STULZ

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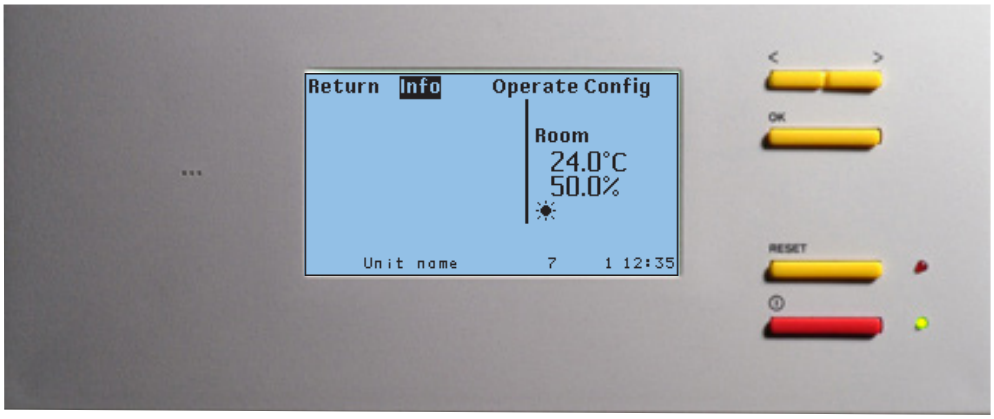


C7000

Original instructions

Microprocessor

Index G57
Issue 6.2019

ABOUT STULZ

Since it was founded in 1947, the STULZ company has evolved into one of the world's leading system suppliers of air-conditioning technology.
Since 1974 the group has seen continual international expansion of its air conditioning technology business, specialising in A/C for data centres and telecommunications installations.
STULZ has ten production plants (2 in Germany, Italy, the USA, Great Britain, Spain, 2 in China, Brazil and India) and twenty subsidiaries (in Germany, France, Italy, Great Britain, Belgium, Brazil, the Netherlands, New Zealand, Mexico, Austria, Poland, Spain, Singapore, China, India, Indonesia, South Africa, Sweden, Australia and the USA). The company also co-operates with sales and service partners in over 140 other countries, and therefore boasts an international network of air-conditioning specialists.

Editor

STULZ GmbH
Holsteiner Chaussee 283
22457 Hamburg

EN/06.2019/G57

Contents

Subject to technical modifications.

1. Presentation of the system

The C7000 control system offers a maximum of operating safety for industrial applications combined with two versions for the operator interface. The C7000IOC takes charge of the control in itself and the optional C7000 Advanced serves as a comfortable operator interface.

Each A/C unit has its own controller while all controllers can be linked together in a bus system.

Beyond the basic cooling functions, the C7000 control system provides some interesting features like an intelligent management of high/low pressure-alarms, a proportional fan speed control which opens a wide spectrum of applications and time-based functions like:

- week timer
- unit sequencing within definable unit groups

A watchdog on the IOC board monitors the CPU function and produces a restart, as soon as for 0,5 seconds no CPU activity could be detected.
The core of the C7000 control system is the C7000 I/O controller on which up to 4 EAIO/EDIO for additional in- and outputs can be perpendicularly plugged.

The C7000 control systems manages 3 busses:

1. RS485 IO-bus for the communication among the A/C units
2. RS485 BMS-bus for the communication with a building management system
3. RS485 component bus (e.g. for EVD {driver module for expansion valve}, µPC)

For service purposes like software download and control via laptop a RS232 interface is located on the I/O controller the same as on the C7000 Advanced.

Analog (A) and digital (D) in- and outputs

	A-IN	A-OUT	D-IN	D-OUT
IOC	4	4	11	7
EAIO	4	4	/	/
EDIO	/	/	8	6
Maximum equipment				
IOC + 4 EAIO	20	20	11	7
IOC + 4 EDIO	4	4	43	31

EAIO: Extension board for analog in- and outputs
EDIO: Extension board for digital in- and outputs
EBUS: Extension board for a RS485 bus

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

IIC-Bus: internal data bus in the IO controller

This manual is based on the software versions IOC-V6.85 and AT-V4.73.

2. Operator interface

2.1 Operational elements - C7000IOC

The operational elements for the C7000IOC i.e. the I/O controller consist of the keyboard of your PC or laptop. You operate the C7000IOC by specified commands which follow an easily comprehensible syntax.
To establish the connection from your PC to the C7000 you need a 9-line cable with SUB-D 9 connectors at both ends (crossed type), which can be obtained as an option and a terminal program e.g "C7000-Serice".
Connect the cable at a serial port of your PC and at the service port X15 on the IOC.

To prevent a destruction of electronical elements due to potential differences, use a laptop with battery supply when connecting the laptop to the C7000IOC service port.
Start the terminal program.

If your PC is not equipped with a serial RS232 interface, you may use a RS232-USB converter.

You can now communicate with the connected C7000IOC, in return the IOC sends the following prompt to your PC:
"`ioc ##:>`", where ## represents the bus address.

The commands can be classified into three major categories:
1. bus specific control commands
2. commands related to A/C unit components
3. commands concerning the whole A/C unit

1. bus command	2. component command	3. A/C unit command

`iobus`
`iobusok`
	`sensor 1`
	`comp 1`
	`suctionv 1`
	`gecwv 1`
	`gvalve 1`
	`drycool 1`
	`pump 1`
	`eheat 1`
	`gasheat`
	`pwwheat`
	`humi 1`
	`dehumi`
	`fan 1`
	`louver 1`
		`equip`
		`is 1`
		`state`
		`ups`
		`wprg`
		`event`
		`log 1`
		`option`
		`exalarmin 1`
		`zone 1`
		`loaddefault dx1`

The commands on a lightgrey (yellow) background need no further parameters. The commands which are followed by a number need this number because there are several components of the same type.

Each command displays a detailed help for further parameters (if there are any) when it is followed by "h" like e.g. "comp h".
A command of the second (component command) or third category (unit comm.) which is typed in without any parameters displays all the information about its subject (except "loaddefault ###" which is an execution command).

The commands of the 2nd and 3rd category will be largely explained in the context of the description of the C7000 functions.

The `iobus` command edits the actually stored IO-bus-configuration.

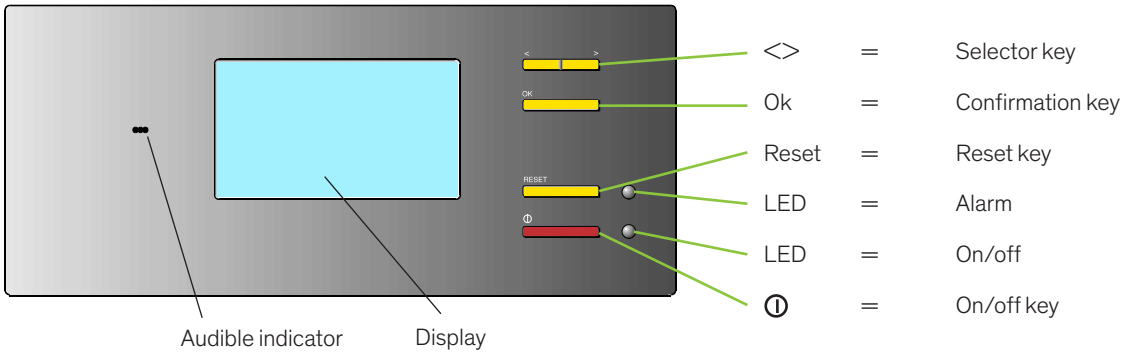
This command is a control command and shows neither help nor information but execute the command right after pressing the return/enter-key.

The counting of any digital or analog in- or output begins with number 1. Despite this the digital/analog in- or output 0 can be assigned to any component. This will allow the component to stay part of the configuration even if it does not take part in the control. A double assignment of inputs and outputs is technically possible but only reasonable in exceptional cases.

Outputs in the languages English and German are available at the service port.
If within a command, where the input of a number is expected, nothing is entered, the terminal program interprets this as "0".

Whenever a parameter is expressed by a logical function, 0 means no, disabled, 1 means yes, enabled.
If at unit start no valid configuration is found, a minimum configuration is loaded.
Note that no year date below 2000 can be entered.

2.2 Operational elements - C7000 Advanced



Selector key	You can select menus and change parameters with the selector key
Confirmation key	You acknowledge the functions/parameters selected with the selector key with the confirmation key.
Reset key	Alarm signals are acknowledged with the reset key. Press it once to silence the alarm tone. Press it a second time to clear the alarm message (if the cause has been eliminated).
LED alarm	This LED display flashes in the event of an alarm and remains lit after the reset key has been pressed once.
LED start/stop	This LED display lights up when at least one C7000IOC within the bus is switched on.
On/off key	The control of the selected A/C unit is switched on/off with this key. If the on/off protection is enabled the control is switched on/off with a delay or after having entered a password (details on page 12).
Audible indicator	The audible indicator issues an alarm tone when an alarm has occurred.
Display	The display shows data, operating conditions and information for the operator's guidance.

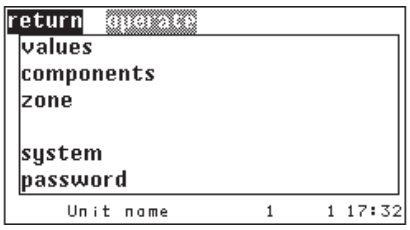
Operation - Navigation through the menus

The principal keys to navigate in and across the menus are the selector key and the confirmation key, which have the function of the mouse for a PC. The cursor, to keep the analogy with a PC, is represented by the inverse display of a field content. This field may contain an expression, a number or a symbol.

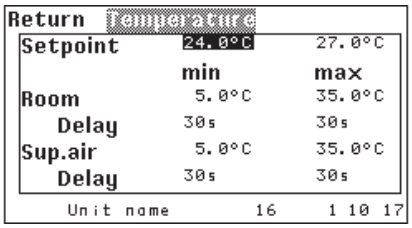
There are two types of menus: Selection menus and parameter menus. In **selection menus** you can choose a menu point with the help of the selector key and after having pressed the confirmation key it will bring you to the next submenu. To get to the next menu on a level above there is a "Return"-field in the top left corner of every menu.

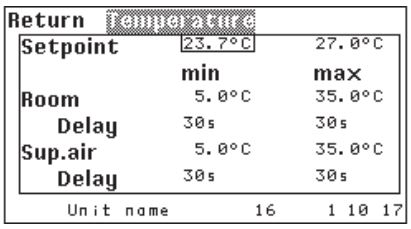
In **parameter menus**, which represent the end of a menu branch, you can select parameters with the selector key, but if you press the confirmation key, the parameter is displayed black on a clear background with a black frame and indicates this way the change mode. By the selector key you can change the parameter value. Pressing the confirmation key finishes the modification and displays the cursor inversely again. Below the smallest value appears the symbol of an arrow to the left. If you select this arrow and press the confirmation key, the enter mode of the parameter is left without modification of this one.

Selection menu



Parameter menu

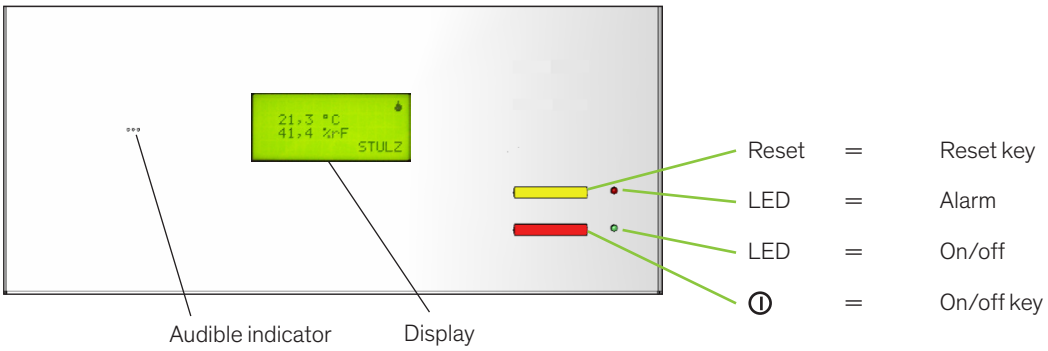




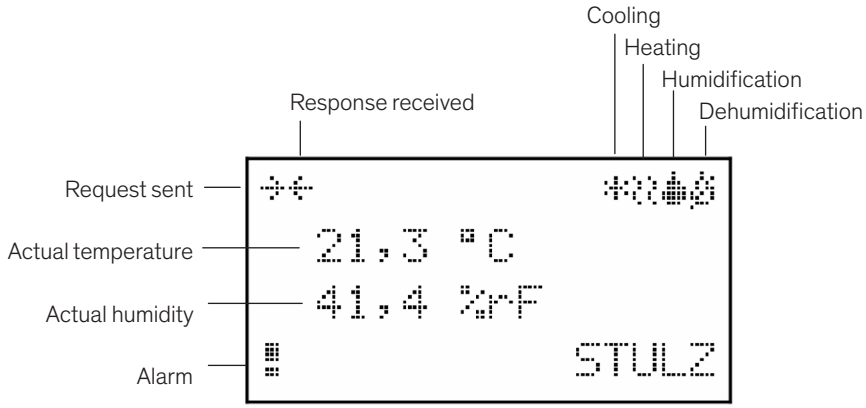
In a few parameter menus, there is the note "more" in the bottom frame line, which indicates that another window will be displayed after the last parameter. You can also reach this window by typing the selector key "<" when the cursor is on the field "return".

Note:
After the C7000AT has displayed a submenu of an C7000IOC for 10 minutes without key activation, it will show the main menu of the corresponding unit again.

2.3 Operational elements - C7000 Display

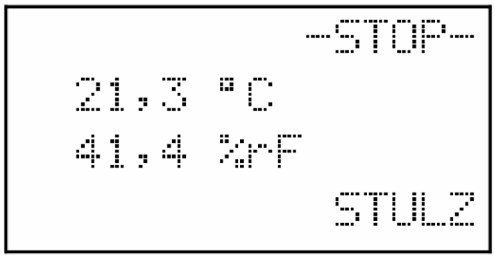


Reset key	Alarm signals are acknowledged with the reset key. Press it once to silence the alarm tone. Press it a second time to clear the alarm message (if the cause has been eliminated).
LED alarm	This LED display flashes in the event of an alarm and remains lit after the reset key has been pressed once.
LED start/stop	This LED display lights up when the control of the A/C unit is switched on.
Start/stop key	The control of the A/C unit is switched on/off with this key.
Audible indicator	The audible indicator issues an alarm tone when an alarm has occurred.
Display	The display shows the actual temperature and humidity, operating states and alarms.



The status request is sent to the C7000IOC in a fixed cycle of 3 seconds. During the request the symbol ✣ is displayed.
As soon as a formally correct response is received the following symbol ✣✣ flashes once.
If no response has been received after three consecutive requests, question marks are displayed instead of the temperature and humidity.

Display with the control switched off:



3. Controller start

Commands

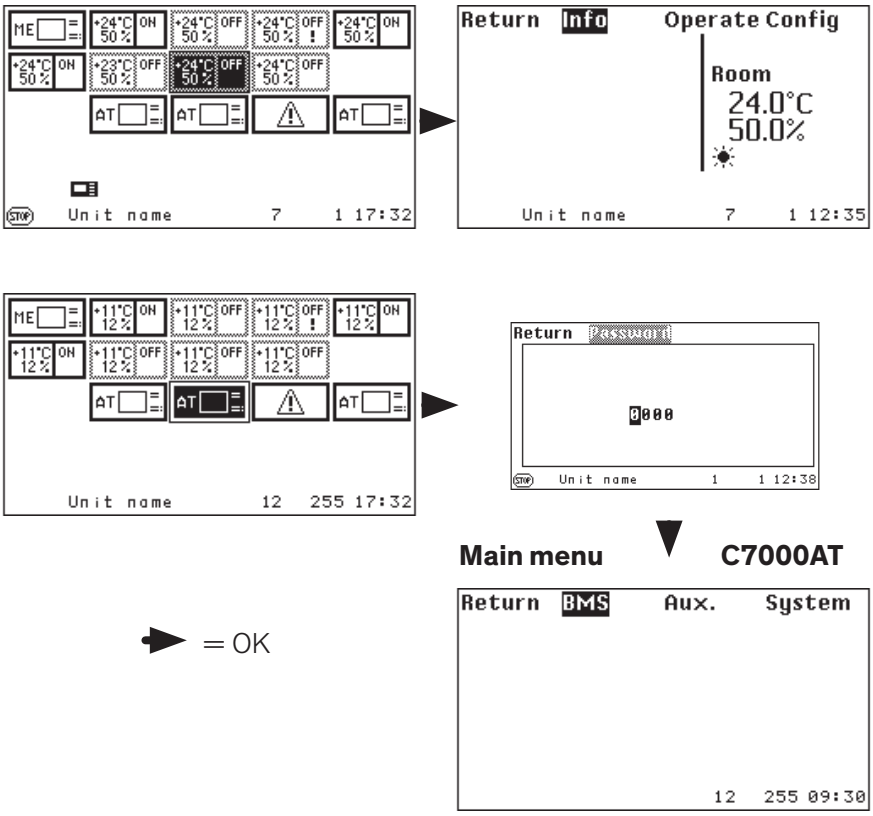
`state start`	The control/the A/C unit is started.
`state stop`	The control/the A/C unit is stopped.

C7000AT

After having switched on the power supply of the C7000AT the bus overview will appear.
With the selector key you can choose the unit which you want to control.
A symbol/unit which is selected, is displayed inversely.
Empty bus positions will be skipped.

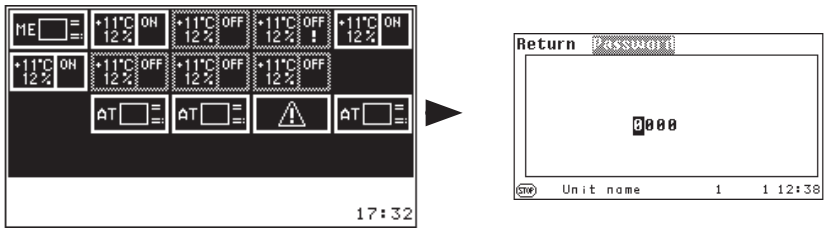
When you have selected a C7000IOC and confirmed by the OK key, the main menu for the C7000IOC is displayed.

When you have selected a C7000AT and confirmed by the OK key, after having entered the AT password the main menu for the C7000AT is displayed.



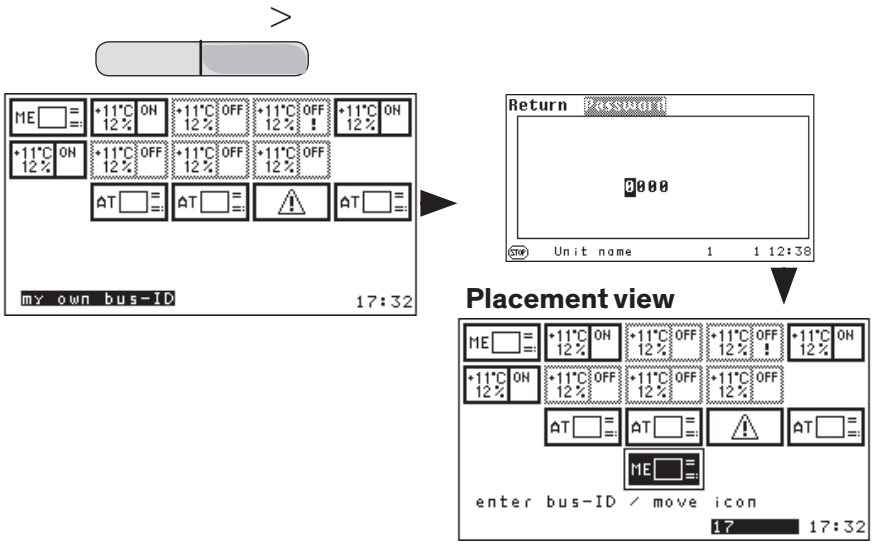
Confirmation view

After having marked the last bus participant position (bus address 14 in the example) you get to the following display, with the selector key, where all units are marked.
In this state you can switch on/off the whole system by the local on/off key.



