO REGULATION	Compressor is switched off.
EVO system alarms (sensor fracture)	EVO SYSTEM	Compressor is switched off.
General inverter alarm (further inform. in Info menu)*	INVERTER	Compressor is switched off.
No communication with the inverter, inverter power failure	INVERT.COMM.LOSS	Compressor is switched off.

pc: Condensation pressure
po: Suction gas pressure

For all µPC alarms except for the alarm highlighted in orange, an advanced alarm management is set, which is described in more detail below.

* You can find further information in the “Info/Components/Cooling/ICC/more/more” menu under the “Inverter error” menu item.

Management of µPC alarms

If the µPC identifies an alarm, the compressor is switched off by the µPC. The IOC has no influence on this. Most alarms are automatically reset by the µPC. Usually, it takes less than 30 seconds such that the compressor is automatically restarted after the compressor break (180 seconds, preconfigured in µPC) or, for a very short runtime, after the minimum new start interval (360 seconds, preconfigured in µPC).

The “Discharge temperature alarm” alarm is not reset by the µPC and must be manually reset.

The “Compressor exceeds max time allowed working out of its envelope limits” and the “General inverter alarm” alarms are not reset by the µPC (depending on the inverter error code, some of the “general inverter” alarms are reset by the µPC) and are handled by the IOC in a special way.
These alarms are automatically reset by the IOC but a maximum of 5 times in 24 hours. If the same alarm occurs for the sixth time in 24 hours, it has to be reset manually.

The IOC resets the alarm 210 seconds after it occurs.
All µPC alarms are suppressed by the IOC for 240 seconds after they occur so are not shown in the status (“status” command) or forwarded to the C7000AT. An alarm is only triggered if they are still there after 240 seconds.

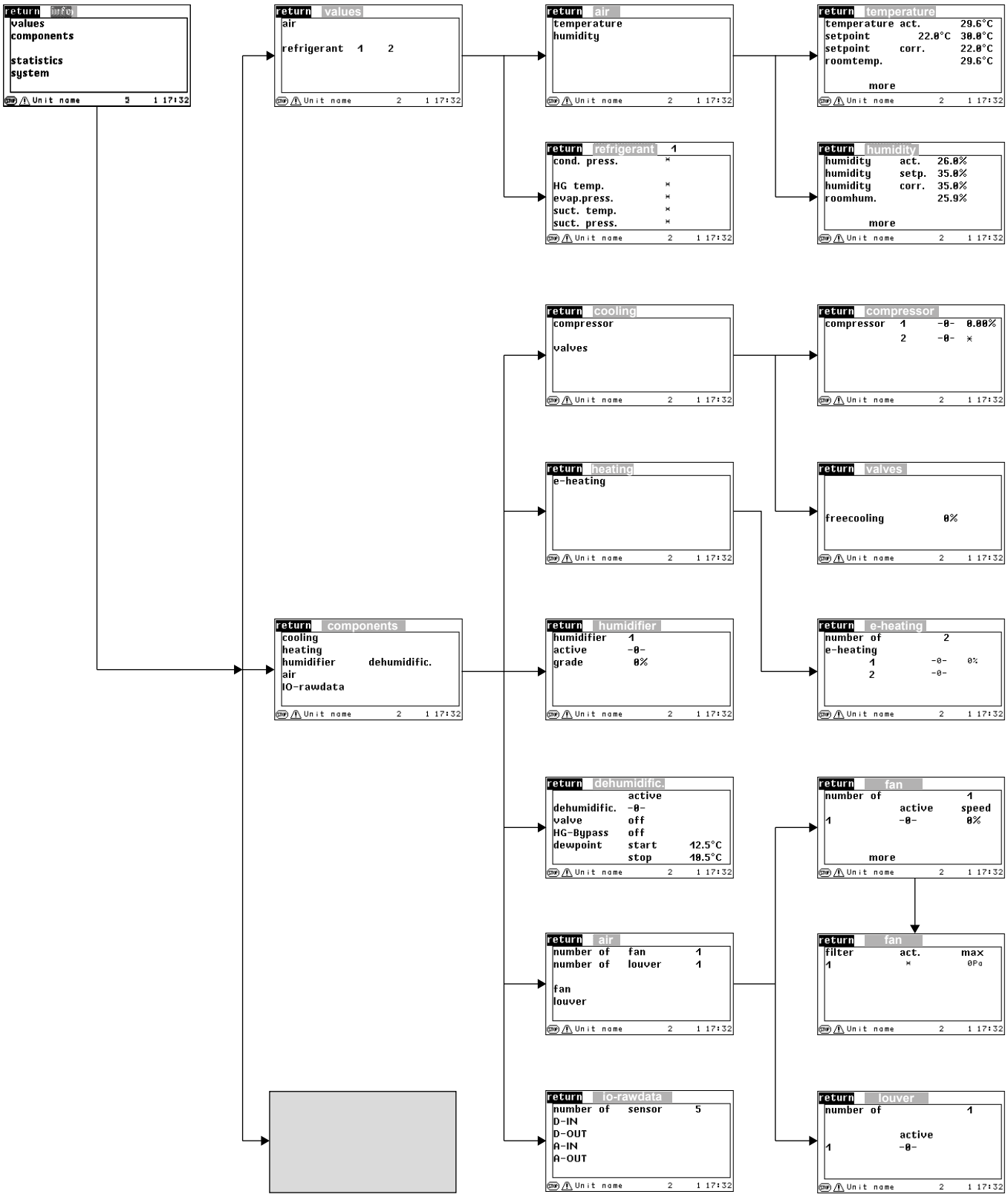
But the alarm is entered in the event log immediately after it occurs.
An alarm reset that is triggered by the IOC appears there as “Automatic alarmreset to µPC”.
A manual alarm reset (e.g. via the C7000AT) appears as “Alarmreset to µPC”.