If some units are in operation, all units are switched off if you press the on/off key.
(Details see on/off protection, on the next page but one).
If you press the OK-button when all positions are marked the existing configuration is confirmed after the request and entry of the AT-password.

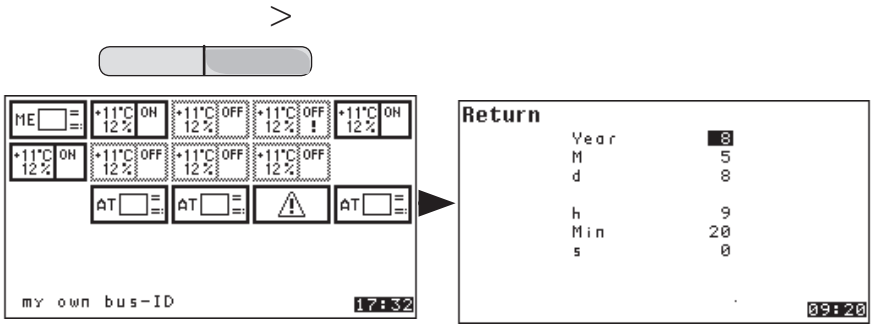
By pressing the selector key ">" you come to the following window in which the box "my own bus-ID is marked.
After the confirmation of this window by "OK" followed by the AT-password the placement view is displayed.



In this window you can shift the C7000AT, from which you operate the system (ME) to another position with the selector key.

By this you modify the bus address. (ME_{old} at position 0 and ME_{new} at position 17)
Confirm the position by the "OK-button".

Finally you can adjust the time and date by selecting the clock in the lower right corner.

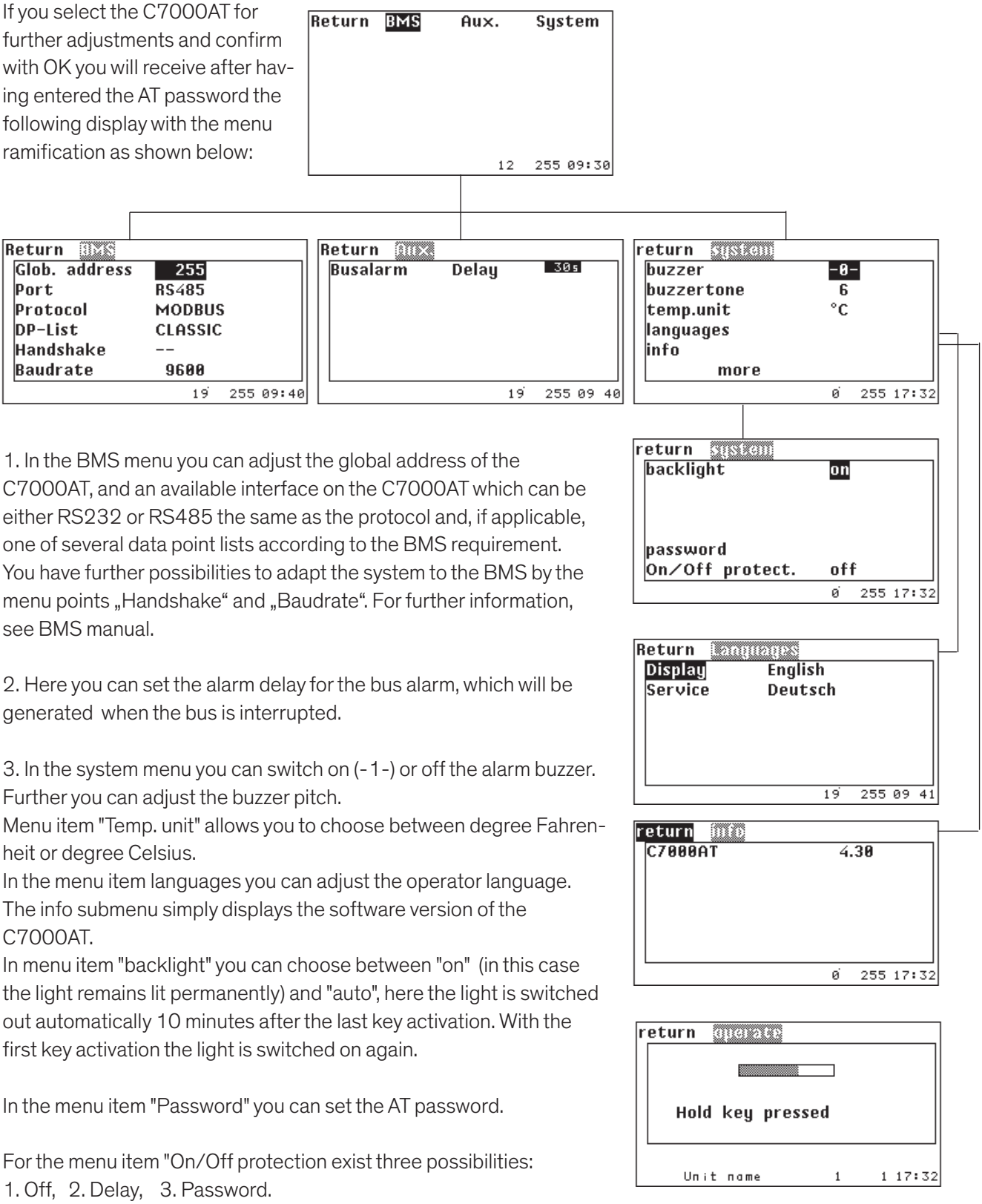


The following items can be adjusted in sequence:
- Year, Month, Day, Hour, Minute, Second.

All active bus participants synchronize their time to this setting.
If a WIB8000, in which the time synchronization is enabled, is part of the Stulz bus, all connected C7000ATs and C7000IOCs (by means of E-bus board) take over date and time of the WIB. This also applies to C7000ATs connected via an IO bus with an C7000IOC, which is connected with the WIB by an E-bus board.

Main menu for a C7000AT

If you select the C7000AT for further adjustments and confirm with OK you will receive after having entered the AT password the following display with the menu ramification as shown below:



1. In the BMS menu you can adjust the global address of the C7000AT, and an available interface on the C7000AT which can be either RS232 or RS485 the same as the protocol and, if applicable, one of several data point lists according to the BMS requirement. You have further possibilities to adapt the system to the BMS by the menu points „Handshake“ and „Baudrate“. For further information, see BMS manual.

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

3. In the system menu you can switch on (-1-) or off the alarm buzzer. Further you can adjust the buzzer pitch.
Menu item "Temp. unit" allows you to choose between degree Fahrenheit or degree Celsius.
In the menu item languages you can adjust the operator language.
The info submenu simply displays the software version of the C7000AT.
In menu item "backlight" you can choose between "on" (in this case the light remains lit permanently) and "auto", here the light is switched out automatically 10 minutes after the last key activation. With the first key activation the light is switched on again.

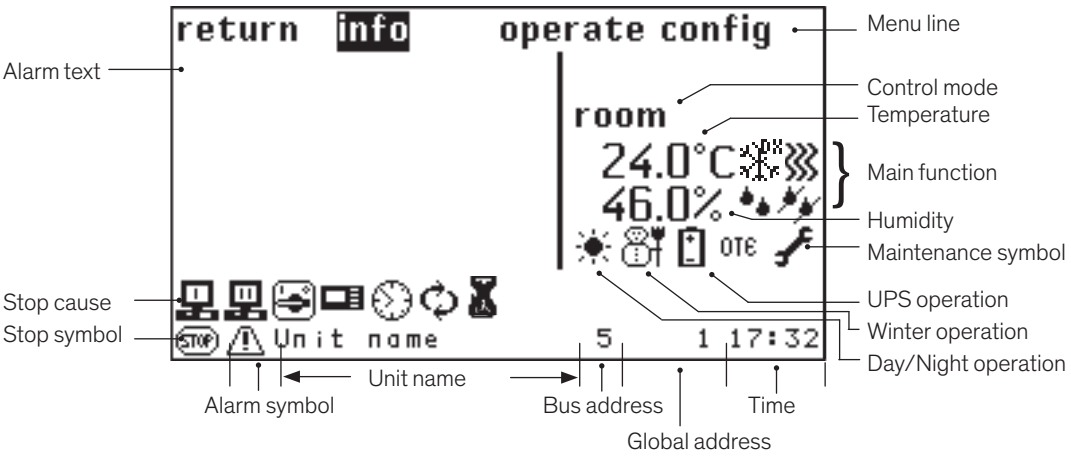
In the menu item "Password" you can set the AT password.

For the menu item "On/Off protection exist three possibilities:
1. Off, 2. Delay, 3. Password.

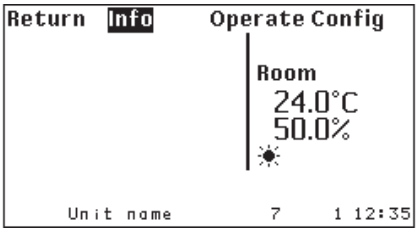
With the first setting (off) the control is instantly switched on/off by the on/off key of the controller.
With the second setting (delay) the window shown beside appears after the on/off key has been pressed. A grey bar diminishes from right to left within 3 seconds. During this time the key must be kept pressed, otherwise the switching operation will not be executed.

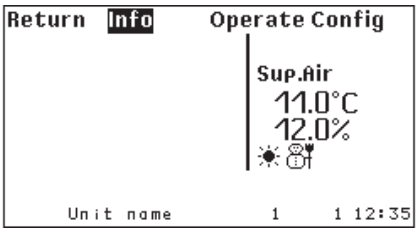
With the third setting (password) the operate password is requested when the on/off key is pressed. Having entered the correct password the switching operation will be executed.

Main menu for a C7000IOC



If you select a C7000IOC you will receive the main menu as shown right with the possibility to choose one of the three submenus "Info", "Operate" or "Config".
In the middle of the window the control type (Room or supply air) is displayed and the actual values (Room or Supply air) below.





Below the actual values a symbol indicates, whether the unit runs in day or night operation. Day operation corresponds to operation at the first temperature setpoint. Night operation corresponds to operation at the second setpoint.

Day operation

Night operation

Further Symbols

This symbols lights up, when the controller has switched over to winter operation. At summer operation the symbol is not visible.

This symbols lights up, when a voltage is detected at the input for UPS operation or if UPS operation is requested by a BMS.

This symbols lights up, when the maintenance interval which can be adjusted in the config menu is expired.

Stop causes

The C7000IOC can be stopped by several functions or devices, which are displayed on the C7000AT.

This symbol indicates, that the C7000IOC has been stopped.
The following symbols show the cause of the unit stop.

stopped by remote On/Off (remote switch connected to digital input)

stopped by BMS/WIB

stopped by WIB sequencing
(depending on the setting in the WIB)

stopped by internal timer (week program)

stopped by the on/off-key at the C7000AT or by the command "state stop" via the C7000IOC service port.

stopped by the sequencing

stopped by fire alarm

Symbols for operating states

When the control is in operation, the following symbols indicate the unit status on the main menu. These symbols are not displayed in the submenus.

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

Heating

Humidification

Dehumidification

Symbols for alarm messages

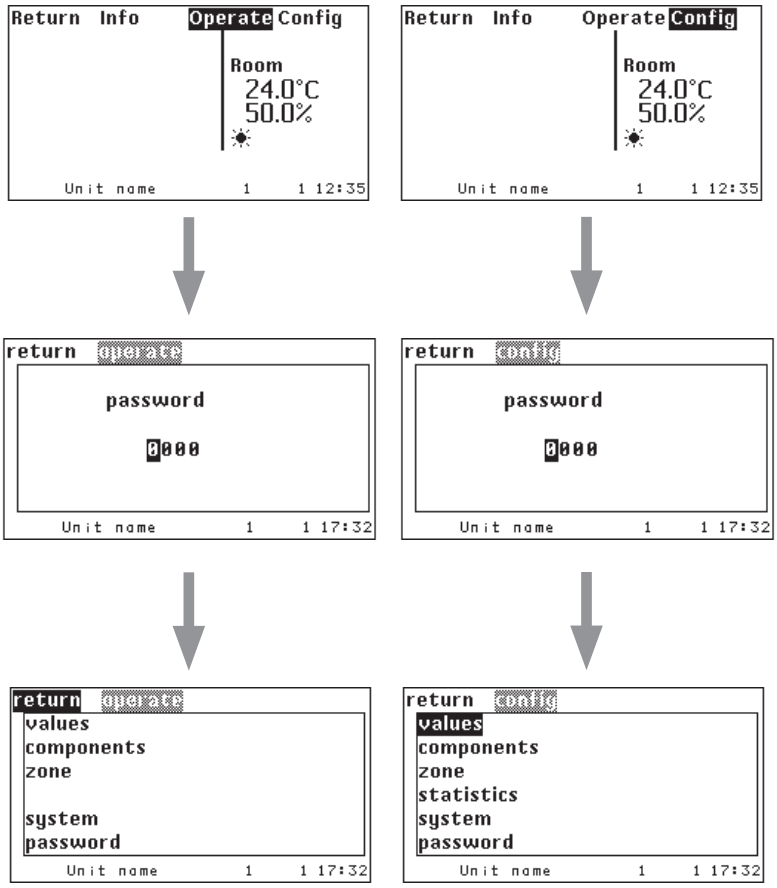
When an alarm has occurred the following symbol is displayed in the left bottom corner.

Parameter values

Instead of numerical values two other displays are possible:
1. ??? - value requested at the C7000IOC, without response yet
2. ~~XXX~~ - component not configured

Passwords

To access the Operate level, the Config level and the C7000AT main menu a password is required.
There are 3 passwords in total, a user-specific password for the Operate level, the Config level and the C7000AT menu each. The passwords can be modified and are set "0000" at the delivery.



Entering the password

The digits can be modified by the selector key, after you have pressed the confirmation key. After the digit adjustment confirm with the confirmation key and pass over to the next digit with the selector key ">".
When you have reached the last digit at the right, you access the main menu of the Operate resp. Config level by activating the selector key ">" (if the password was right).

There is no limitation for the number of attempts.

The passwords for the "operate" and "config" level are saved on the C7000IOC board. So it is possible for example to adjust the "operate" password "1234" for a C7000IOC with bus address 3 and the "operate" password "5678" for a C7000IOC with bus address 5.

4. Info menus

4.1 Info commands - C7000

Each component- or A/C unit command which is entered without parameters only displays information without changing adjustments. However, the following commands give a general overview about the unit state and configuration.

`equip` - shows the components and its number, also the extension cards (dig/ana)
`state` - shows the unit- and functional (cooling, heating etc.) runtimes and the unit/component state
`is 1` - setpoints, actual zone/unit values, limit values
`is 2` - alarm delay, priority, common alarm assignment for each limit value alarm
`is 3` - control type, sensor limitation values, cooling priority, winter operation, ups mode, outside temp. for condensation pressure reduction, gradient for press. reduction, winter start delay, bus/global address, temperature difference for overload activation, last service, service interval,
- assignment of in/outputs: common alarm, winter operation, remote on/off, ups operation, actual temp./humidity, CW cooling off

`wprg` - shows the programmed timer function for the week (week program)

`events` - shows all registered events (maximum 200, alarms & unit on/off)
`event 1` Prints the last events from number 1 to 20
`event 2` Prints the last events from number 21 to 40
:
`event 10` Prints the last events from number 181 to 200
`event 20.07.2007` Prints all events of this date
`event comp` Prints all events which contain the expression „comp“
`event clear` Erases the event memory
`event 1 13` Prints the events from number 1 to 13

`ups` - shows the ups (uninterrupted power supply) configuration
`water` - shows all settings concerning the water alarm.
`fire` - shows all settings concerning the fire alarm.
`phase` - shows all settings concerning the phase alarm.
`flow` - shows all settings concerning the water flow alarm.
`service` - shows all settings concerning the service alarm.
`ain` - shows the assignment of the analog inputs.
`aout` - shows the assignment of the analog outputs.
`din` - shows the assignment of the digital inputs.
`dout` - shows the assignment of the digital outputs.

`option` - Shows all information about activated special software options
e.g.: `002. Restart after fire (active)`
`option all` Shows all possible special software options
`001. OTE`
`002. Restart after fire` → When the fire alarm has ended the controller switches to the state, in which it has been before the alarm occured e.g. sequencing stop.
`003. automatic alarm reset after limit value excess`
`004. SATS`

```
005. CPP: commutation in case of flow alarm
006. ACT
007. Supply air pressure standby management
008. CyberLab ──────────► described in chapter 6.15
```

`option 3 1` Activates special software option number 3
`option 3 0` Deactivates special software option number 3

As the C7000AT menu structure takes into account the requirements of different unit types, there are many menus which are relevant only for special applications.

1. Chiller - When chiller specific menu items appear, they are faded out by a grey background in this manual. For the chiller software a separate manual (Index G57D) exists.

2. DFC control - Specific menu items are designated but not described in detail. For DFC control a separate manual (G57B) exists.

3. DFC² control - The relevant menu items are mostly located in separate menus (named AE control), which are not displayed here. When specific menu items appear, they are faded out by a grey background in this manual. For DFC² control a separate manual (Index G17A, 18AA) exists.

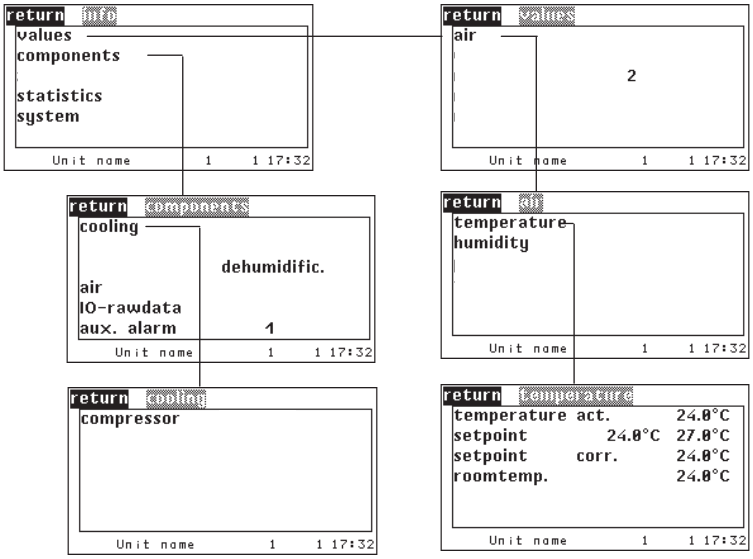
4. CyberSonic - A detailed description can be found in the CyberSonic manual (Index G85).

Indication in the Info- and Control menus depending on configuration

The info- and control menus display only the components, sensors, unit and auxiliairy alarms, which are configured in the config menu. This concerns the selection menus also. If e.g. no heating is configured the menu item "heating" in the menus "Info/components" and "Control/components" does not appear. If no zone is configured, this menu item is omitted in the menus "Info" and "Control". The runtime menus are reduced correspondingly under "Info/statistics/runtimes".

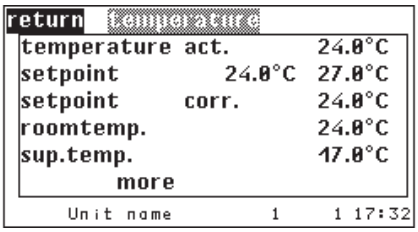
The Info menus for an A/C unit, version A equipped with a room air T/H sensor and one auxiliairy alarm, which does not belong to a zone, reduce themselves as shown beside.

Further on in this manual, the menus appear in full view so that all menu items can be explained.