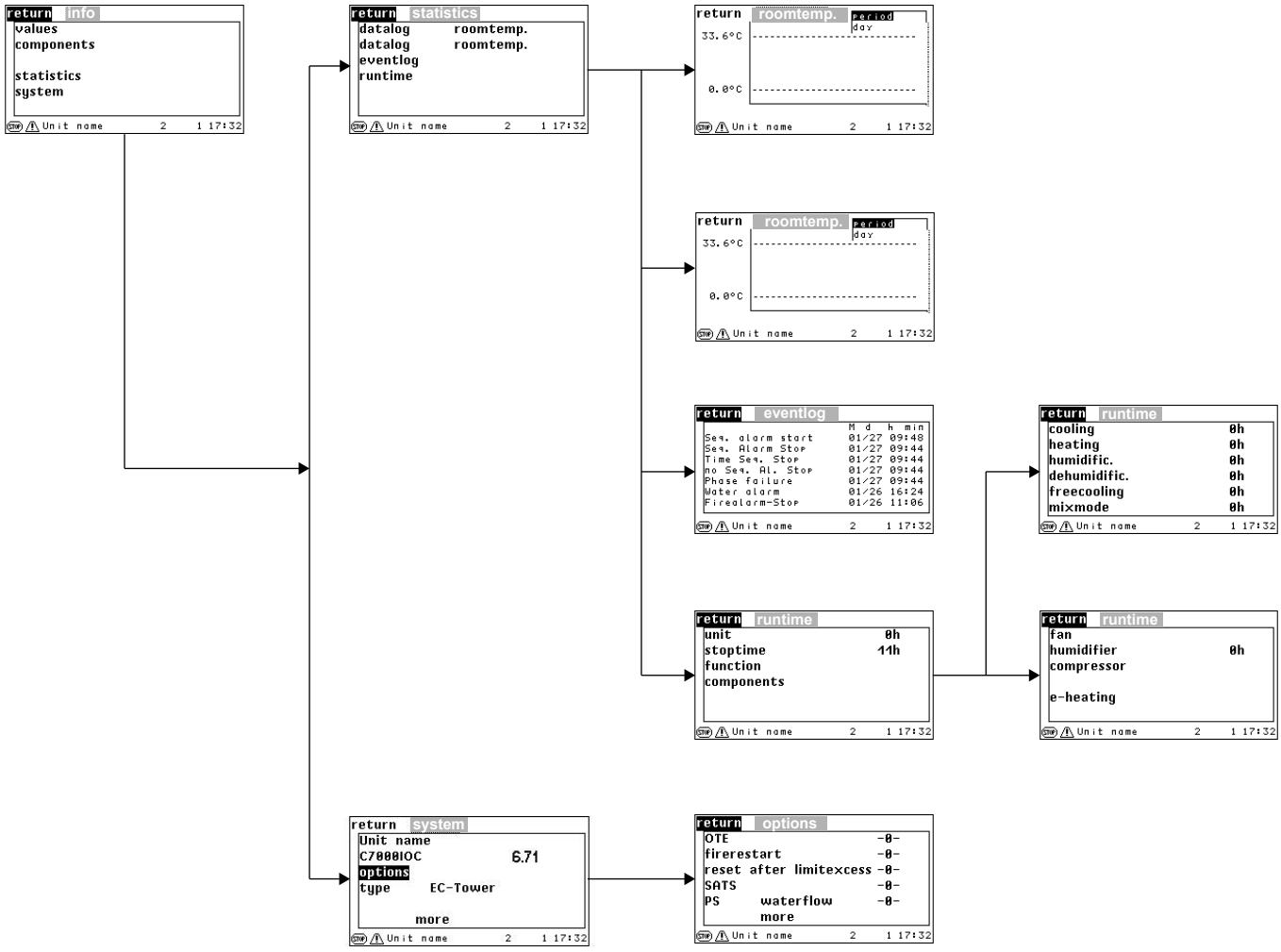
12. Menu structure of the main menu for operating the EC tower

The menu structure applies for the EC tower of size 1 as of version 05, size 2 as of version 06 and size 3 as of version 02.

12.1 Menu structure of the Info main menu

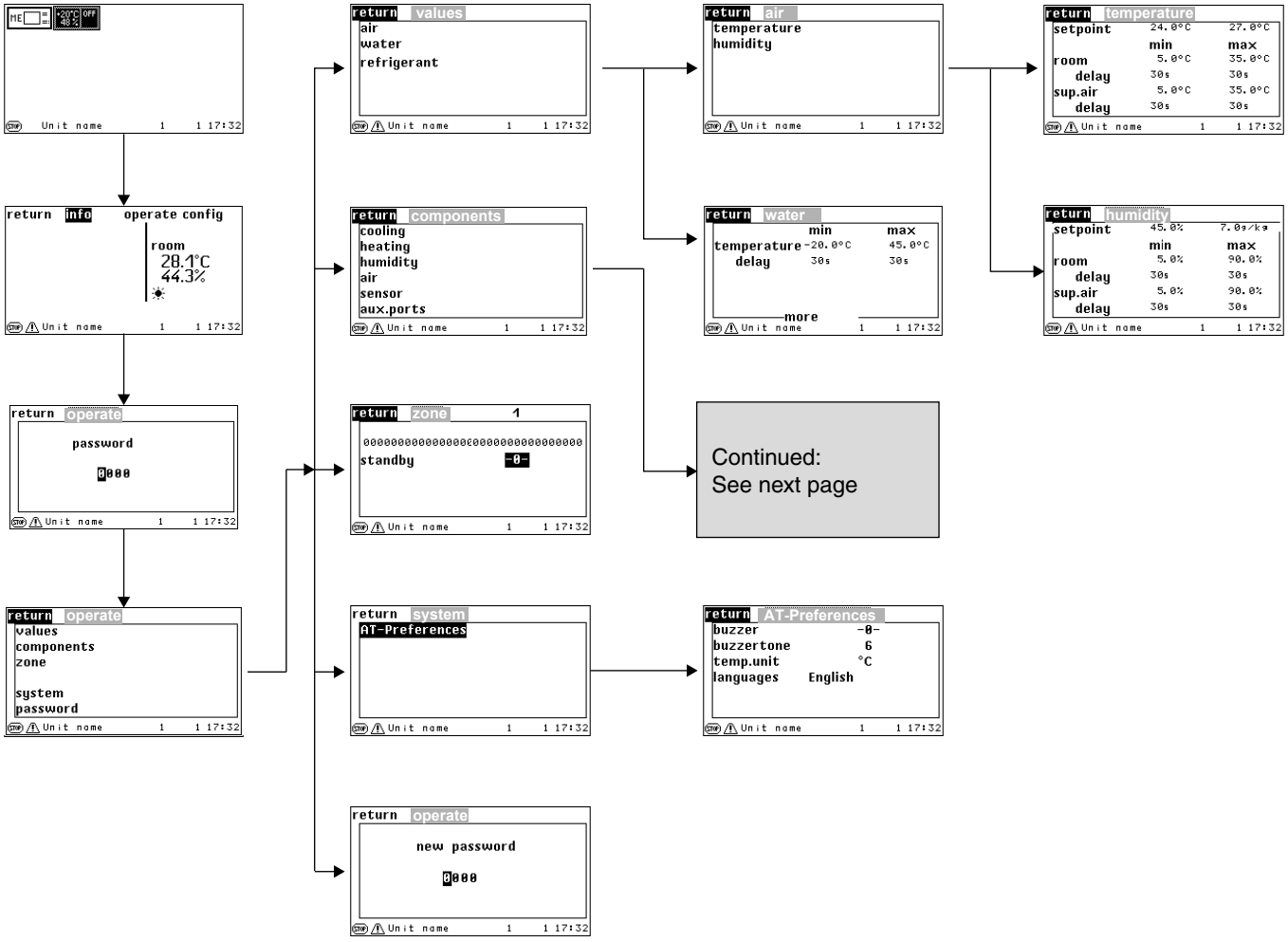
No password is necessary for the info main menu.