Info **Values**
Air

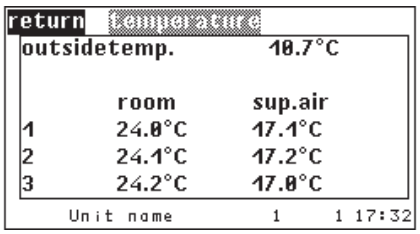
.../Temperature



This window shows the following temperatures:

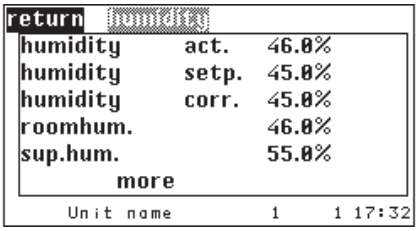
1. The value, which is used for the control. It can also be a zone temperature. These values represent an average value for each parameter, which is calculated of all sensors of the units which are assigned to the same zone.
2. The adjusted setpoint (setpoint 1/ setpoint 2)
3. The setpoint shifted by the controller, the unit is controlled according to this parameter only. This value corresponds to the adjusted setpoint in most cases.
   It may be different in the following cases by:
   - week program
   - external setpoint shifting
   - emergency operation
   - limitating control
   - integral factor
4. The actual value of the room temperature sensor.
5. The actual value of the supply air temperature sensor.
6. The outside temperature

.../Temperature/more



The following values are only shown for the CyberRow unit series.
Three room air and supply air temperatures each are measured in different heights where each room/supply air sensor pair is assigned to a different fan.
These values are used for the differential temperature control od the fan.
The average of the 3 room temperatures is displayed in the top menu in line 4, the average of the 3 supply temperatures in line 5.

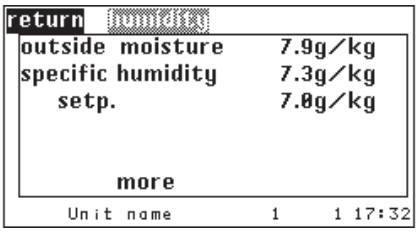
.../Humidity



The values of the relative humidity are displayed in this window.

1. The value, which is used for the control. It can also be a zone humidity.
2. Setpoint of the relative humidity
3. Shifted setpoint (caused by external setpoint setting or limitating control)
4. The actual value of the room humidity sensor.
5. The actual value of the supply air humidity sensor (if existant).

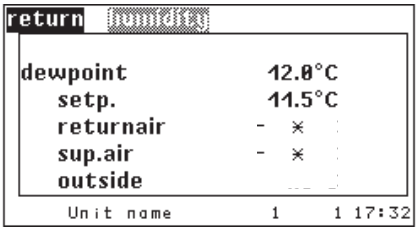
.../Humidity/more



1. The actual value of the outside moisture content sensor (if existant).
2. The actual value of the specific humidity.
3. The setpoint of the specific humidity.

Info **Values**

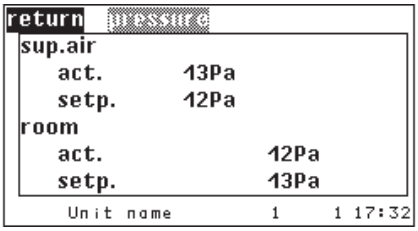
...Air/Humidity/more/more



1. actual dew point
2. dew point of the setpoints (temperature and humidity)

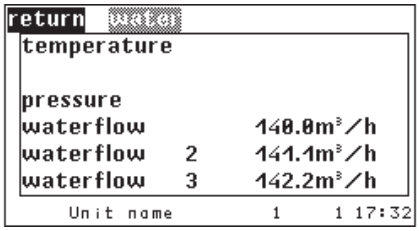
You find a detailed description in chapter 5.4.6 in the description of humidification and dew point control.

...Air/Pressure



In this window the actual value and the setpoint for the differential pressure of the supply air (pressure gain in contrast to the room air pressure) in the raised floor or cold aisle compartment is indicated.
The actual value and the setpoint for the room air pressure, which are displayed in the lower part, is measured as differential pressure between the room and the external pressure.
(part of DFC² control)

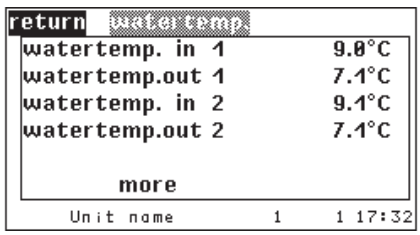
.../Water



To display the water volume flow the A/C unit must be equipped with volume measuring device.
The water volume flow sensor must be configured with the sensor purpose „50 - water volume flow“.
To display the water volume flow for example in the second water circuit (in the menu "waterflow 2") of a CW2 A/C unit the water volume flow sensor must be configured with the sensor purpose „53 - water volume flow 2“.

To display a third water volume flow for example through the hot water reheat (in the menu "waterflow 3") the water volume flow sensor must be configured with the sensor purpose „54 - water volume flow 3“.

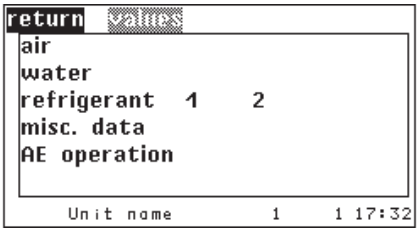
...Water/Temperature



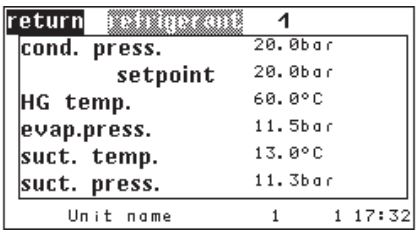
Here the measured values of the cooling water circuits 1 and 2 are displayed.
1. Water temperature at the inlet, circuit 1
2. Water temperature at the outlet, circuit 1
3. Water temperature at the inlet, circuit 2
4. Water temperature at the outlet, circuit 2

Further menu only relevant for the chiller.

Info **Values**

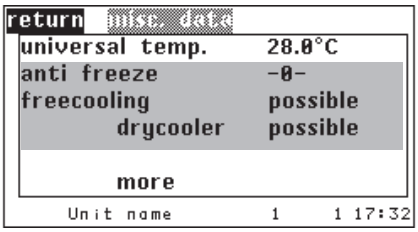


...Refrigerant



Here the measured values of the refrigerant circuits 1 and 2 are displayed.
1. Condensation pressure → used for G valve, HP management
2. Hotgas temperature
3. Evaporation pressure → used for LP management
4. Suction gas temperature
5. Suction gas pressure

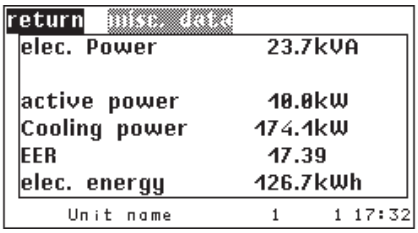
...misc. data



Here the temperature of a freely adjustable sensor is shown.
This value does not influence the control and is only displayed for information.

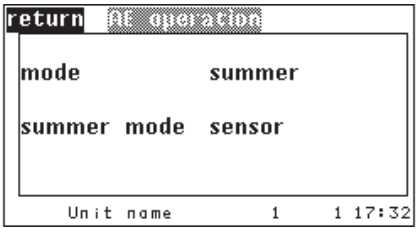
The other values are only relevant for the chiller.

...misc. data/more

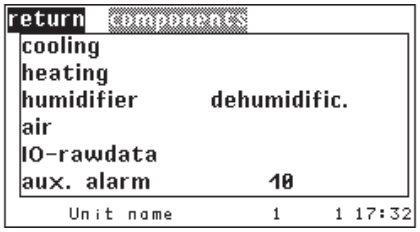


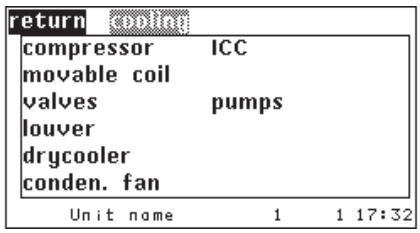
You find background information to the values displayed here in chapter 6.13.

...AE operation



This menu is valid for units with enabled DFC² control. For historical reasons the DFC² control is still designated by "AE-control" in this menu.
In the top line the operation mode (freeze protection, free cooling, mix mode, summer mode) of the DFC² control is displayed. In the lower line the reason for which summer mode has been forced is indicated. This can happen when certain alarms have been released or when a digital input is set. The summer operation which has not been caused by alarms but by the excess of the outside temperature limit, is not indicated here.



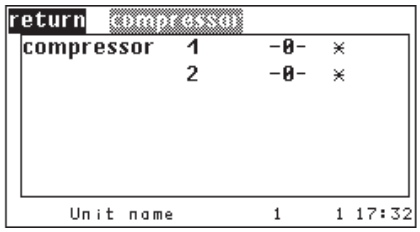


Info Components/Cooling

The C7000 Advanced gives a detailed representation of the components' operating states. In the window in the left margin the first five menu items lead to submenus. In the last menu item you can read the number of configured external alarms.

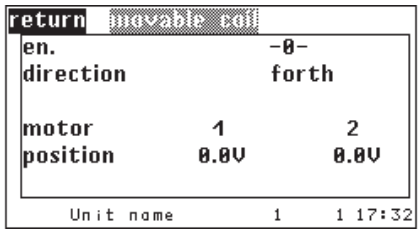
In the following windows you can see the operating state of each component:
-0- means component is off.
-1- means component is on.
✕ means component does not exist.

..../compressor



Compressor operating state.
✕ - here the speed of a speed-controlled compressor is displayed (up to now only relevant for EC-Tower).

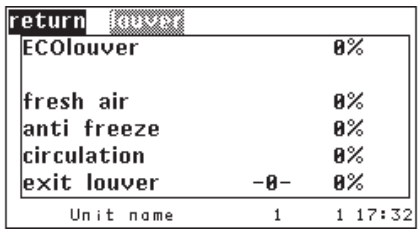
..../movable coil



The parameter "en." in the Info menu means enabling of the actuators and indicates whether the movable coil is moved (can be moved [1]) or whether the actuators are disabled because the coil is wedged or supposed to be wedged soon (0).
The actual or following moving direction in relation to the unit front is displayed the same as the positions of the left and right actuator.

0,0 V corresponds to position: Heat exchanger in the air flow
10,0 V corresponds to position: Heat exchanger outside the air flow (vertical)

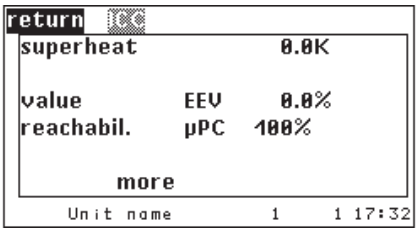
..../louver



This menu displays the opening degrees of different configured louvers.
The opening degree of the fresh air and exhaust air louver is displayed in the first line if the EcoCool function is enabled.
In the following lines the opening degrees of the louvers for the DFC² control are displayed. If digital control is adjusted for the exit louver, it is controlled by the states "open" (1) and "closed" (0).

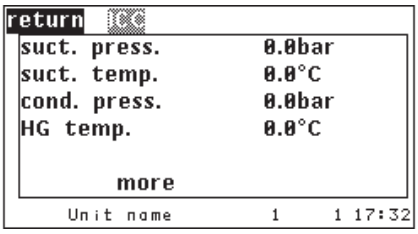
Info

Components/Cooling
ICC



The following menus display information about the ICC (Integrated Cooling Circuit).
The ICC controls by means of a microprocessor (µPC) board an expansion valve and by an inverter a compressor.
In the first menu the superheat calculated by the µPC is displayed.
Following the opening degree for the expansion valve which is given by the µPC and the reachability of the µPC by the RS485 bus.

..../ICC/more



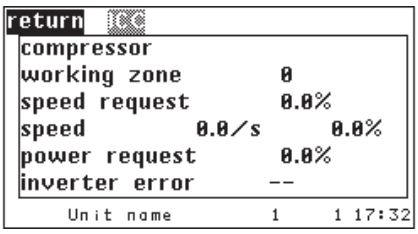
In the second menu the measured values of the sensors which are connected at the µPC are displayed. At the low pressure side of the compressor:

- suction gas pressure
- suction gas temperature

These sensors are part of the ICC and can not be configured in the menu "Config/ components/sensor".

at the high pressure side:
- hot gas pressure
- hot gas temperature

..../ICC/more/more

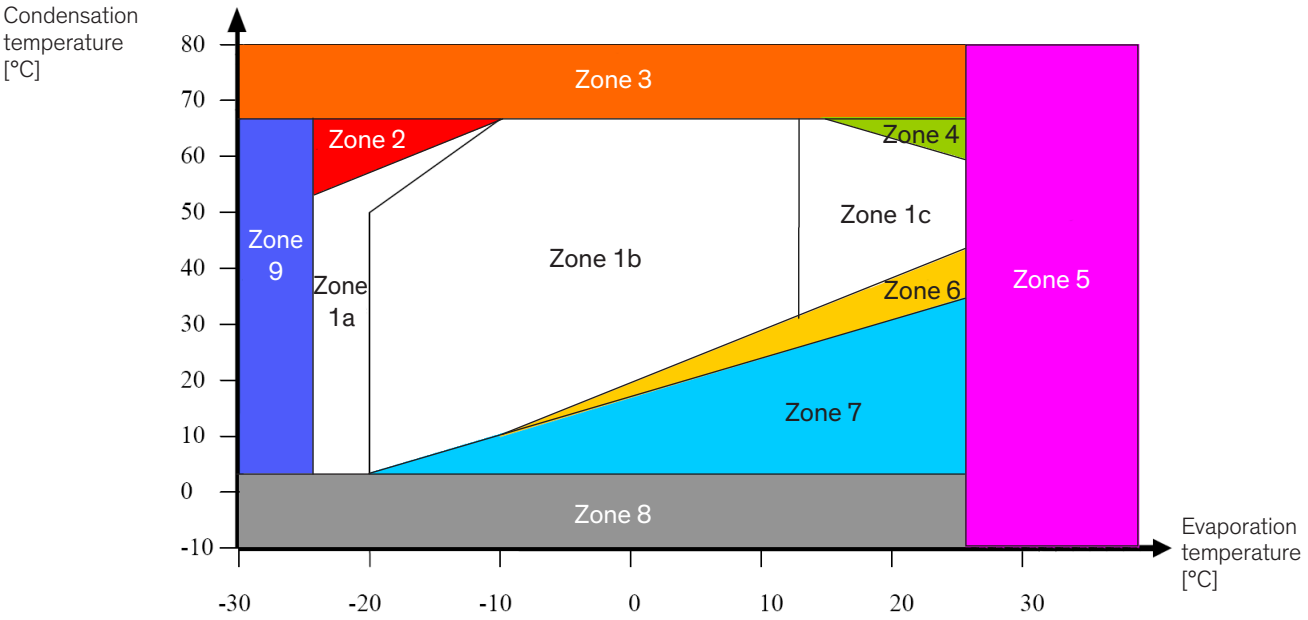


The ICC working zone should be indicated as 1 in the normal case. If a higher number appears there, The ICC will soon be in eror. See "Working zones ICC for R410a" on the following page.
The performance requirement, which is sent by the C7000 to the µPC, is displayed in the penultimate line. The third line displays the speed requirement calculated from this, that sends the µPC to the inverter. The actual speed of the compressor will be shown in the fourth line.
The last line displays the error code if there is a malfunction of the inverter.

Error code	Cause	Error code	Cause
1:	Overcurrent	15:	Autotune fault
2:	Motor overload	16:	Drive disabled
3:	Excess voltage	17:	Motor phase fault
4:	Low voltage	18:	Fan fault
5:	Drive temperature too high	19:	Speed fault
6:	Drive temperature too low	20:	PFC module error overcurrent
7:	Hardware overcurrent	21:	not used
8:	Motor overtemperature	22:	PFC undervoltage
9:	reserved	23:	STO detection error Signal detection at STO input
10:	CPU error	24:	STO detection error Signal detection at STO input
11:	Parameter default	25:	Ground fault Ground current too high
12:	DC bus ripple	26-98:	Undefined inverter event
13:	Data communication fault	99:	Unexpected inverter stop
14:	Drive thermistor fault		

PFC - power factor correction

Operating zones of the ICC for R410a



Normal zones:

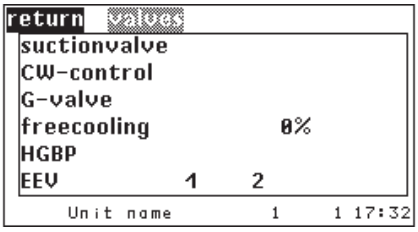
Zone 1a : Speed range 20-120 rps;
max. hot gas temp. = 110°C
Zone 1b : Speed range 20-120 rps;
max. hot gas temp. = 120°C
Zone 1c : Speed range 20 - 90 rps;
max. hot gas temp. = 120°C

pc = condensation pressure (= hot gas press.)
po = suction gas pressure

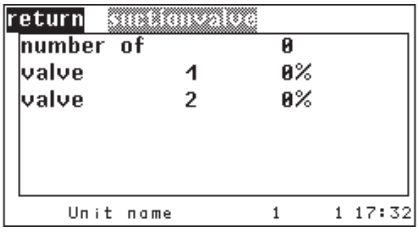
Problematic zones:

Zone 2 : max. admissible pressure ratio exceeded, pc/po > 9,0
Zone 3 : max. admissible hot gas pressure pc = 43,5 bar exceeded
Zone 4 : max. compressor current consumption exceeded
Zone 5 : max. suction pressure po = 17 bar (26°C) exceeded
Zone 6 : min. admissible pressure ratio passed under, pc/po < 1,8
(unstable zone for capacity control)
Zone 7 : min. admissible pressure difference passed under,
pc-po < 4bar
(oil transport no longer guaranteed)
Zone 8 : min. hot gas pressure 8 bar (0°C) passed under
Zone 9 : min. suction pressure 3,3 bar (-25°C) passed under

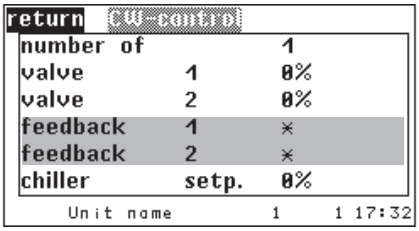
Info **Components/Cooling Valves**



This window displays the opening degree of the free cooling valve in a percentage from 0 to 100.
The free cooling valve is the GE valve in GE units and the CW valve 2 of the second cooling circuit in CW2 units, for which DFC control is enabled.

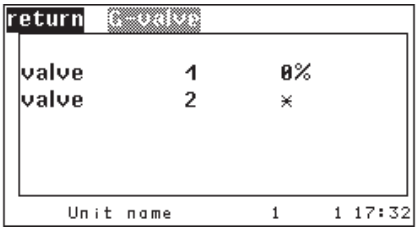


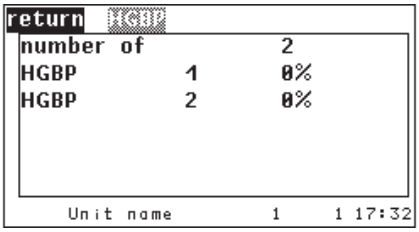
For the suction valve, the GE/CW valve, the G-valve, the hotgas bypass valve and the electronical expansion valve (EEV) a submenu exists.
Each of the valves can appear twice in the cooling unit.



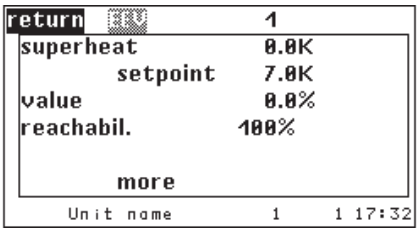
In the CW control menu (GE/CW valve) the following values are displayed:
- the number and the opening degrees of the valves
- the height of the chillersaver signal in %. 0-100% correspond to 0-10V.

The menu items with a grey background are relevant for chillers only.