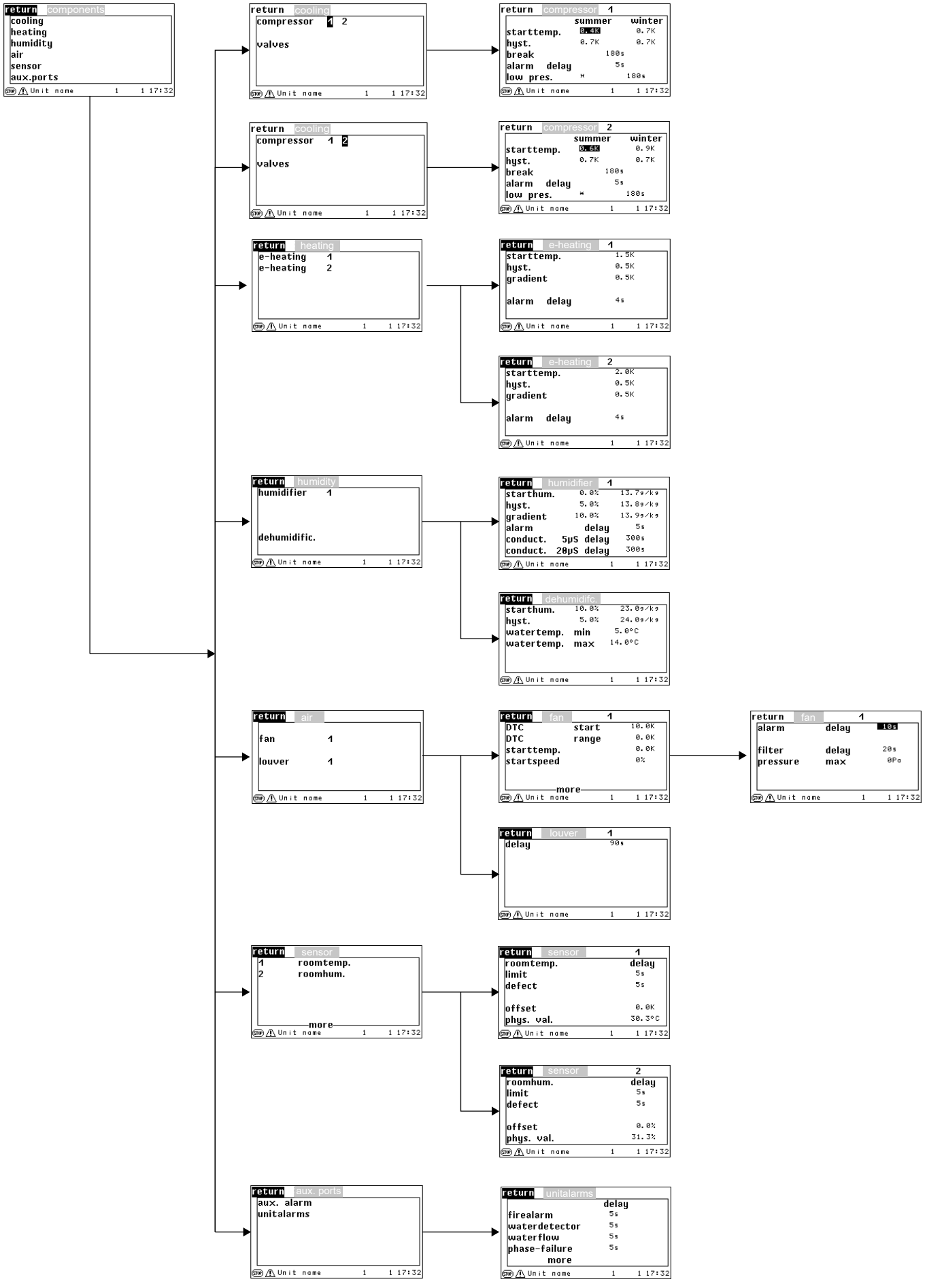



return info
values
components
statistics
system
Unit name 2 1 17:32
return statistics
datalog roomtemp.
datalog roomtemp.
eventlog
runtime
Unit name 2 1 17:32
return roomtemp. period day
33.6°C
0.0°C
Unit name 2 1 17:32
return roomtemp. period day
33.6°C
0.0°C
Unit name 2 1 17:32
return eventlog
M d h min
Seq. alarm start 01/27 09:48
Seq. Alarm Stop 01/27 09:44
Time Seq. Stop 01/27 09:44
no Seq. AL. Stop 01/27 09:44
Phase failure 01/27 09:44
Water alarm 01/26 16:24
Firealarm-Stop 01/26 11:06
Unit name 2 1 17:32
return runtime
cooling 0h
heating 0h
humidific. 0h
dehumidific. 0h
freecooling 0h
mixmode 0h
Unit name 2 1 17:32
return runtime
unit 0h
stoptime 11h
function
components
Unit name 2 1 17:32
return runtime
fan
humidifier 0h
compressor
e-heating
Unit name 2 1 17:32
return system
Unit name
C7000IOC 6.71
options
type EC-Tower
more
Unit name 2 1 17:32
return options
OTE -0-
firerestart -0-
reset after limitexcess -0-
SATS -0-
PS waterflow -0-
more
Unit name 2 1 17:32

12.2 Menu structure of the Operate main menu

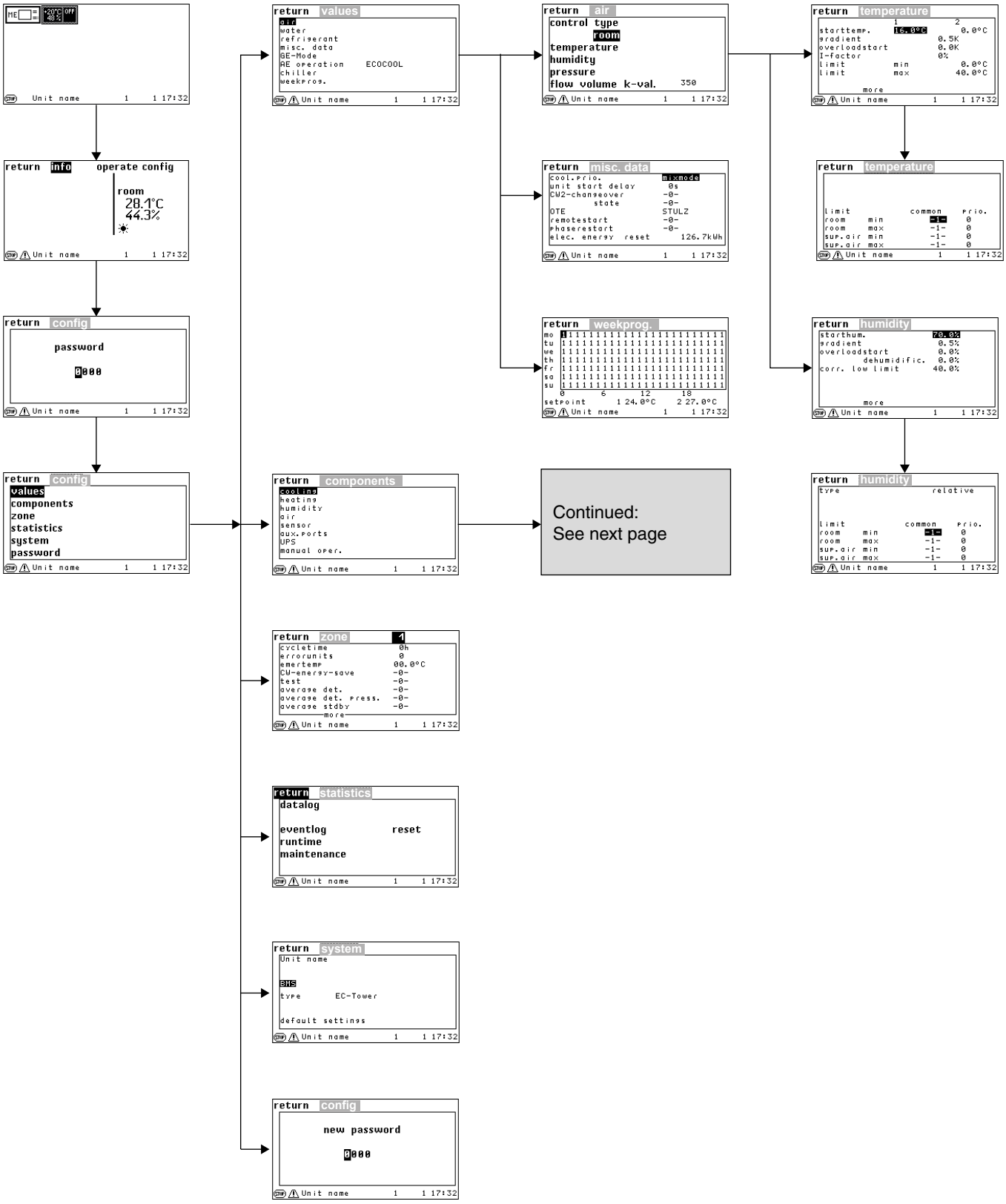
The Operate main menu, the Config main menu and the AT main menu are each protected by a password (see section “Passwords” on page 17).