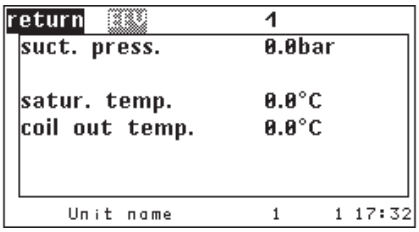


.../Valves/EEV/1-2



For the EEV a submenu exists for each valve.
The following values are displayed:

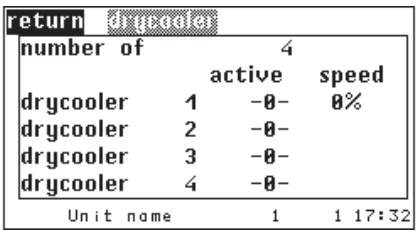
1. Superheat temperature (calculated)
2. Superheat setpoint
3. Opening degree of the valve
4. Reachability of Carel valves



5. Measured suction gas pressure
6. Saturated temperature (calculated)
7. Measured suction gas temperature

.../Drycooler

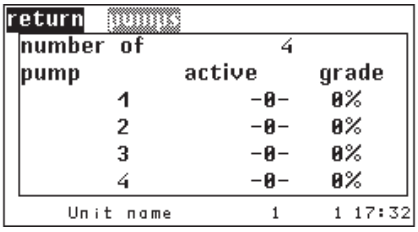
Info **Components/Cooling**



In this menu the on/off state of the drycoolers is displayed.

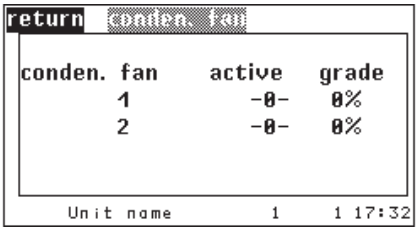
Drycooler 1 may also be controlled proportionally, in this case the speed is displayed from 0 to 100%.

.../Pumps



In this menu the on/off state of the pumps is displayed. In case of speed controlled pumps the actual speed is displayed from 0 to 100%.

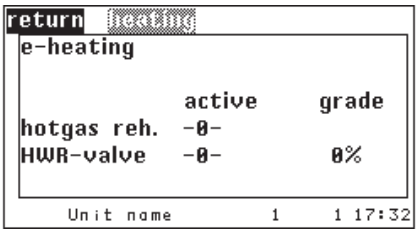
.../Conden. fan



This menu displays the on/off state of the condenser fans and the actual speed from 0 to 100%.

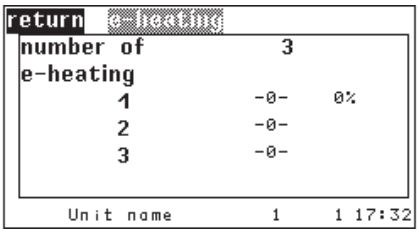
Info **Components**

.../Heating



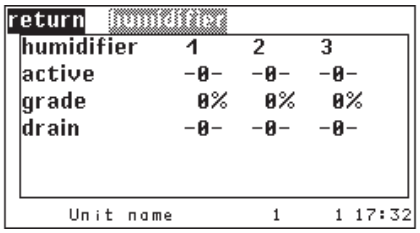
If your A/C unit is equipped with a heating, the operating state is displayed in this window. For proportional heating the actual capacity is shown from 0-100%.
For the hot water reheat the actual capacity is displayed in the shape of the opening degree of the HWR valve.

.../Heating/E-heating



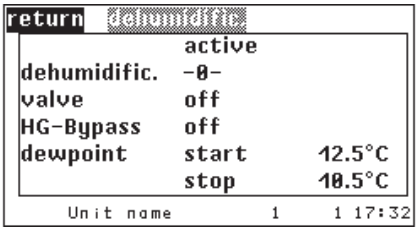
In the submenu of the electrical heating the number of configured electrical heatings and the operating state is displayed. The first heating can be quasi proportionally controlled by pulse width modulation.

.../Humidifier



If your A/C unit is equipped with a humidifier, the operating state and the degree of steam production of the humidifier is displayed in this window. The drain valve state (0 = closed) is only relevant for CyberSonic units.

.../Dehumidification

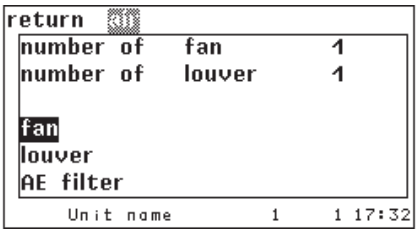


The dehumidification menu indicates whether the dehumidification is switched on and whether the dehumidification valve is opened. The enabled dehumidification with a closed valve indicates that the air is dehumidified by the fan speed reduction.

The display of the start and stop dewpoint is only relevant for the activated dewpoint control.
If the actual dewpoint is bigger than the start dewpoint, dehumidification is switched on. If the actual dewpoint is smaller than the stop dewpoint, dehumidification is switched off.
Display of the start- and stop dew point, see chapter 5.4.6 → dew point control.

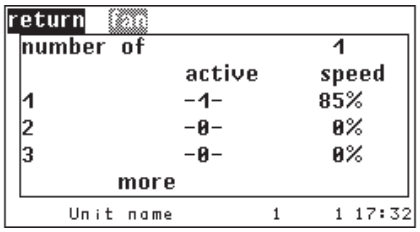
Info

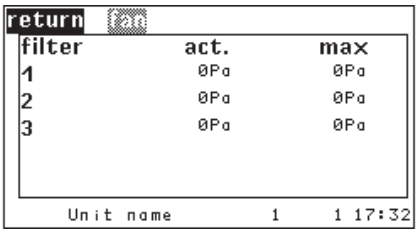
Components
Air



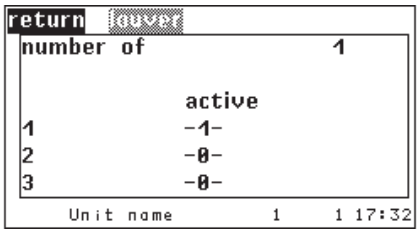
In this menu the number of configured fans and louvers is displayed. By using the menu points "fan" and "louver" further menus can be accessed in which the operating state of the fans with the actual speed from 0-100% is displayed.

Menu point "AE filter" refers to a special function which is explained in the corresponding A/C unit manual (G17A, 18AA).





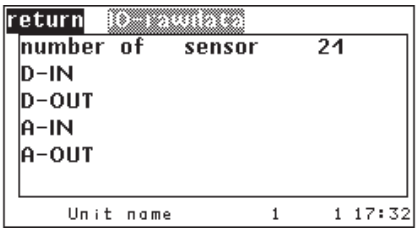
Another fan menu displays the pre-filter pressure drops measured by analog pressure sensors and the maximum admissible pressure drops (adjustable).



If your A/C unit is equipped with louvers, -1- indicates that the louver is open.

Info

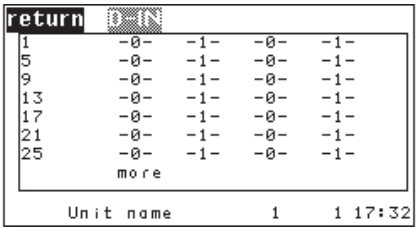
Components
IO-rawdata



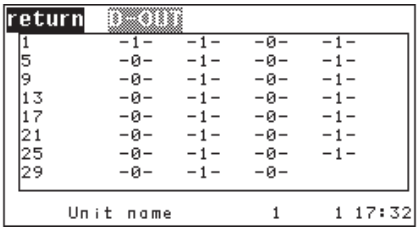
The menu displays the number of configured sensors.

The submenus "D-IN", "D-OUT", "A-IN", "A-OUT" serve for diagnosis purposes and display the state of each digital and analog in/output.
In the first line the inputs from 1 to 4 are displayed, in the second line the inputs from 5 to 8 etc.
The meaning of the displayed values can be taken from the table below.

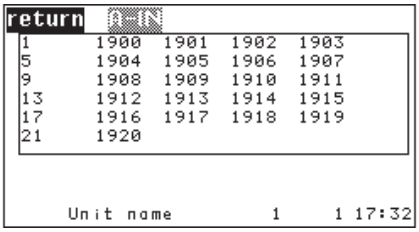
.../D-IN



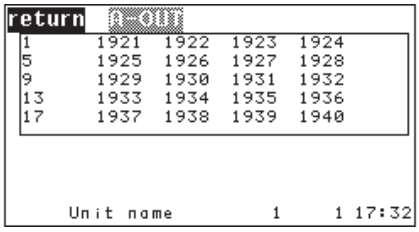
.../D-OUT



.../A-IN



.../A-OUT

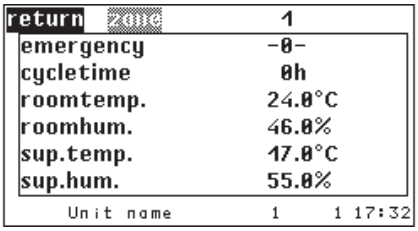


	Display	Signification
D-IN	1	Voltage present → no alarm
D-OUT	1	Relay activated* → component in service
A-IN	0-4095	0-20mA, 0-10V corresp. to sensor type
A-OUT	0-4095	0-10V

* Exception: When dehumidification is carried out, the relay is not activated.

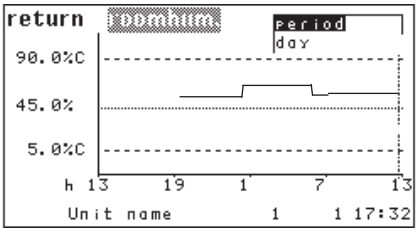
Info

Zone



If the unit is assigned to a zone, in this window the values of the corresponding zone are displayed. In the first line it is displayed if emergency operation for this zone is activated. In the second line you see the sequencing cycle time. Then the room temperature, the room humidity, the supply air temperature and the supply air humidity of the zone are diisplayed.
If the determination of average values is disabled, these values correspond to the measured unit values.

Statistics/Data logger



By the data logger you can save measured values or average values (zone data) calculated by the controller and have them displayed in the shape of a graphical curve so as to show the time course of these values.
Values of two different sensors can be simultaneously recorded.
You set the lapse of time which will be displayed. Further parameters (type of measured value and cycle) can be adjusted in the service menu.
You can choose among 5 different lapses of time: hour (adjusting this lapse displays the recent 3 hours), day, week, month and year.
The time lapse is displayed in horizontal direction, a vertical dashed line marks the actual time.
In the vertical direction the range of the measured value within the limit values (if existant for this type of value) is displayed. Two exterior dashed lines mark the limit values. An interior dotted line marks the set value, if existant.
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 corresponding Config menu.
If the A/C unit is de-energized, the memories of both data loggers are deleted. (The control however, can be switched off by the start/stop key without having the data loggers deleted.)

The corresponding commands:

for data logger 1 each

`log 1` - displays adjustments, number of data and date of recent and eldest value.

```
Type.............:1 (Unit room temp)
Store cycle......:15 Min
Number of values.:938
Youngest.........:11.08.2004 15:33:00
Eldest...........:01.08.2004 02:18:00
```

`log 1 1` - displays the 20 recent values as follows.

```
0001. 11.08.2004 15:33:00 Room temperature 22,9°C
0002. 11.08.2004 15:18:00 Room temperature 23,0°C
0003. 11.08.2004 15:03:00 Room temperature 23,1°C
```

`log 1 2` - edits the 20 recent but one values (value 21 to 40 counting from the actual point of time).

`log 1 72` - edits the eldest 20 values (value 1421 to 1440 counting from the actual point of time).

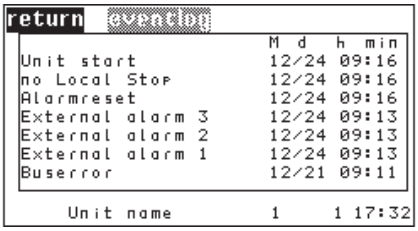
`log 1 15.05.2006` - edits all values of this day as far as stored.

`log 1 1 13` - edits the values 1 to 13 counting from the actual point of time.

`log 1 clear` - deletes all stored values.

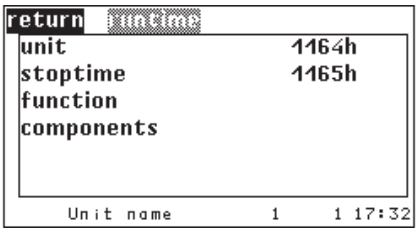
Info

Statistics
Event-Log



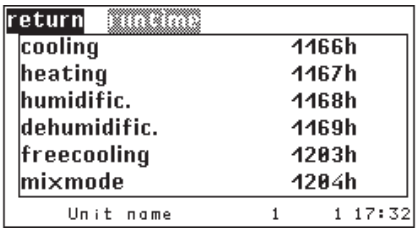
All alarm messages and events of one A/C unit (Unit on/off, watchdog (WD) restart) are listed in this window. The messages contain the following information:
Alarm text, day and time. When the unit was started and stopped is also displayed.
Up to 200 events can be stored.
A list of the events is displayed on the next page but one.

Statistics
Runtimes



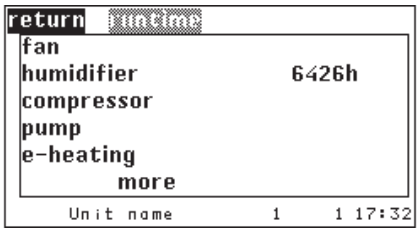
The runtimes are shown in hours.
The unit runtime comprises all times, when the unit is **not** in a stop or standby mode.
The stop time is counted, when the unit **is** in a stop or standby mode.
Stop mode means: Unit is supplied with power, the control is switched off.

.../Function

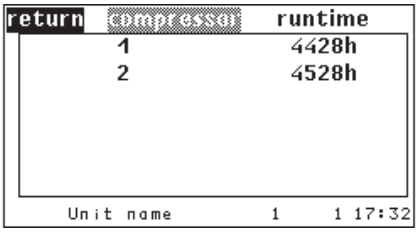


The functional runtimes are displayed in a submenu.
The cooling runtime is counted each time when cooling is requested.
The heating runtime is counted each time when heating is requested.
The humidification runtime is the time in which the unit has humidified. The dehumidification runtime is counted each time when dehumidification is requested.
Runtime for free cooling is counted, when the opening degree of the GE valve is bigger than zero, when no compressor request exists and if the GE valve is actually not used for heating. Runtime for mixmode is counted, when the opening degree of the GE valve is bigger than zero, when a compressor request exists and if the GE valve is actually not used for heating.

.../Components



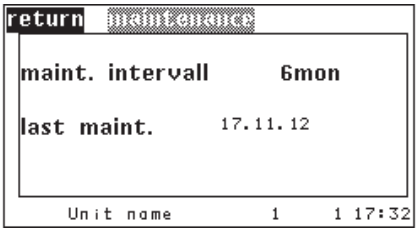
In another submenu the component runtimes are displayed.
Here, the humidifier runtime is displayed.



For the components fan, compressor, pump, E-heating and drycooler exist further submenus of the kind as shown left.

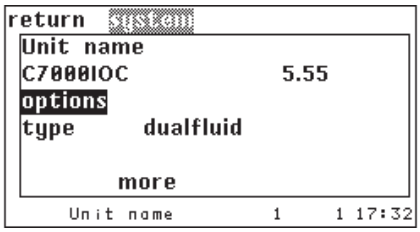
Info

Statistics
Maintenance

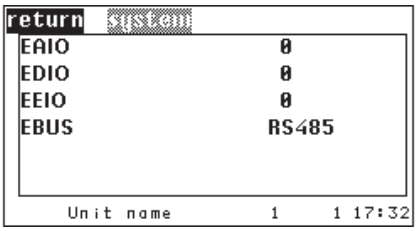


In this menu the adjusted maintenance interval and the date of the maintenance recently carried out is displayed.

System

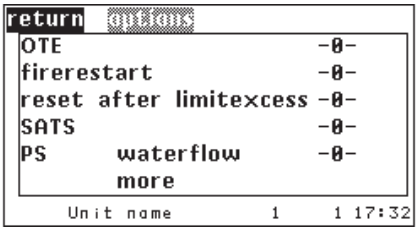


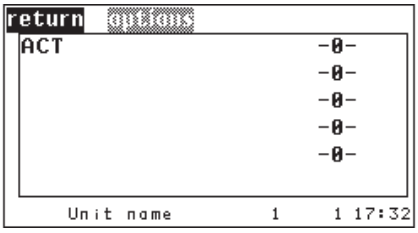
In this menu the software version and the unit type are displayed.
The menu point "Option" leads to a submenu, which displays which special software options are active.



Here the number of connected EAIO-, EDIO-, EEIO- and EBUS-boards is indicated.

.../options





Except for the alarm messages (see 8.4 alarm texts) the following event messages can be displayed:

Event text	Meaning
Unit switch on	The controller (the A/C unit) is provided with voltage.
Unit switch off	The controller (the A/C unit) is de-energized.
Unit start	The A/C unit has started.
Unit stop	The A/C unit has stopped.
Local Stop	The A/C unit has been stopped by the ON/OFF key on the controller or by command "state stop".
no Local Stop	The stop condition by the ON/OFF key does no longer exist.
Remote Stop	The A/C unit has been stopped by the remote on/off contact.
no Remote Stop	The stop condition by the remote on/off contact does no longer exist.
BMS stop 1	The A/C unit has been stopped by BMS or WIB.
no BMS Stop 1	The stop condition by BMS or WIB does no longer exist.
BMS Stop 2	The A/C unit has been stopped by the WIB sequencing function.
no BMS Stop 2	The stop condition by the WIB sequencing function does no longer exist.
Timer Stop	The A/C unit has been stopped by the week program.
no Timer Stop	The stop condition by the week program does no longer exist.
Time Sequenc. Stop	The A/C unit has been stopped by time dependent sequencing.
Time Sequenc. Start	The stop condition by time dependent sequencing does no longer exist.
Sequenc. Alarm Stop	The A/C unit has been stopped by a valid alarm in the context of the sequencing function.
no Sequ. Al. Stop	The stop condition (the valid alarm) does no longer exist.
Ext. Setp. exc. Stop	The unit has been stopped because the measured value has underrun the adjusted minimum measure value of the virtual sensor for the external setpoint (sensor purpose 17).
no ext. Setp. Stop	The stop condition for the minimum measure value does no longer exist.
Sequenc. Alarm Start	The A/C unit has been started by a valid alarm of another A/C unit in the context of the sequencing function.
no Sequ. Al. Start	The start condition (by a valid alarm of another A/C unit) does no longer exist.
Sequenc. Load Start	The A/C unit has been started by meeting the overload start condition in the context of the sequencing function.
no Sequ. Load Start	The overload start condition does no longer exist. The A/C unit is stopped.
Sequenc. Emer. Start	The A/C unit has been started by the emergency operation function in the context of the sequencing function.
no Sequ. Emer. Start	The condition for emergency operation does no longer exist ist.
Fire alarm stop	The A/C unit has been stopped by a fire alarm.
no Fire alarm stop	The A/C unit has been locally started after eliminating the cause of the fire alarm and an alarm reset.
Alarmreset	All pending alarms have been reset.
Maintenance required	The maintenance interval has elapsed.
HP management #	The high pressure management of circuit # is in operation.
LP management #	The low pressure management of circuit # is in operation.
Freecool management	The free cool management is in operation.
old time	Timestamp of old time in case of new setting of time
new time	Timestamp of new time in case of new setting of time
Busid changed	The bus ID has been changed.
backlight auto	The display lighting has been switched to automatic mode.
backlight on	The display lighting has been permanently switched on.

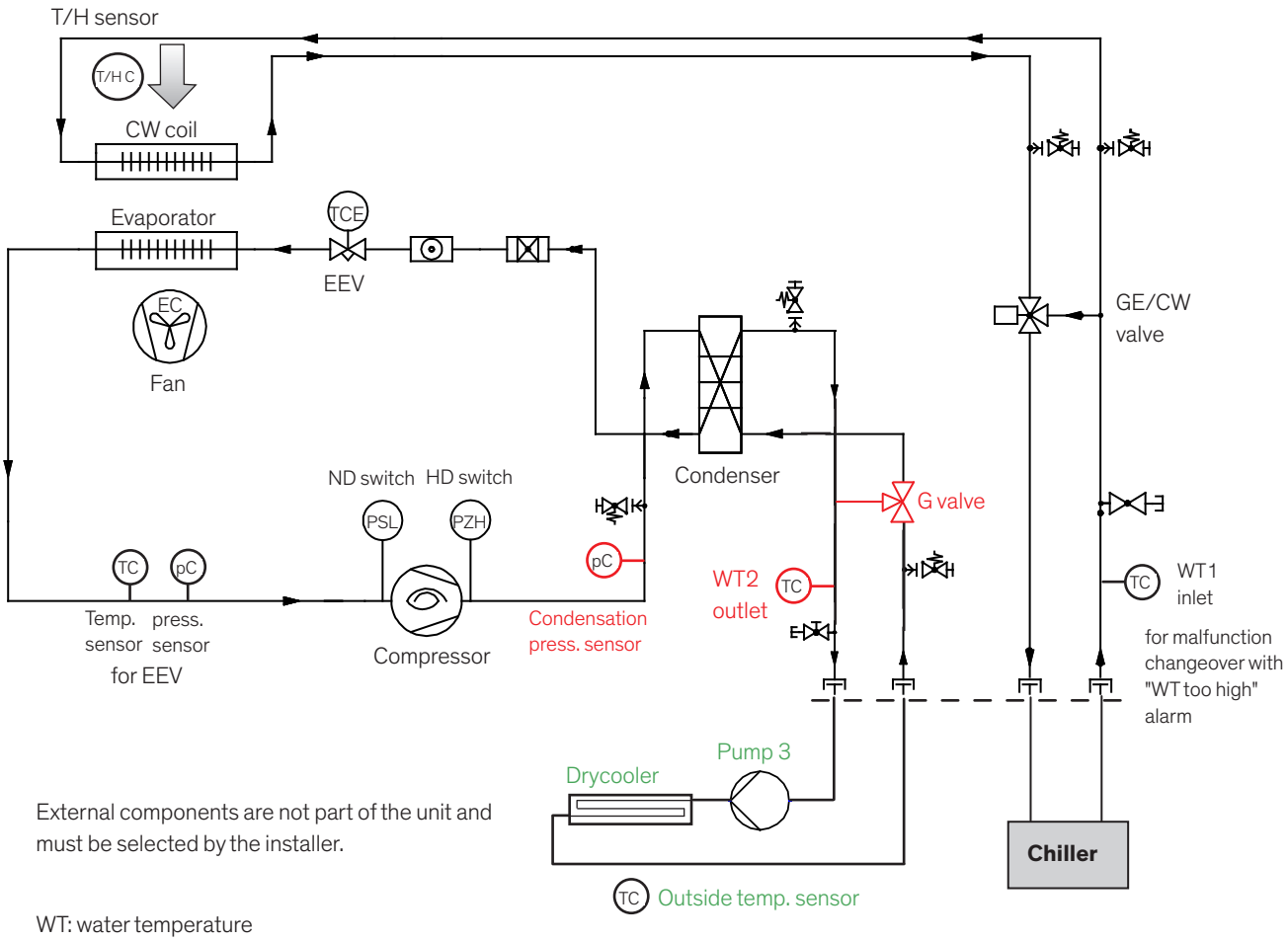
Event text	Meaning
config commit	The new bus configuration has been confirmed by the command "iobusok".
Alarmreset to uPC	manual reset of a µPC alarm, see "Management of µPC alarms"
Automatic alarmreset to uPC	automatic reset of a µPC alarm by the IOC, see "Management of µPC alarms"
compressor # ASTP	The differential pressure (condensation pressure - evaporation pressure) is equal to the threshold or lower than the threshold.
compressor # no ASTP	The threshold for the differential pressure (condensation pressure - evaporation pressure) + hysteresis has been reached or exceeded.
Uk24mod # not reacha-ble	Faulty Modbus connection from EBUS board to Uk24mod gateway.
Uk24mod # MP# error	Error in connection with the MP# node
No response from MP node	Faulty connection from Uk24mod to MP#-node.

5. Configuration

First steps

1. When several units shall operate in a bus: Establish bus wiring and configure bus.
2. Check the equipment by command "equip".
3. Configure additional components like e.g. glycol pump, drycooler, outside temperature sensor.
   At the C7000AT you can do this in the Config-level in the submenus of the menu point "Components". Part of the configuration is the activation of the component, the allocation of an output for the component control, the assignment of an alarm input and setting the start value / hysteresis.
4. Calibrate the sensors by reference instruments (menu Operate/Components/Sensor), important for condensation pressure sensor.
5. Adjust setpoints.
6. Adjust special operating modes like week program, zone operation.
7. possibly BMS configuration

Refrigerating scheme for a GCW type unit to localize the standard, optional and external components



External components are not part of the unit and must be selected by the installer.

WT: water temperature

Configuration of the interfaces RS485-2 and RS485-3

The parameters of the RS485-2 (BMS bus) and RS485-3 (component bus) interfaces can be configured.
This is necessary, if Modbus components must be controlled by RS485-3, which only can be configured by Modbus and which does not work with fixed settings (9600 8n2 for RS485-3).

Component bus:

```
ioc 01:>serbus 3
RS485 bus 3
Baud.........:19200
Databits.....:8
Parity.......:0
Stopbit......:2
Protocol.....:16
```

Commands:

`serbus 3 baud 19200`	Baudrate (9600, 19200)
`serbus 3 databits 8`	Bit per word (8)
`serbus 3 parity 0`	Parity setting (0=none, 1=odd, 2=even)
`serbus 3 stopbit 2`	Stopbit setting (1, 2)
`serbus 3 protocol 16`	Protocol setting (16=Modbus Master)
`serbus 3 init 1`	Application of new parameter setting [1]

Default setting:
Baudrate: 9600
Databits: 8
Parity: 0
Stopbit: 2
Protocol: Modbus Master

BMS bus:

```
ioc 01:>serbus 2
RS485 bus 2
Baud.........:9600
Databits.....:8
Parity.......:0
Stopbit......:1
Protocol.....:1
```

Commands:

`serbus 2 baud 9600`	Baudrate (9600, 19200)
`serbus 2 databits 8`	Bit per word (8)
`serbus 2 parity 0`	Parity setting (0=none, 1=odd, 2=even)
`serbus 2 stopbit 1`	Stopbit setting (1, 2)
`serbus 2 protocol 1`	Protocol setting (0, 1, 2)[2]
`serbus 2 init 1`	Application of new parameter setting [1]

Default setting:
Baudrate: 9600
Databits: 8
Parity: 0
Stopbit: 1
Protocol: SCP (WIB)

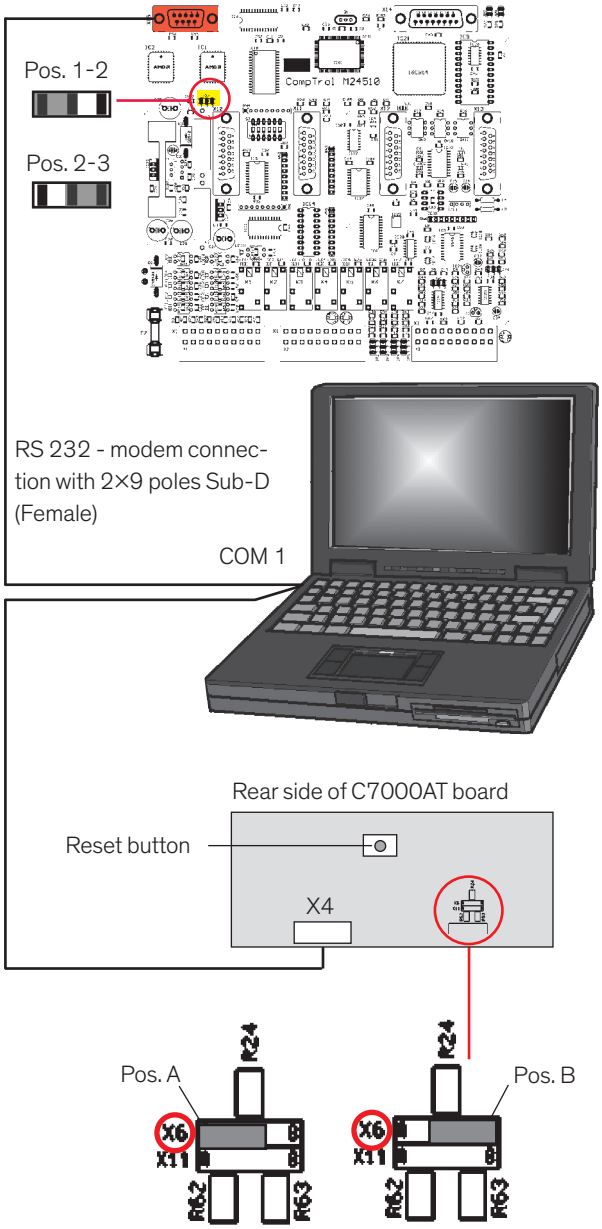
Explanation of indexed parameters:

1 - The change of parameters becomes effective only by this command. This allows you to change several parameters at the same time.

2 - 0 = no protocol
1 = SCP (WIB)
2 = Modbus Slave
16 = Modbus Master

5.1 Loading a new Software

For a C7000 control system there are two different softwares. The essential control software, which contains the commands for the command level, is located in the EPROM on the C7000IOC board. The second software contains the menu structure of the C7000AT and is located in the EPROM of the C7000AT board.
The control parameters in the C7000IOC are resistent and do not have to be re-entered after loading the software. This is also the case for the IO bus configuration of the C7000AT.



For loading a software in the EPROM of the C7000IOC you must connect the service port of the IOC to a serial interface of your PC/Laptop by means of a RS232 modem connection.

- Switch off the master switch.
- Set the jumper JP7 to position 2-3.
- The master switch must then be switched on again. The IOC is now in the „download“-mode.
- Start the C7000-Service program on your PC. This program can be downloaded from the Stulz-website.
- Switch off the master switch after the new software has been loaded.
- Set the jumper JP7 in position 1-2.
- Now switch on the master switch.

For loading a software in the EPROM of the C7000AT you must connect the service port of the C7000AT to a serial interface of your PC/Laptop by means of a RS232 modem connection.

- Set the jumper X6 in the position A.
- Press the reset button on the rear side of the C7000AT board. The C7000AT is now in the „download“-mode.
- Start the C7000-Service program on your PC.
- Set the jumper X6 in position B after the new software has been loaded.
- Press the reset button on the rear side again.
- When switching on, ensure that the new version number is correctly displayed.

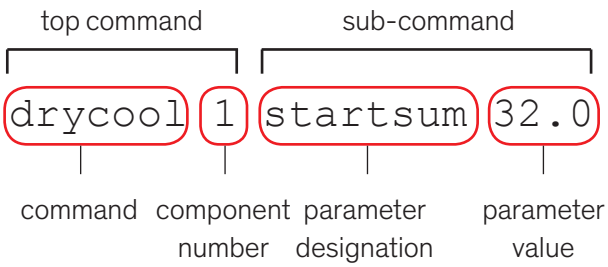
In the service manual G60 the possible applications of the program "C7000-Service.exe" are described.

*System requirements: Windows 95/98/NT/2000/ME/XP/Vista/Win7/Win8

Only for the C7000AT:
In the next step all parameters, if they deviate from the default settings and the bus configuration, must be readjusted. The default language is English. If you require another language, you can change this in the „System\ Languages“ menu.

5.2 Control commands - C7000

A typical control command is structured as follows:



Following a summary of the most frequent sub-commands:

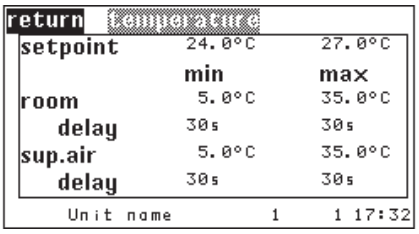
`type 1/2/3..`	sets the type of control (mostly 1=2-point control, 2 = proportional)
`start #,#`	sets the startpoint (temperature or humidity according to the component)
`startsum #,#`	sets the summer operation startpoint
`startwin #,#`	sets the winter operation startpoint
`hys #,#`	sets the hysteresis (for on/off-controlled components)
`hyssum #,#`	sets the summer operation hysteresis
`hyswin #,#`	sets the winter operation hysteresis
`press #`	sets the pressure startpoint
`grad #,#`	sets the gradient (for proportionally controlled components)
`pretime #`	sets the pre-start time in seconds
`preopen #`	sets the pre-opening of a valve in %
`prespeed #`	sets the pre-speed of a fan or pump in %
`conf 0/1`	0 = deactivates a component from the configuration 1 = activates a component for the configuration
`ain #`	assigns the analog input # to the component (sensor)
`din # / alarm #`	assigns the digital input # to the component related alarm
`aout #`	assigns the component to the analog output #
`dout #`	assigns the component to the digital output #
`commonalarm 0/1`	0 = no common alarm when component alarm 1 = common alarm when component alarm
`alarmdelay #`	sets the alarmdelay in seconds
`alarmprio #`	assigns the alarm to alarm relay # (digital output)
`runtime #`	sets the runtime in hours
`hand 0/1`	0 = disables manual operation, 1 = enables manual operation
`handon 0/1/#`	0/1/# = switches off/on the component in manual operation or sets a value in % for proportionally controlled components

The bullet items within the text refer to the corresponding command at the bottom of the page.
In general the parameters which can be modified, are numbered line by line from top to bottom. If a line contains several parameters the bullet number is followed by a small letter for each column.
For example, the parameter which is indicated by ❺b can be found in the second column of the fifth line.

5.3 Values

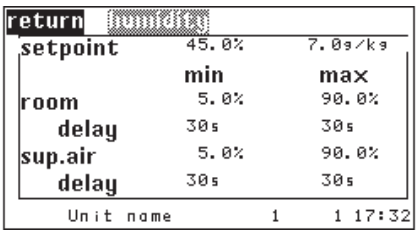
Operate **Values/Air/...**

...Temperature



The first item of the menu concerns the adjustment of temperature setpoints. The following items serve to adjust the temperature limits, which are decisive for the alarms "temperature/humidity too high/low".
Two temperature setpoints can be adjusted, setpoint 1 ❶**a** concerns the operation by day, whereas setpoint 2 ❶**b** concerns operation at night according to the week timer (chapter 6.1).
Following the limit values for the room air sensor. The "MIN" column contains the values for the lower temperature limit and the "MAX" column relates to the upper limits accordingly.
If e.g. the measured value is lower than the adjusted minimum room air temperature, the alarm "Room temperature too low" is displayed.
In the line below you can set the alarm 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 air humidity. However no difference between day- and night setpoint is made. ❷**a**
The setpoint for specific humidity ❷**b** is required for the control according to specific humidity.

The limit values for humidity are only valid for the control of relative humidity.

The corresponding commands:

Temperature

❶**a** `settemp 24.3`
❶**b** `nightsettemp 27.0`

`mintemp` `room` `temp 15.0`
`maxtemp` `supply` `alarmdelay 4`

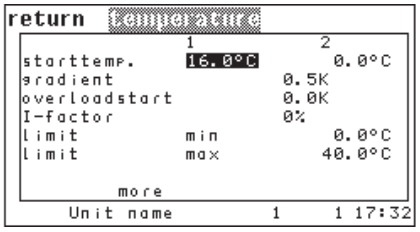
Humidity

❷**a** `humidity set 45.1`
❷**b** `humidity setsp 7.0`

`minhumi` `room` `humi 3.0`
`maxhumi` `supply` `alarmdelay 4`

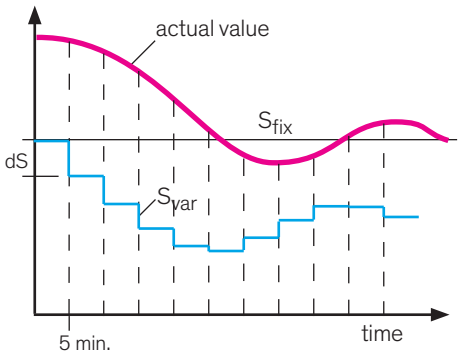
All combinations are possible.

Config **Values**
Air/Temperature



The controller offers the possibility to have start a standby unit when an adjustable positive temperature difference to the air temperature setpoint is achieved. This difference can be adjusted by the parameter "Overloadstart" ❸ . The adjustment 0.0K disables this function.
When the temperature difference is obtained the A/C unit, so far as it is defined as standby unit, will be started. The sequencing function is not influenced by this. In order to use this function, a zone must be defined.

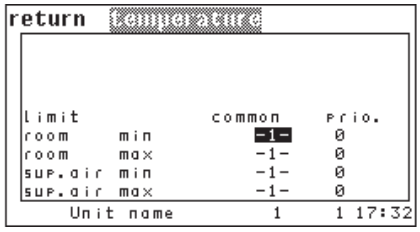
You can determine an integral factor ❹ for the air temperature control to avoid a control discrepancy which is characteristic for P-controllers. In this case a variable setpoint S_{var}, which is recalculated every 5 minutes is decisive for the control. This variable setpoint is calculated by adding the setpoint alteration dS to the previous setpoint.
The values for the integral factor can be varied between 0 and 10%. A low value should be used to start with in order to prevent the control system from oscillating. 2% are recommended and can stepwise be increased to find out the limit of safe control.



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

$dS = (S_{fix}$ - actual value) x integral factor

S_{fix} represents the fixed setpoint which is adjusted in the menu **Operate/values/air/temperature**.



Concerning the limit alarms "Room temperature too low ❺/too high ❻" and Supply air temperature too low ❼/too high ❽" you can adjust:
a. common alarm release (1=yes).
b. alarm priority

The corresponding commands:

Values/Air/Temperature

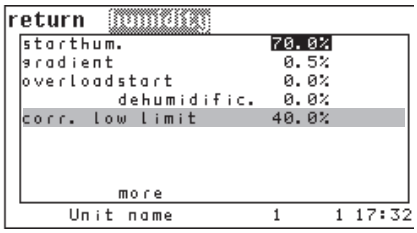
❸ `load cool 2.5`
❹ `integral 10`
❺ `mintemp room`
❻ `maxtemp room`
❼ `mintemp supply`
❽ `maxtemp supply`

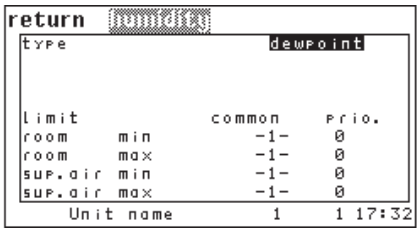
a `commonalarm 1`
b `alarmprio 8`

All combinations are possible.

Operate

Values
Air/Humidity





The controller offers the possibility to start a standby unit when an adjustable negative humidity difference to the setpoint of the relative humidity is achieved. This difference can be adjusted by the parameter "Overloadstart" ❸ . The adjustment 0.0% disables this function.
In the same way you can make start a standby unit when an adjustable positive humidity difference to the setpoint of the relative humidity is achieved. This difference can be adjusted by the parameter "Overloadstart dehumidific." ❹ .
When the humidity difference is obtained the A/C unit, so far as it is defined as standby unit, will be started. The sequencing function is not influenced by this.

The parameter "corr. low limit" is only relevant for CyberSonic units.

Concerning the limit alarms "Room humidity too low ❺/too high ❻" and Supply air humidity too low ❼/too high ❽" you can adjust:
a. common alarm release (1=yes).
b. alarm priority

The corresponding commands:

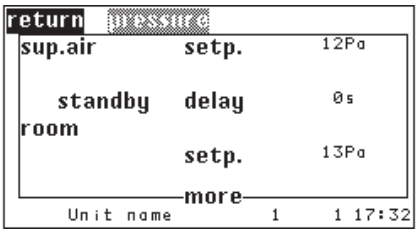
Values/Air/Humidity

```
❸ load humi 10.5
❹ load dehumi 5.5
❺ minhumi room
❻ maxhumi room
❼ minhumi supply
❽ maxhumi supply
```

a commonalarm 1
b alarmprio 8

All combinations are possible.