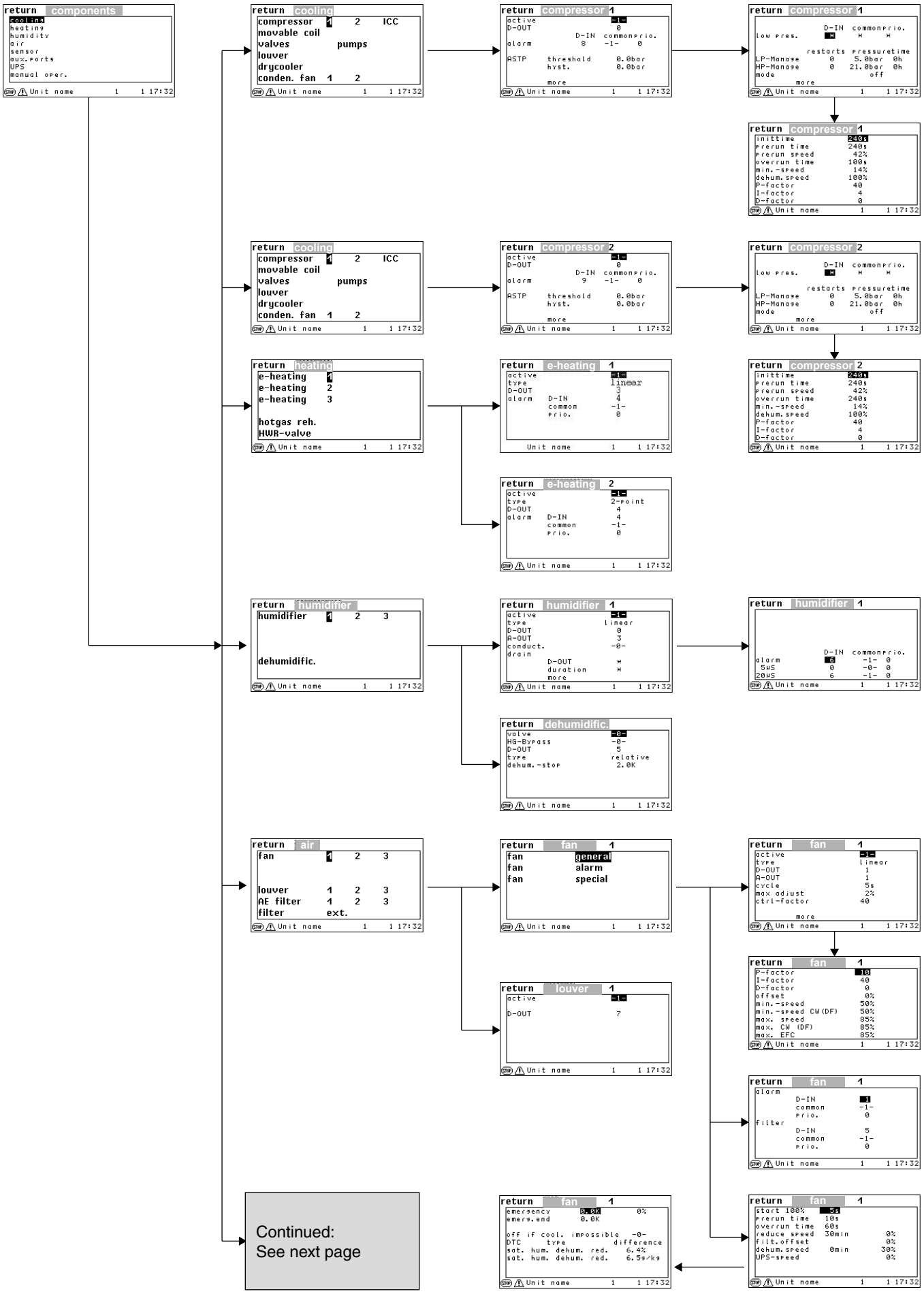


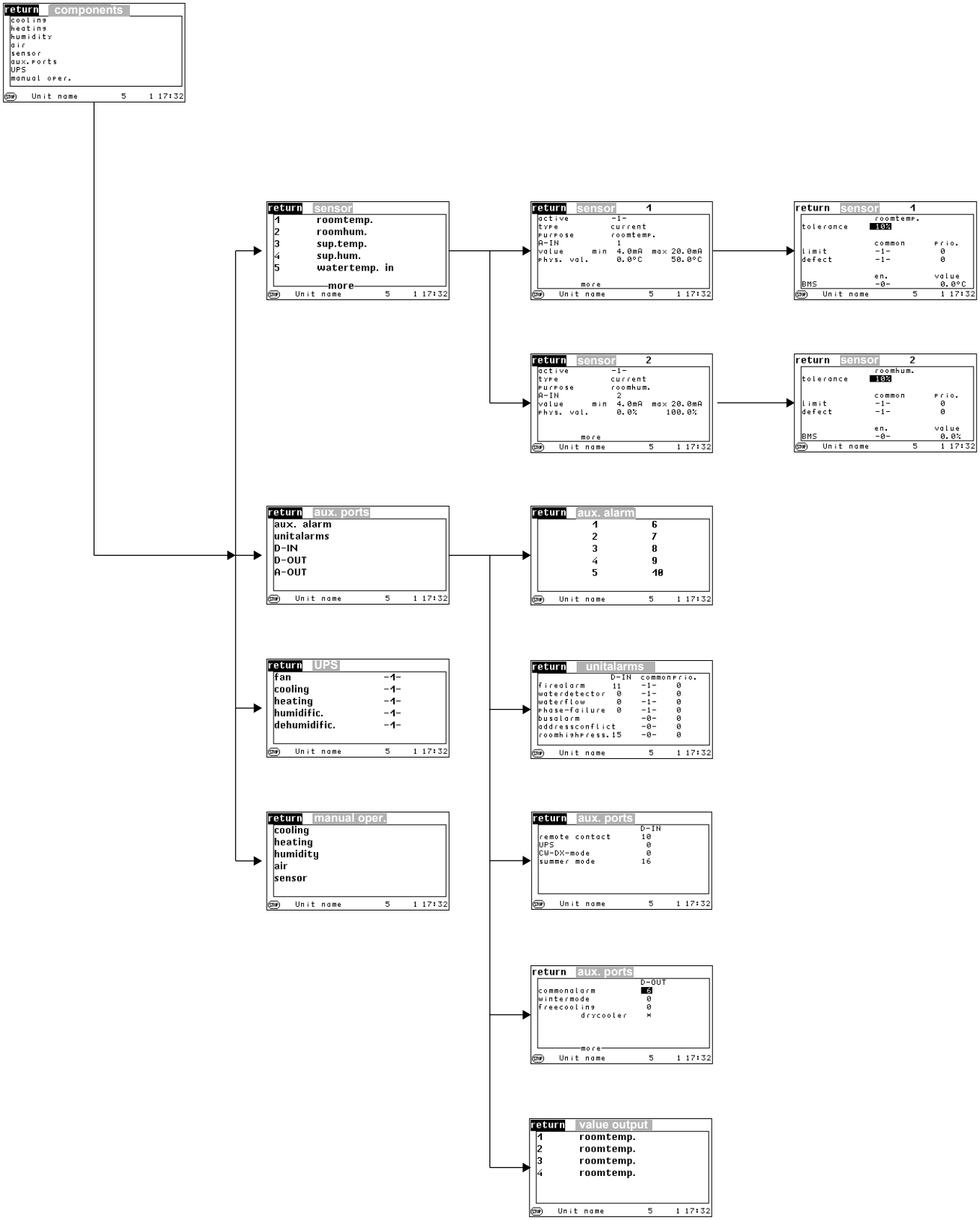

return components
cooling
heating
humidity
air
sensor
aux.ports
Unit name 1 1 17:32
return cooling
compressor 1 2
valves
return compressor 1
summer winter
starttemp. 0.4K 0.7K
hyst. 0.7K 0.7K
break 180s
alarm delay 5s
low pres. * 180s
return cooling
compressor 1 2
valves
return compressor 2
summer winter
starttemp. 0.6K 0.9K
hyst. 0.7K 0.7K
break 180s
alarm delay 5s
low pres. * 180s
return heating
e-heating 1
e-heating 2
return e-heating 1
starttemp. 1.5K
hyst. 0.5K
gradient 0.5K
alarm delay 4s
return e-heating 2
starttemp. 2.0K
hyst. 0.5K
gradient 0.5K
alarm delay 4s
return humidity
humidifier 1
dehumidific.
return humidifier 1
starthum. 0.0% 13.7g/kg
hyst. 5.0% 13.8g/kg
gradient 10.0% 13.9g/kg
alarm delay 5s
conduct. 5µS delay 300s
conduct. 20µS delay 300s
return dehumidific.
starthum. 10.0% 23.0g/kg
hyst. 5.0% 24.0g/kg
watertemp. min 5.0°C
watertemp. max 14.0°C
return air
fan 1
louver 1
return fan 1
DTC start 10.0K
DTC range 0.0K
starttemp. 0.0K
startspeed 0%
more
return fan 1
alarm delay 10s
filter delay 20s
pressure max 0Pa
return louver 1
delay 90s
return sensor
1 roomtemp.
2 roomhum.
more
return sensor 1
roomtemp. delay
limit 5s
defect 5s
offset 0.0K
phys. val. 30.3°C
return sensor 2
roomhum. delay
limit 5s
defect 5s
offset 0.0%
phys. val. 31.3%
return aux. ports
aux. alarm
unitalarms
return unitalarms
delay
firealarm 5s
waterdetector 5s
waterflow 5s
phase-failure 5s
more