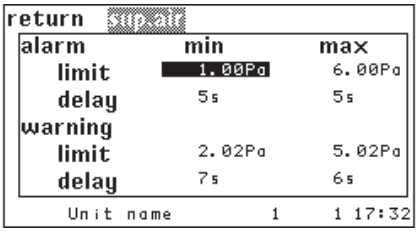
Operate/Values/Air/Pressure



Operate Values/Air/Pressure

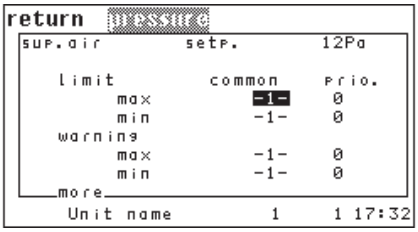
Here you can input a setpoint for the differential pressure ① of supply air. If this value is different from zero, the **differential pressure control** will begin, see chapter 6.5.
The parameter "standby delay" ② is only relevant in the context of the SAPSM control, see chapter 6.6.
Here you can input a setpoint for the differential pressure ③ between room air and external air to control the exhaust air louver. This is a special function of DFC² control. See manuals G17A and 18AA.

.../more



For the supply air pressure, which is measured by a sensor with the sensor purpose 47 = supply air pressure in cPa, you can set an upper limit value ❺ and a lower limit value ❶. Attaining these values triggers the alarms "supply air pressure too high" or "supply air pressure too low". Additionally you can set an upper ❺a and a lower ❶a limit value for the prealarm (in the menu named "Warning").

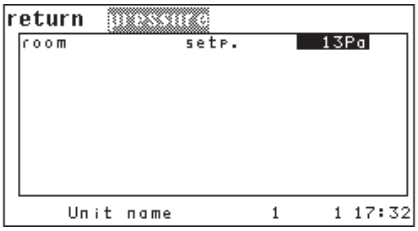
Config/Values/Air/Pressure



For both alarms you can set the following alarm parameters:

1. alarm delay ❷ ❻ , prealarm delay ❷a ❻a

2. common alarm release ❹ ❽ , common alarm release (prealarm) ❹a ❽a
3. alarm priority/digital output ❸ ❼ , prealarm priority/digital output ❸a ❼a



In contrast to the principle not to modify the same parameter in different menus, you can set the setpoints for supply air and room air pressure here, which also can be adjusted in the menu Operate/Values/Air/Pressure.

The corresponding commands:

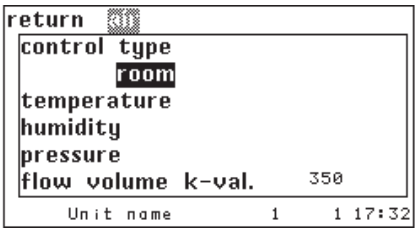
```
① setapress 60
② sapsmdelay 20
③ setrpress 20
```

```
❶ minalarm 47 limit 1.00
❷ minalarm 47 delay 30
❸ minalarm 47 dout 10
❹ minalarm 47 common 1
❺ maxalarm 47 limit 6.00
❻ maxalarm 47 delay 30
❼ maxalarm 47 dout 10
❽ maxalarm 47 common 1
```

```
❶a minprealarm 47 limit 2.02
❷a minprealarm 47 delay 30
❸a minprealarm 47 dout 10
❹a minprealarm 47 common 1
❺a maxprealarm 47 limit 5.02
❻a maxprealarm 47 delay 30
❼a maxprealarm 47 dout 10
❽a maxprealarm 47 common 1
```

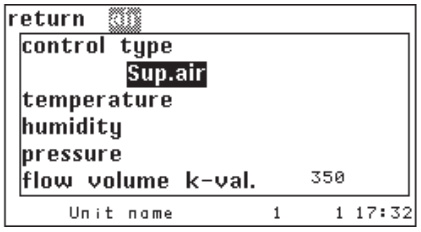

Config **Values**

Air / Control type (Part 1)

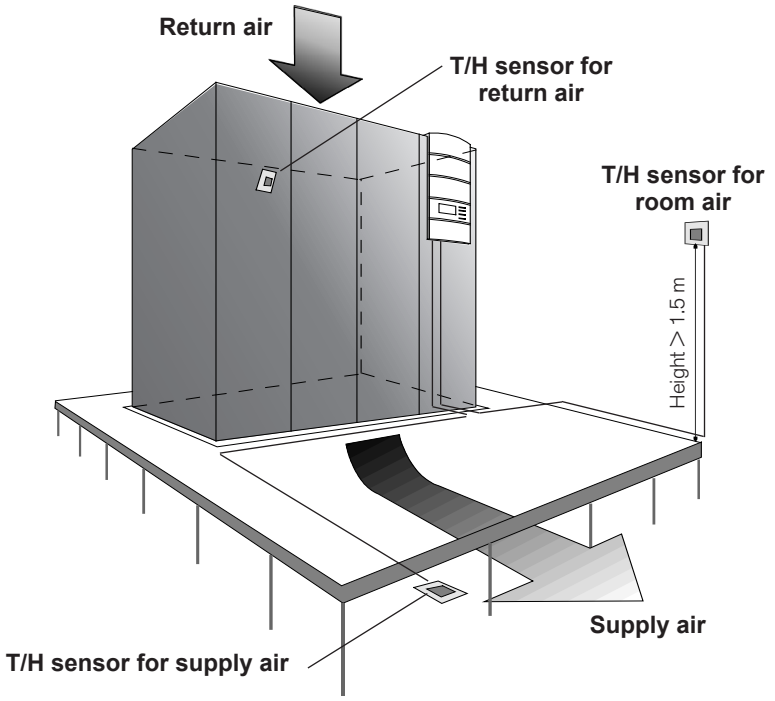


Here you can choose the control type. The display of the actual values changes corresponding to the above adjusted type of control (Room / Sup.Air). ❶

The 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 in accordance with the setpoints set in the menu **Config/values/air/temperature** or **humidity**.



An external T/H sensor is required for supply air control. The control takes place for the room air control in accordance with the adjusted setpoints.



The sensor should be positioned depending on the space available, thermal load distribution and selected type of control. The maximum distance to the C7000 IOC is 20 m.

The corresponding commands:

❶ `control 2` → Four different control types can be chosen by entering the corresponding number:
1: room air
2: supply air
3: room air with supply air limitation
4: supply air with room air limitation

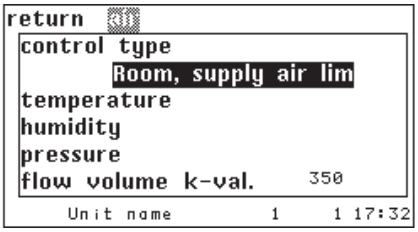
❷a `lim temp 16.3`
❷b `lim temp2 15.3`
❸ `grad temp 0.6`
❹ `lim humi 75.0`
❺ `grad humi 0.6`

The surrounded numbers refer to the corresponding passages in the descriptive text.

See next page for explanation of the commands ❷ - ❺.

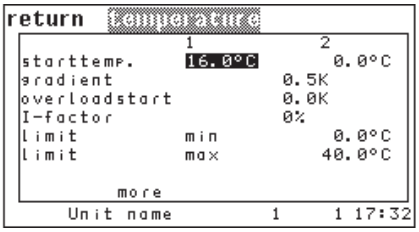
Config **Values**

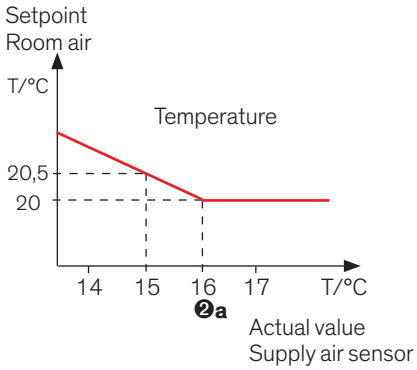
Air / Control type (Part 2)



With the room control with supply air limitation the control works with the T/H sensor in the return air intake and with a second T/H sensor in the supply air.

.../Temperature

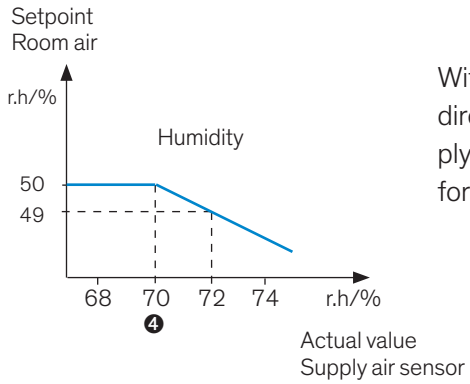




Primarily the control works as for room air control, only if the measured supply air temperature is lower than the start temperature ❷a the temperature set-point is shifted. The extent of the setpoint increase is determined by a factor which you enter, as a gradient ❸, in the menu.
The relationship, according to which this happens, is made clear by the graph opposite. A steep gradient drastically corrects the failure to meet the supply air temperature, but has the risk that the control circuit starts to oscillate.

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

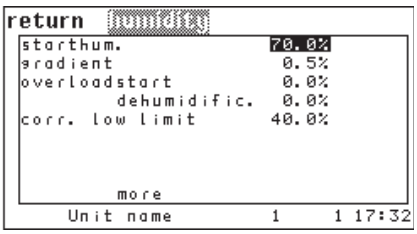
New setpoint = old setpoint + gradient • (start value - actual value)

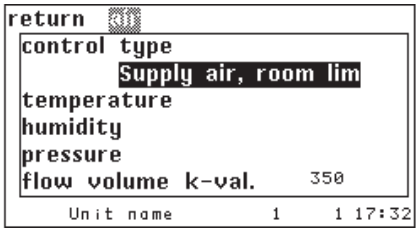


With humidity control (only for rel. humidity) the setpoint shifts to the opposite direction. If the adjusted starting humidity ❹ is exceeded by the measured supply air humidity, the setpoint is reduced. You can also enter a gradient factor ❺ for this. The relationship is shown in the graph opposite.

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

.../Humidity

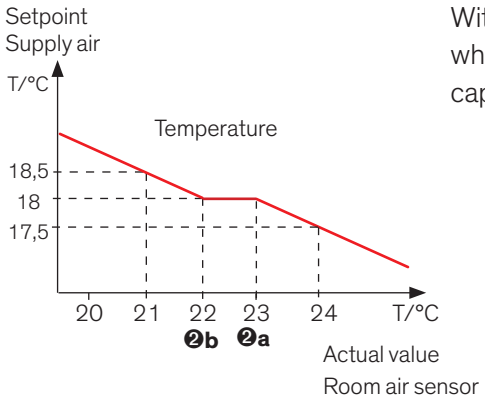




The supply air control with room air limitation is based on the same control principle as the supply-air limited room air control. Only here the setpoint shifts to the opposite direction, because it works on the basis that the supply air is colder than the return air.

If the room temperature exceeds the start temperature 1 ❷a, the supply air temperature setpoint is reduced.

Start value 1 > Start value 2

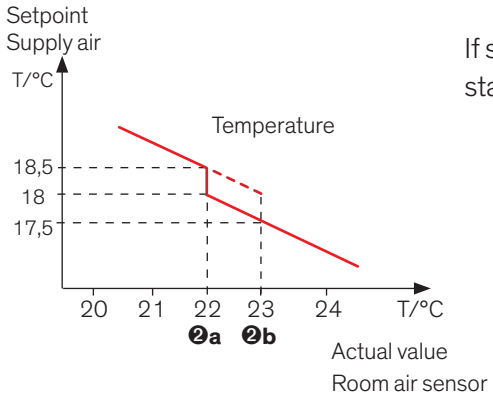


With the setting of a second start value ❷b the supply air setpoint is raised when the room air temperature falls due to less thermic charge. By this, cooling capacity is reduced and energy is saved.

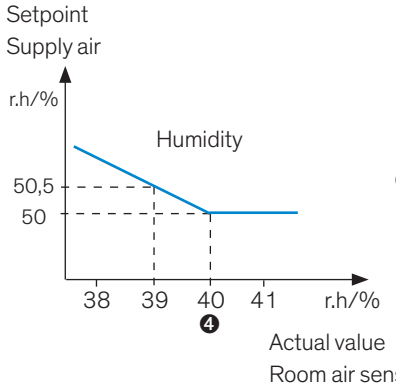
2a: start value 1
2b: start value 2

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

Start value 1 < Start value 2

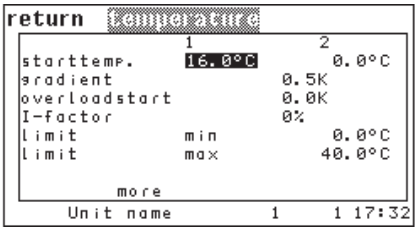


If start value 1 is lower than start value 2, the setpoint is shifted according to start value 1 for an actual value between both start values.



If the room humidity (only for rel. humidity) drops below the starting humidity entered ❹, the supply air humidity setpoint is increased.

Example:
$50.5 = 50 + 0.5 \cdot (40 - 39)$



Config

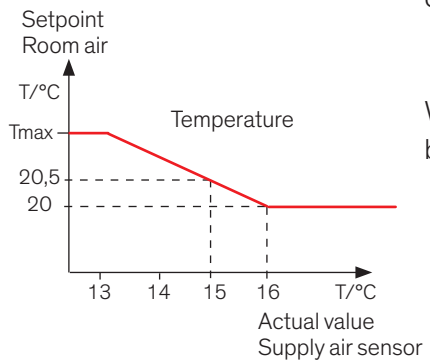
Values
Air / Control type (Part 3)

With the room control with supply air limitation as for supply air control with room air limitation you can set temperature limit values.
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

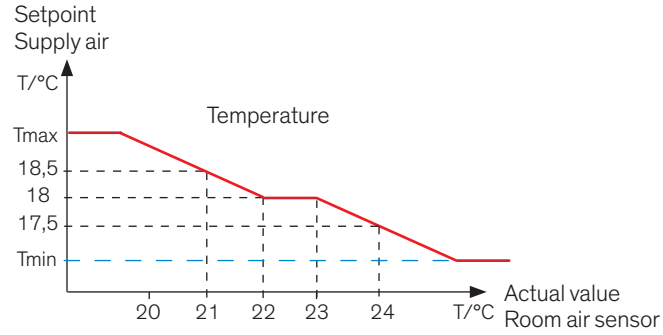
With adjusted temperature limit values the control diagrams change as shown beside (room, supply air limited) respectively below (supply air, room limited).

Room, supply air limited

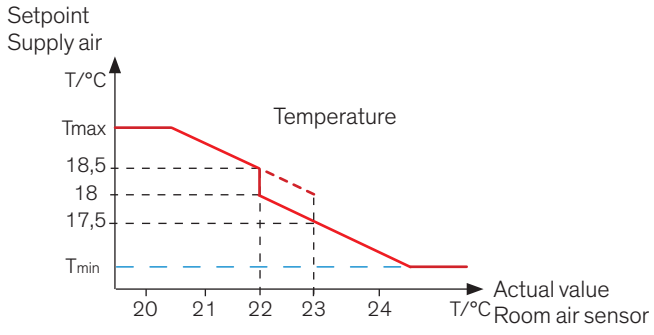


Supply air, room limited

Start value 1 > Start value 2



Start value 1 < Start value 2



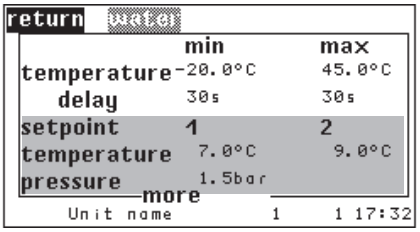
The corresponding commands:

❺ `lim mintemp 17.8`
❻ `lim maxtemp 21.3`

Operate

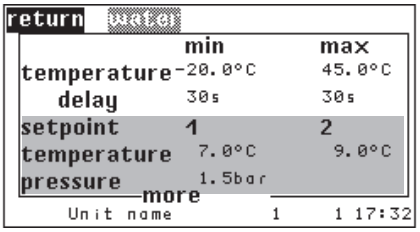
.../Values
Water/more

Operate...



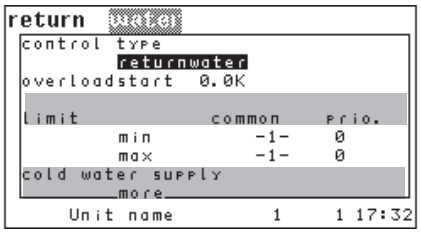
You can set minimum ❶ and maximum ❺ limit values for water temperature 1. When the limit values are exceeded, the alarms "Water temperature 1 too low/ high" are released.

Also the alarm delays ❷ ❻ can be set in this menu.



For water temperature 2:
Minimum limit ①
Maximum limit ⑤
Minimum alarm delay ②
Maximum alarm delay ⑥

Config...



For the limit value alarms "Water temperature 1 too low/too high" you can adjust:
common alarm release (1=yes). ❹ ❽
alarm priority ❸ ❼

For the limit value alarms "Water temperature 2 too low/too high" you can adjust:
common alarm release (1=yes). ④ ⑧
alarm priority ③ ⑦

The corresponding commands:

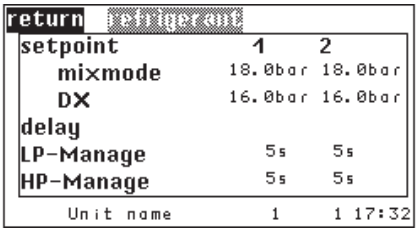
Water inlet temperature 1

❶ `minalarm 5 limit -20,0`
❷ `minalarm 5 delay 30`
❸ `minalarm 5 dout 8`
❹ `minalarm 5 common 1`
❺ `maxalarm 5 limit 45,0`
❻ `maxalarm 5 delay 30`
❼ `maxalarm 5 dout 10`
❽ `maxalarm 5 common 1`

Water inlet temperature 2

① `minalarm 12 limit -20,0`
② `minalarm 12 delay 30`
③ `minalarm 12 dout 8`
④ `minalarm 12 common 1`
⑤ `maxalarm 12 limit 45,0`
⑥ `maxalarm 12 delay 30`
⑦ `maxalarm 12 dout 10`
⑧ `maxalarm 12 common 1`

Operate/Values/Refrigerant



Here you can separately adjust a setpoint for the condensation pressure of each refrigerant circuit. The G valve is controlled according to this setpoint. For the DX-mode and the mixmode in case of proportional GE control individual values can be set. The setpoint for mixmode should be higher than for DX mode. So the water flow through the G-valve will be smaller (than in DX mode) and more water will flow through the FC coil. This way free cooling takes a greater part in total cooling. For normal GE control only the DX value is operative.

The dynamic condensation pressure control which can be set in the Config menu level is explained on the following pages.

Set the alarm delay for the low pressure alarm of circuit 1 and 2 in the last but one line.
The alarm delay for high pressure alarm of circuit 1 and 2 can be set in the last line.