12.3 Menu structure of the Config main menu

The Operate main menu, the Config main menu and the AT main menu are each protected by a password (see section “Passwords” on page 17).




return components
cooling
heating
humidity
air
sensor
aux. ports
UPS
manual oper.
Unit name 1 1 17:32
return cooling
compressor 1 2 ICC
movable coil
valves pumps
louver
drycooler
conden. fan 1 2
return compressor 1
active -1-
D-OUT 0
D-IN common prio.
alarm 8 -1- 0
ASTP threshold 0.0bar
hyst. 0.0bar
more
low pres. D-IN common prio.
restarts pressuretime
LP-Manage 0 5.0bar 0h
HP-Manage 0 21.0bar 0h
mode off
inittime 240s
prerun time 240s
prerun speed 42%
overrun time 100s
min.-speed 14%
dehum.speed 100%
P-factor 40
I-factor 4
D-factor 0
return heating
e-heating 1
e-heating 2
e-heating 3
hotgas reh.
HWR-valve
return e-heating 1
type linear
return e-heating 2
type 2-point
return humidifier
humidifier 1 2 3
dehumidific.
return humidifier 1
conduct.
drain
duration
return dehumidific.
valve
HG-Bypass
dehum.-stop relative
2.0K
return air
fan 1 2 3
louver 1 2 3
AE filter 1 2 3
filter ext.
return fan 1
fan general
fan alarm
fan special
return louver 1
return fan 1
P-factor 10
I-factor 40
D-factor 0
offset 0%
min.-speed 50%
min.-speed CW(DF) 50%
max. speed 85%
max. CW (DF) 85%
max. EFC 85%
alarm
filter
return fan 1
emersency 8.0K 0%
emers.end 0.0K
off if cool. impossible -0-
DTC type difference
sat. hum. dehum. red. 6.4%
sat. hum. dehum. red. 6.5g/kg
return fan 1
start 100% 5s
prerun time 10s
overrun time 60s
reduce speed 30min 0%
filt.offset 0%
dehum.speed 0min 30%
UPS-speed 0%
Continued:
See next page


return components
cooling
heating
humidity
air
sensor
aux.ports
UPS
manual oper.
Unit name 5 1 17:32
return sensor
1 roomtemp.
2 roomhum.
3 sup.temp.
4 sup.hum.
5 watertemp. in
more
return sensor 1
active -1-
type current
purpose roomtemp.
A-IN 1
value min 4.0mA max 20.0mA
phys. val. 0.0°C 50.0°C
more
return sensor 1
roomtemp.
tolerance 1.0K
limit common -1- Prio. 0
defect -1- 0
BMS en. -0- value 0.0°C
return sensor 2
active -1-
type current
purpose roomhum.
A-IN 2
value min 4.0mA max 20.0mA
phys. val. 0.0% 100.0%
more
return sensor 2
roomhum.
tolerance 1.0%
limit common -1- Prio. 0
defect -1- 0
BMS en. -0- value 0.0%
return aux. ports
aux. alarm
unitalarms
D-IN
D-OUT
A-OUT
return aux. alarm
1 6
2 7
3 8
4 9
5 10
return UPS
fan -1-
cooling -1-
heating -1-
humidific. -1-
dehumidific. -1-
return unitalarms
D-IN common Prio.
firealarm 11 -1- 0
waterdetector 0 -1- 0
waterflow 0 -1- 0
phase-failure 0 -1- 0
busalarm -0- 0
addressconflict -0- 0
roomhighpress. 15 -0- 0
return manual oper.
cooling
heating
humidity
air
sensor
return aux. ports
D-IN
remote contact 10
UPS 0
CW-DX-mode 0
summer mode 16
return aux. ports
D-OUT
commonalarm 6
wintermode 0
freecooling 0
drycooler M
more
return value output
1 roomtemp.
2 roomtemp.
3 roomtemp.
4 roomtemp.

Notes

Notes

You can obtain
more information from
www.s-klima.de

www.s-klima.de

Technical data subject to change without notice.

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