The corresponding commands:

Refrigerant

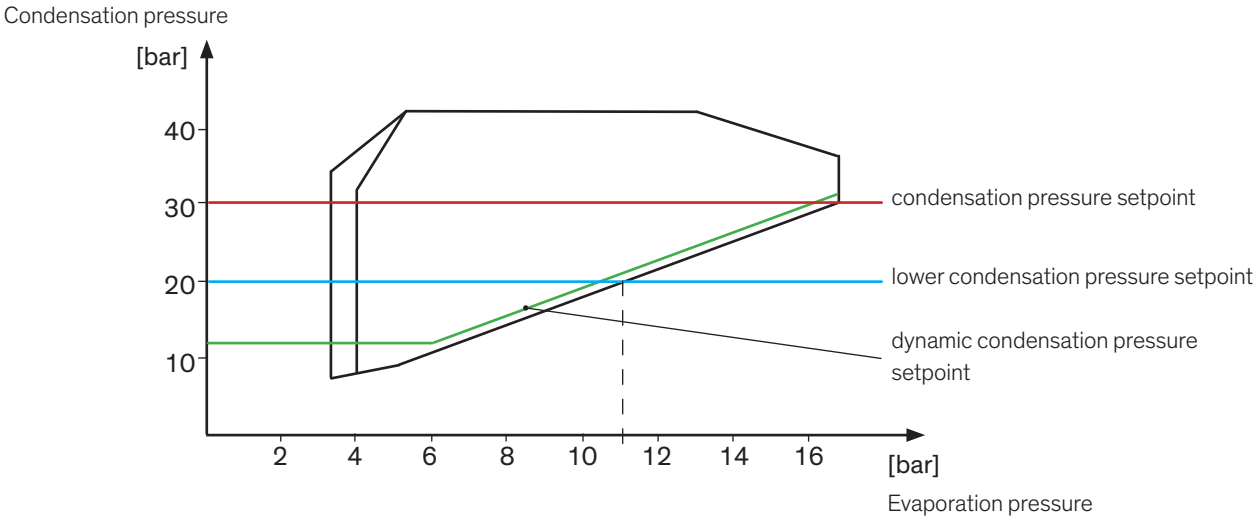
```
cpset 1 mix 18.2
cpset 1 dx 16.0
lowpressure 2 alarmdelay 5
highpressure 1 alarmdelay 5
```

circuit 1

Dynamic condensation pressure control

The control with a fixed condensation pressure setpoint leads in combination with speed controlled compressors to the necessity to adjust high setpoints.
As for speed controlled compressors of the ANB series a minimum pressure ratio of 1:1.8 between suction and pressure side is specified, the condensation pressure setpoint must be set to rather a big value (red line), to avoid that the compressor is pushed out of its operating zone by the compressor control at a high evaporation temperature. A lower setpoint (blue line) in the example below would result in the fact that the compressor control detects an error as soon as the evaporation pressure rises above 11 bar.
So with a maximum evaporation pressure of 16,8 bar, a condensation pressure setpoint of 30 bar must be set, see red line in the ANB52 operating zone.

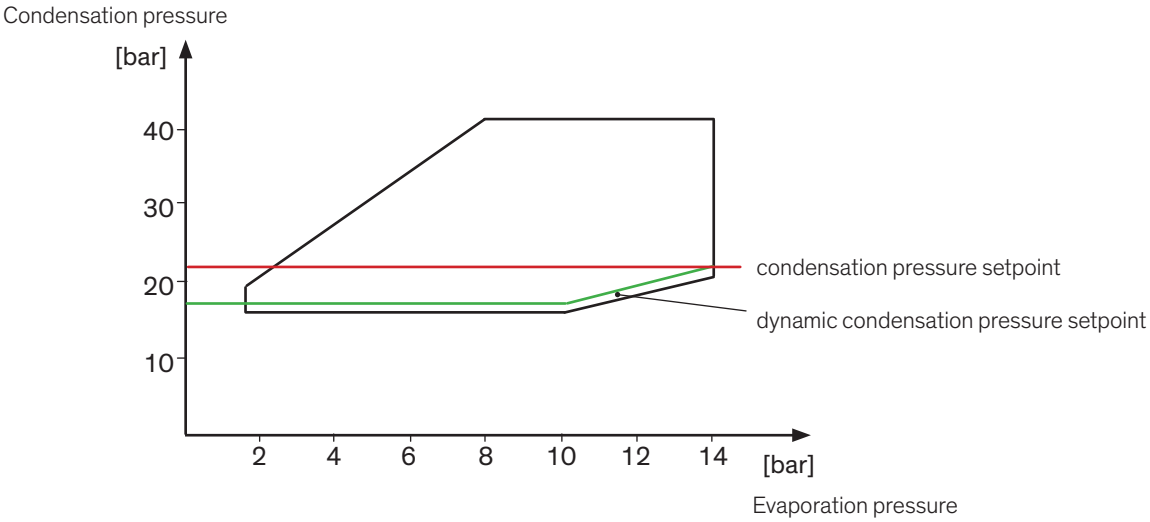
Compressor ANB52 operating zone



The green line represents the curve for a dynamic condensation pressure setpoint which follows the lower limit of the operating zone.

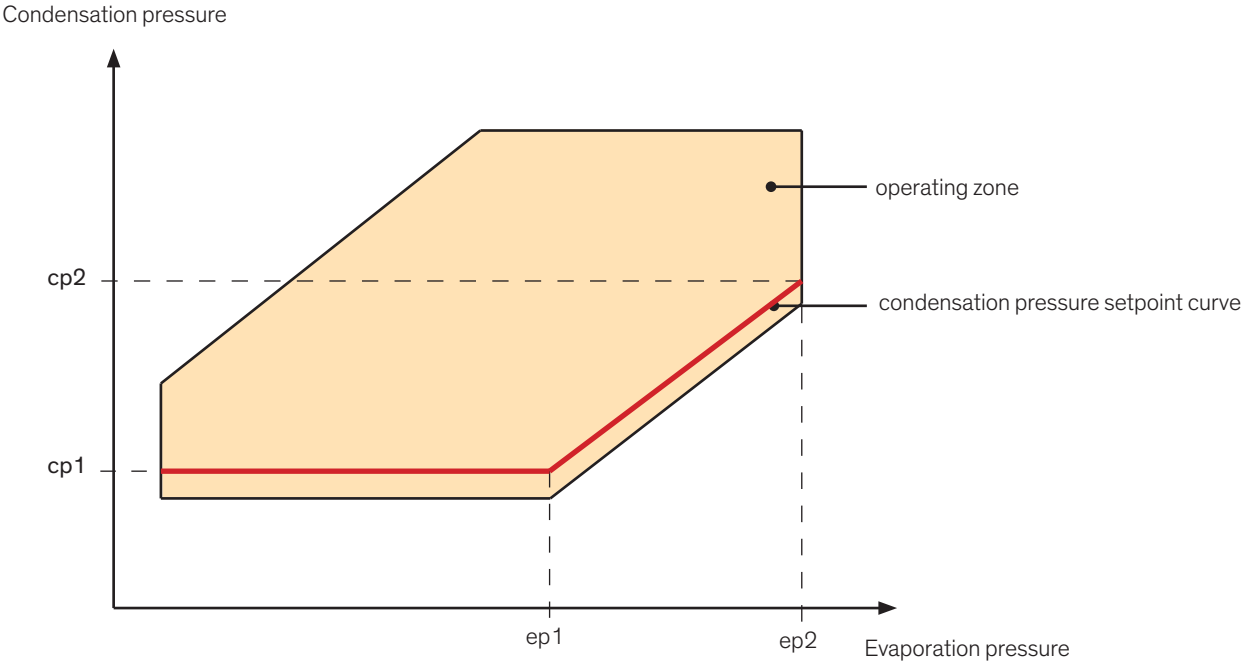
Compared to that, the operating zone of an on/off compressor is somewhat less problematic. Here you could also adjust a fix condensation pressure setpoint. Yet the dynamic condensation pressure control benefits also here.

Compressor ZP120KCE operating zone



The dynamic condensation pressure control can be applied in A/C units of the G, GE, GCW and GS, GES, GSCW version.
For each refrigerant circuit a condensation pressure curve can be set, according to which the condensation pressure setpoint is calculated as a function of the measured evaporation pressure. The deviation of the measured condensation pressure to the condensation pressure setpoint has an effect on the opening degree of the G valve.
The condensation pressure curve is set by four parameters, which define two points of a straight line.
This straight line is optimally positioned such as it runs along the lower limit of the compressor operating zone.

Compressor operating zone



By the following four commands you set the pressures, which determine the course of the condensation pressure setpoint curve. The lower limit is set by cp1, the upper limit by cp2.

```
cpset 1 ep1 6,5
cpset 1 cp1 12,8
cpset 1 ep2 17,0
cpset 1 cp2 32,6
```

circuit 1 — pressure value

By means of a further parameter the condensation pressure control is activated. This can be separately set for each rerigerant circuit. So it is possible to run one refrigerant circuit with the dynamic condensation pressure control, whereas the other refrigerant circuit runs with a fix condensation pressure setpoint.

`cpset 1 dyn 1`	Activation of dynamic condensation pressure control in circuit 1
`cpset 2 mix 12,3`	Setting the fix condensation pressure setpoint for the mix mode in circuit 2
`cpset 2 dx 18,4`	Setting the fix condensation pressure setpoint for the DX-mode in circuit 2

The command cpset 1 or cpset 2 displays all related parameters:

```
ioc02:>cpset 1
Condensation pressure setpoints 1
Setpoint Mix..:12.0 bar
Setpoint DX...:18.0 bar
dynamic.......:0
ep1...........:10.1 bar
cp1...........:16.6 bar
ep2...........:14.1 bar
cp2...........:21.1 bar
```

```
ioc02:>kdsoll 2
Condensation pressure setpoints 2
Setpoint Mix..:12.0 bar
Setpoint DX...:18.0 bar
dynamic.......:0
ep1...........:10.0 bar
cp1...........:16.5 bar
ep2...........:14.0 bar
cp2...........:21.0 bar
```

The effective condensation pressure calculated as a function of the evaporation pressure is displayed by the command "is1":

```
Condensation pressure 1 setp. mix.:27.0 bar
Condensation pressure 1 setp. DX..:27.0 bar
Condensation pressure 1 setp. dyn.:27.5 bar
Condensation pressure 1...........:13.9 bar
Hotgas temperature 1.............:23.0 °C
Evaporation pressure 1............:14.2 bar
Suction gas temperature 1.........:22.7 °C

Condensation pressure 2 setp. mix.:20.0 bar
Condensation pressure 2 setp. DX..:20.0 bar
Condensation pressure 2 setp. dyn.:21.0 bar
Condensation pressure 2...........:14.2 bar
..
.
```

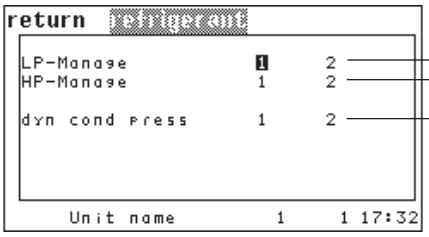
Units with 1 refrigerant circuit
The adjusted parameters for "cpset 1" are valid.

Units with 2 refrigerant circuit, one speed controlled compressor and one on/off-compressor
For the circuit with speed controlled compressor the parameters adjusted by "cpset 1" are valid.
For the circuit with on/off-compressor the parameters adjusted by "cpset 2" are valid.

Units with 2 refrigerant circuit, 2 on/off-compressors only 1 G valve
The parameters adjusted by "cpset 1" are valid for both circuits.
The condensation pressure setpoint is calculated corresponding to the measured evaporation pressure according to the cpset 1 parameters. The bigger one of both pressure values serves as a setpoint for the opening of the G-valve.

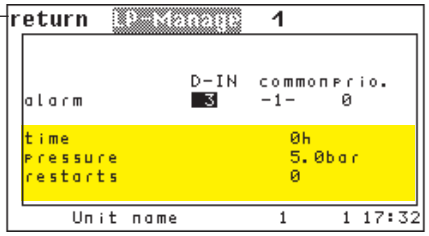
The dynamic condensation pressure control has the following advantages in contrast to the control with fixed condensation pressure setpoint:
- significantly reduced electrical power consumption at the same cooling capacity
- improved pressure control in most operating states by bigger G valve opening

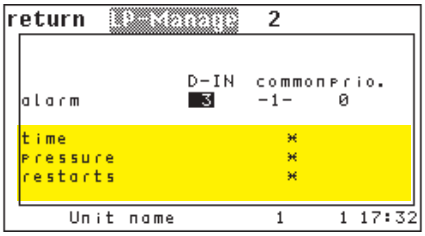
Config/Values/Refrigerant



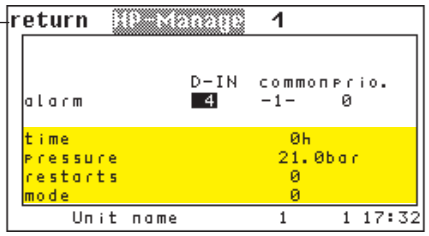
❶a digital input, ❶b common alarm release,
❶c digital output to forward the alarm

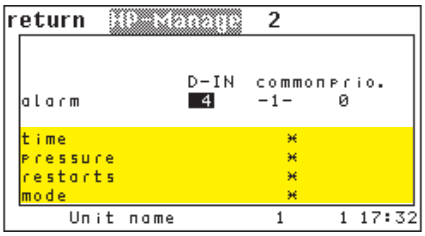
In this menu you can configure the low pressure alarm individually for each refrigerant circuit.
The menu items for the LP management can not be used at the time.





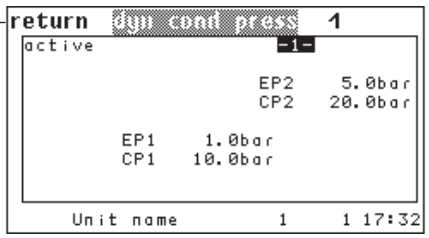
In this menu you can configure the high pressure alarm individually for each refrigerant circuit.
The menu items for the HP management can not be used at the time.

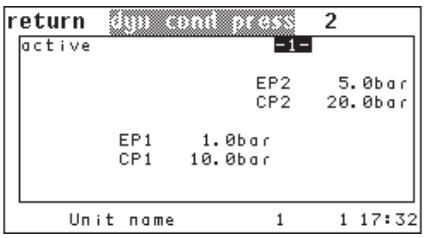




❶d digital input, ❶e common alarm release,
❶f digital output to forward the alarm

A dynamic condensation pressure control can be configured and activated for each refrigerant circuit in the menus beside.
The graphical arrangement of the parameter reflects the form of the condensation pressure curve.





By the parameter in the first line you can activate the control. ❷

The curve is determined by the following four parameters:
EP1 - evaporation pressure 1 ❸
CP1 - condensation pressure 1 ❹
EP2 - evaporation pressure 2 ❺
CP2 - condensation pressure 2 ❻

---

❶a `lowpressure 1 din 2`
❶b `lowpressure 1 commonalarm 1`
❶c `lowpressure 1 alarmprio 7`
❶d `highpressure 1 din 4`
❶e `highpressure 1 commonalarm 1`
❶f `highpressure 1 alarmprio 8`

❷ `cpset 1 dyn 1`
❸ `cpset 1 ep1 6,5`
❹ `cpset 1 cp1 12,8`
❺ `cpset 1 ep2 17,0`
❻ `cpset 1 cp2 32,6`

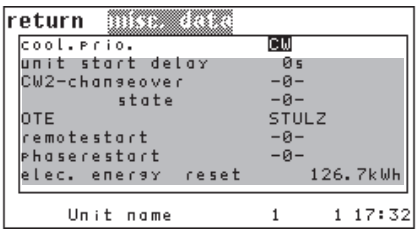
Application of dynamic condensation pressure control (parameter "dyn." = 1)
The table displays the recommended values in dependence of the compressor type and the refrigerant:
(up to now for refrigerant R410A only)

Compressor model	Refrigerant	ep1 [bar]	cp1 [bar]	ep2 [bar]	cp2 [bar]
Mitsubishi ANB33	R410A	6,0	12,8	17,0	32,6
Mitsubishi ANB42	R410A				
Mitsubishi ANB52	R410A				
Copeland ZP182KCE-TFD	R410A	10,0	16,5	14,0	21,0
Copeland ZP154KCE-TFD	R410A				
Copeland ZP137KCE-TFD	R410A				
Copeland ZP120KCE-TFD	R410A				
Copeland ZP103KCE-TFD	R410A				
Copeland ZP90KCE-TFD	R410A				

Due to the right-angled shape of the envelope in the pressure diagram, the configuration of a fix condensation pressure setpoint is sufficient for the following compressor types. (parameter "dyn." = 0)

Compressor model	Refrigerant	MIX setpoint [bar]	DX setpoint [bar]
Copeland ZP83KCE-TFD	R410A	16,5	16,5
Copeland ZP72KCE-TFD	R410A		
Copeland ZP61KCE-TFD	R410A		
Copeland ZP54KCE-TFD	R410A		
Copeland ZP42KCE-TFD	R410A		
Copeland ZP36KCE-TFD	R410A		
Copeland ZP31KCE-TFD	R410A		
Copeland ZP29KCE-TFD	R410A		
Copeland ZP24KCE-TFD	R410A		

Config **Values**
Misc. data/more



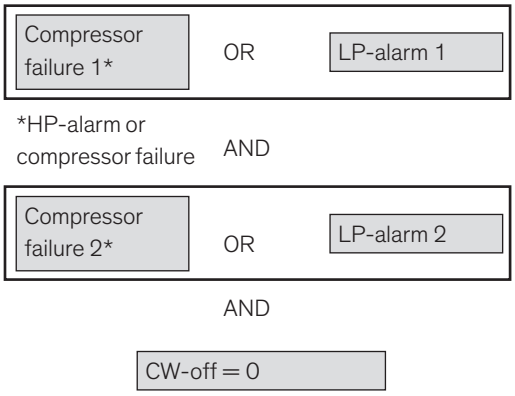
The cooling priority determines the overriding cooling circuit for units with two different cooling systems (Dual-Fluid units). The parameters GE, CW and DX can be adjusted.

GE - no priority, this is the adjustment for GE-systems, where a mixed operation of both systems is possible.
CW - means, that chilled water cooling is prior at ACW/GCW-units.
DX - means, that compressor cooling is prior at ACW/GCW-units.

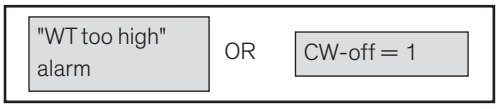
The diagram below displays the conditions for a malfunction change-over at Dual-Fluid units.

For a better understanding:
The OR-conditions are horizontally located.
The AND-conditions are vertically located.

Malfunction change-over
DX → CW (cooling priority 2)



Malfunction change-over
CW → DX (cooling priority 1)



WT - water temperature 1

CW-off - digital input (pre-set DIN16) to enable DX-operation or to disable CW-operation

Switching back to the original priority can only be done by an alarm reset.

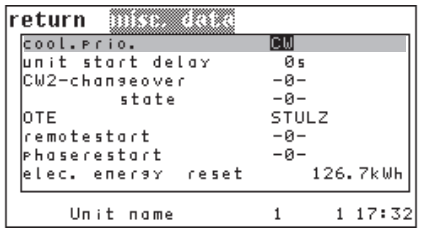
The corresponding commands:

`coolingprio 1`

0: GE
1: CW
2: DX

Config

Values
Miscellaneous Data/more

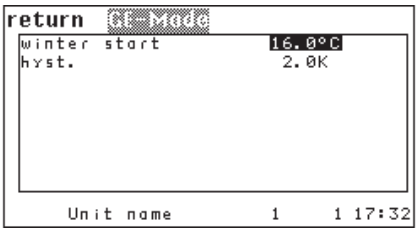


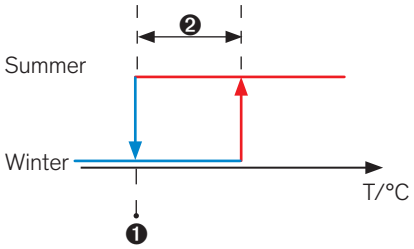
In the second line you can adjust a unit start delay ❷. By different start delays for different units it is avoided that the most current consuming components start simultaneously and overcharge the power supply of the building.

With the parameter in the third line you can effect a change-over of the two chilled water valves in CW2 units. The parameter in the fourth line displays the state of change-over. For details, see chapter 6.4 CW2 units.
The parameter "OTE" ❺ in the fifth line is customer specific, for standard units the setting must be "STULZ". For enabling the OTE software this parameter is set to "OTE".

With the parameter ❻ in the sixth line you can determine whether the unit may be started by a remote on/off signal. (0 = no, 1 = yes, all other stop causes (Timer, BMS, local stop, sequencing) are deleted. The remote on/off signal has the priority).
With the parameter ❼ in the seventh line you can determine whether the unit restarts automatically in case of power supply return after a phase failure. (0 = no, with this setting the unit must be restarted locally, 1 = yes).
In the last line you can reset the energy counter (see chapter 6.13).

Values
GE-mode





The outside temperature ❶ for the commutation from summer to winter operation is decisive for the drycooler and compressor control. With this hysteresis ❷ the winter operation changes to summer operation.
The winter operation is also switched over to summer operation, if an outside temp. sensor breakdown is detected. An alarm "Outside temperature sensor defective" is not displayed.

If no outside temperature sensor is configured, summer operation is active.

The corresponding commands:

Misc. data

❷ `startdelay 5`
❸ no correspondance
❹ `---`
❺ `option 1 1`
❻ `remote start 1`
❼ `phase start 1`

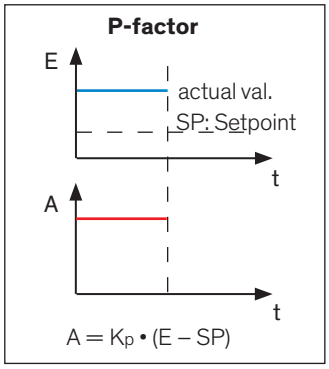
GE-Mode

❶ `sumwin start 16.0`
❷ `sumwin hys 2`

PID control

For the following components you can adjust a PID control, consisting of a P-factor, I-factor and D-factor:

- ICC
- HGBP valve
- G-valve
- GE/CW-valve
- Fan with differential temperature control
- Louvers with DFC² control
- Condenser fan with DFC² control
- Pump in CPP units



E: input value, return air temp. / supply air temp. in general, condensation pressure for G-valve
A: output value, speed in general, opnening degree for valves

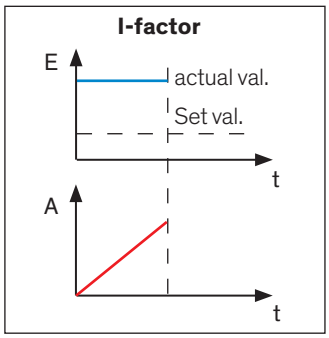
P factor

By the P factor you set the ratio of the output variable to the input variable difference (measured value minus setpoint).
To each deviation from the setpoint exists a fix output value for the component which is to work against the deviation.
A characteristic of the proportional control is a permanent discrepancy of the input variable to the setpoint as long as there is a disturbance variable.
With the help of an example the single parts (P-, I-, and D-part) shall be calculated for a setpoint discrepancy of $\Delta T = 0{,}3$ K for the GE/CW valve.

Example: $T_{set} = 24°C$ $\Delta T = T_{act} - T_{set}$
$T_{act} = 24{,}3°C$ $\Delta T = 0{,}3$ K

P factor: $K_P = 10$
component dependant constant: $k_{KP} = 1$

$\varphi_P = K_P \cdot \Delta T \cdot k_{KP}$
$\varphi_P = 10 \cdot 0{,}3 \cdot 1$
$\varphi_P = 3$ (opening degree in %)



I factor

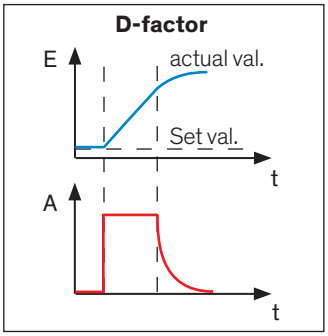
By the I-factor you adjust the integral part of the control. The integral part reacts to a difference between actual (measured) value and set value with a constantly rising output. The bigger the difference, the faster increases the output. The integral part serves to avoid a constant discrepancy from the set value. The more straight away the control takes effect, the bigger the I-factor can be chosen.

Example:
for the ICC, if supply air control has been set.
The more storage elements (as for example big space volumes in case of return air control) exist in the control loop, the smaller the I-factor must be chosen to avoid an overshooting of the control loop.

Example: $\varphi_I = K_I \cdot \Delta T \cdot t \cdot k_{KI}$ $\Delta T = 0{,}3$ K
$\varphi_I = 10 \cdot 0{,}3 \cdot 1 \cdot 0{,}333$ $t = 1$ sec.
$\varphi_I = 1$ (opening degree in %)

I factor: $K_I = 10$
component dependant constant: $k_{KI} = 0{,}333$

after 5 sec.:
$\varphi_I = 5\%$



To show the principal influence of the I-/D-factor the diagrams feature an open control circuit.
In reality the control circuit is closed and the alteration of the output has an effect on the input (measured value).

D factor

By the D-factor you adjust the differential part of the control. By the differential part a change of the setpoint discrepancy is detected. This way the control can rapidly work against an erratic change of the input value.
The size of the D factor should be set in dependance on the possibility for a sudden change of the input variable. If the input variable is the return air temperature, a D factor makes hardly any sense, as there are generally no erratic changes of the return air temperature. In contrast to this the setting of a D factor can lead to a better control characteristic for the G valve (input variable is the condensation pressure) or for supply air control.

Example:

$\varphi_D = K_D \bullet (\Delta T_n - \Delta T_{n-1}) \bullet k_{KD}$
$\varphi_D = 10 \bullet -0{,}1 \bullet 2$
$\varphi_D = -2$ (opening degree in %)

D factor: $K_D = 10$
component depedant constant: $k_{KD} = 2$

Setpoint discrepancy
at the moment t_1 $\Delta T_{n-1} = 0{,}4$ K
at the moment t_2 $\Delta T_n = 0{,}3$ K

For calculating the output variable the single parts are added:

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

Instruction for the setting of a PID controller

This instruction gives an answer to the following questions with the example of a G valve. These measures can also be used for other components which are controlled by a PID controller:

1.) Why does the G valve react too fast?
2.) Why does the G valve react too slowly?
3.) Why does the G valve oscillate?

1.) PID controller too fast	→	I factor too big or P factor too big
2.) PID controller too slow	→	I factor too small or P factor too small
3.) PID controller oscillates	→	there are resonances between the PID controller and the system which has to be controlled. This happens mostly if: 1.) the PID controller is too fast.

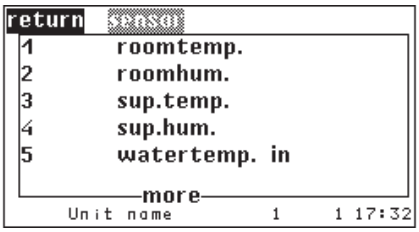
PID controller setting:
P factor on 1
I factor on 1
D factor on 0

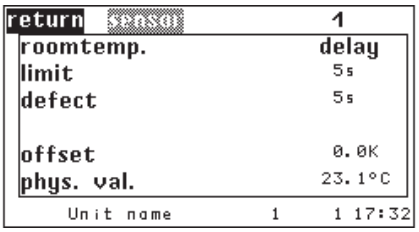
- increase the P factor very slowly until the system begins to oscillate or behaves strangely in another way.
- now reduce the P factor to 50-70% of the previously adjusted value.
- increase the I factor very slowly until the actual value is controlled fast but without overshooting exactly to the setpoint.
- leave the D factor always at 0.

Not only the control parameters have an influence on the control characteristics but also, e.g for the G valve, the actual water temperature and the actual compressor speed.
So it may happen that the G valve tends to oscillate with the default setting, when the water is very cold or the compressor is running slowly and that the valve reacts a bit too slowly when the water is very warm and the compressor is running fast.
The default settings for the G valve are chosen in such a way that they work for possibly all operating states in a satisfying way. Optimizations on one side (control speed) can easily entail a significantly worse behaviour on the other side (control stability and accuracy).

5.4 Components

5.4.1 Sensor





Operate **Components/Sensor/1-21**

After the selection of the sensor you can enter the alarm delay for the limit alarm ❶ and for the sensor failure alarm ❷ in seconds.

With the offset you can calibrate the sensor with the help of a reference measuring instrument. ❸

Compare the PHYSICAL VALUE with the value of the reference measuring instrument and modify the parameter "Offset" until the displayed value "Phys. val." corresponds to the value read on the reference instrument.

The corresponding commands:

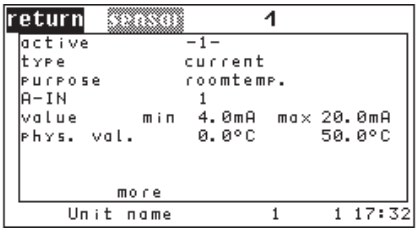
```
❶ sensor 1 alarmdelay 7
❷ sensor 1 alarmdelaybr 8
❸ sensor 1 trim 22.3
```

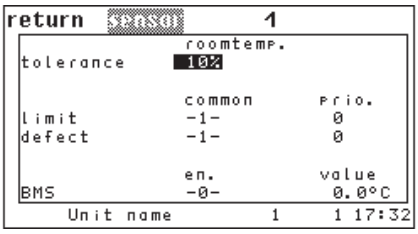
If, instead of a temperature, the expression "reset" is entered, the sensor calibration is deleted.

Insert here the value of the reference measuring instrument.

Config

Components
Sensor/1-21





By setting the parameter "ACTIVE" on 1 you add a sensor to the configuration. With "0" you disable the sensor. ❶
In the next line you determine the sensor type (current, voltage). ❷
With the parameter "PURPOSE" you specify for what the sensor is used ❸. See left listing.
With the parameter "A-IN" you adjust the analog input for the proportional sensor signal. ❹

The following 5 items serve to calibrate the sensor. The minimum measure value (phys. value) ❻**a** is assigned to the minimum output (value). ❺**a**
The maximum measure value (phys. value) ❻**b** is assigned to the maximum output (value). ❺**b**
The unit of the adjusted measure value depends on the sensor purpose (1-55). The unit of the adjusted output depends on the sensor type (current, voltage).

If there is more than one sensor with the same purpose, an average value is calculated. In the first line of the second menu you can adjust a maximum difference to the average value.❼ If the maximum difference is exceeded, the alarm "limit exceeded: Sensor ##" is released. For the evaluation of the sensor excess alarm at least three sensors with the same purpose are needed.

Alarm parameters:
sensor excess alarm in the second line,
common alarm release ❽**a**.
alarm priority ❽**b**

sensor failure alarm in the third line,
common alarm release ❾**a**.
alarm priority ❾**b**.

In the last line it is indicated whether the measured value is provided by a BMS (e.g. by an external sensor). If this is the case the value is automatically enabled and accepted as actual value for this sensor. The value in column "EN" will be -1- then. The measured value itself is displayed in the column "Value".
This external measuring value can be disabled by setting "0" for the parameter in column "EN" ❿. Then the value, which is measured at the corresponding analog input is taken as actual value.

PURPOSE:
1 - Room temperature
2 - Room humidity
3 - Supply temperature
4 - Supply humidity
5 - Water temperature, inlet 1
6 - Outside temperature
7 - Outside humidity
8 - Hotgas temperature 1
9 - Condensation pressure 1
10 - Suction gas temperature 1
11 - Evaporation pressure 1
12 - Water temperature, inlet 2
13 - Hotgas temperature 2
14 - Condensation pressure 2
15 - Suction gas temperature 2
16 - Evaporation pressure 2
17 - Setpoint temperature
18 - Setpoint humidity
19 - Water temperature, outlet 1
20 - Water temperature, outlet 2
21 - Water pressure
23 - Universal temperature 1
24 - Differential pressure 1

continued overleaf

The corresponding commands:

see listing "Purpose"

```
❶  sensor 1 conf 1
❷  sensor 1 type 3
❸  sensor 1 use (5)
❹  sensor 1 ain 3
❺a sensor 1 minout 0.0
❺b sensor 1 maxout 9.0
❻a sensor 1 minmeas -20.0
❻b sensor 1 maxmeas 40.0
❼  sensor 1 div 20
❽a sensor 1 commonalarm 1
❽b sensor 1 alarmprio 2
❾a sensor 1 commonalarmbr 1
❾b sensor 1 alarmpriobr 3
❿  sensor 1 bms 0
```

Sensor type:
1: Current
2: Voltage

PURPOSE (continued):

25 - Differential pressure 2
26 - Differential pressure 3
27 - Room temperature 1
28 - Supply temperature 1
29 - Room temperature 2
30 - Supply temperature 2
31 - Room temperature 3
32 - Supply temperature 3
33 - Room air pressure
35 - Diff.press. airflow
36 - Outside moisture content
37 - Air volume flow
47 - Supply air pressure in cPa
48 - actual electric power
50 - Water volume flow
51 - electric active power
53 - Water volume flow 2
54 - Water volume flow 3
55 - Ext. setpoint spec humidity

External Setpoint:
Using the sensor purposes 17 and 18 an external setpoint can be provided. The external setpoint takes priority over the internal setpoint.

NOTICE

For dry cooler control you have to configure an outside temperature sensor and a water temperature sensor.

You need two water temperature sensors for:

1. GCW-units with dry coolers
Water temperature 1 is always the temperature for the CW-circuit.
Water temperature 2 is the cooling water temperature, by which the dry coolers are controlled.

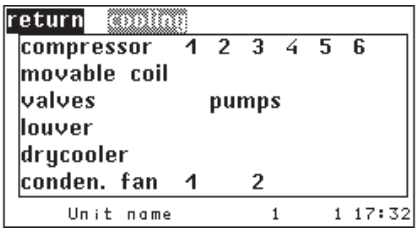
2. CW2-units
Water temperature 1 is always the temperature for the CW-valve which is active, when no change-over has taken place (no voltage at DIN 3).
Water temperature 2 is the temperature for the second CW-valve, which is active after a change-over.

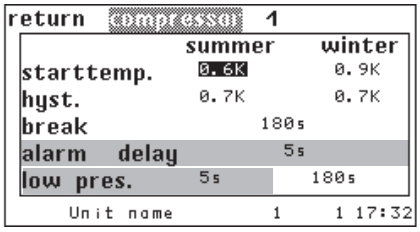
5.4.2 Refrigerant circuit, Standard

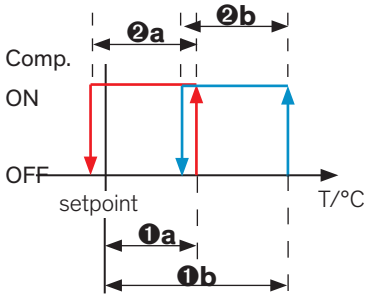
Compressor

The compressor is incorporated in the A/C unit as standard. There is also the possibility to control an external compressor. An external and internal (incorporated) compressor can not be controlled simultaneously.
Set the compressor type by the following commando: `comp 1 type 1` (incorporated compressor)
or: `comp 1 type 2` (external compressor)
By setting the compressor type different parameters of the compressor menu are effective.
On the following five pages the parameters for the internal compressor are explained.

Compressor, internal







Operate **Components/Cooling Compressor/1-6**

The parameters in the first four lines can be adjusted separately for compressor 1 till 6.
The start temperature for the compressor is entered as a positive difference to the setpoint.
Two different start temperatures ❶a,❶b + hysteresis ❷a,❷b for summer and winter operation can be entered.
The compressor pause ❸ is entered in seconds and delays the restart by the adjusted time. This reduces the number of possible compressor starts per interval and has a positive effect on the compressor service life.

Alarm parameters:
Compressor alarm delay, see menu Operate/values/refrigerant
Low pressure alarm delay, see menu Operate/values/refrigerant

Winter start delay
After the compressor start the low pressure alarm can be inhibited for an adjustable time ❺b. If the unit is equipped with two compressors, the adjusted time is valid for both compressors (1 and 2). This time avoids a low pressure alarm right after the compressor start which could occur when outside temperatures are low. The effect of this parameter does not depend on the summer/winter operation.

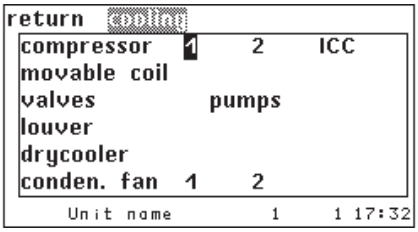
The corresponding commands:

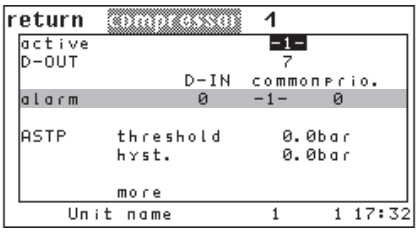
❶a `comp 1 startsum 0.6`
❶b `comp 1 startwin 1.2`
❷a `comp 1 hyssum 0.7`
❷b `comp 1 hyswin 0.7`
❸ `comp 1 pause 180`
❺b `winterdelay 180`

Compressor sequencing in units with two refrigerant circuits and one on/off compressor per circuit:

The controller software tries to equilibrate the compressor runtimes. Once in an hour the software checks whether the difference between the runtimes is 20 hours or more.
If this is the case and if the compressor with the bigger runtime has a smaller start value than the other compressor, the start values and hysteresises for summer and winter operation are exchanged between the compressors.

If only one suction valve or one HGBP valve is configured, there is no sequencing between the compressors.





Config **Components/Cooling Compressor/1-2**

Choose the compressor (1 or 2) in the menu "Config/components/cooling" for which the following inputs shall be valid.
Compressor 3 to 6 can only be configured by commands.
Following a new menu opens.

In the first line you add the compressor to the configuration by entering "1". With "0" you disable the compressor although all settings concerning the compressor are kept. ❶

NOTICE

You only can configure either compressor 1 or the ICC (integrated cooling circuit, see menu "Config/components/cooling/ICC"). The ICC can exclusively work with the compressors 2, 4 and 6.

You can determine a digital output for the compressor on/off signal. ❷

The alarm parameters for the compressor alarm In the fourth line are not effective for the internal compressor. A high pressure alarm is evaluated for each refrigerant circuit instead.

- see menu Config/values/refrigerant/HP management

The corresponding commands:

❶ `comp 1 conf 1`
❷ `comp 1 dout 3`
❸ `comp 1 limit 1.5`
❹ `comp 1 hys 0.5`

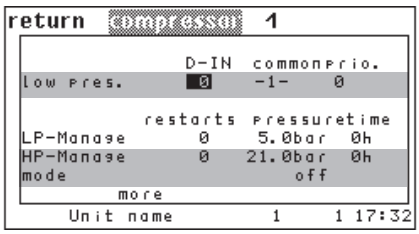
Scroll compressors are equipped with an ASTP (advanced scroll temperature protection), which consists of a mechanical protection against an excessive hotgas temperature.
If the ASTP triggers, the compressor motor runs without compressing refrigerant (i.e. running idle). The ASTP is automatically reset.
To record this event in the event log, you must apply and configure a sensor for the condensation pressure and another one for the evaporation pressure and set values for the ASTP threshold and the ASTP hysteresis in the menu beside.
The ASTP threshold represents a pressure difference between the condensation pressure and the evaporation pressure. For R407C, in normal operation this difference amounts to 10 - 12 bar (R410A → 15 - 25 bar).

If the pressure difference is smaller or equal to the ASTP threshold ❸, the event „Compressor # ASTP“ is generated.
If the pressure difference rises to the value ASTP threshold + ASTP hysteresis ❹, the event „Compressor # no ASTP“ is generated.

```
comp 1 minruntime 300
```

You can set a minimum runtime for the compressor by a command. The minimum runtime is entered in seconds.

.../more

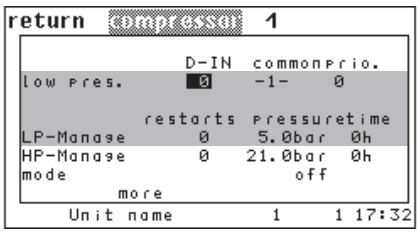


The low pressure alarm can be managed in a way to avoid a premature and unnecessary service intervention.

If the LP switch releases, the compressor is stopped and restarted after the **compressor pause** has elapsed. The LP alarm is inhibited during the **winter start delay**. This way the controller tries to bypass temporary LP alarms.
You can limit the number of compressor restarts in "RESTARTS" ❺ within a time space you can adjust in the left column of the fifth line to avoid an LP alarm. You can define the time space in the right column of the same line ❺**b**.
If after the maximum number of restarts, the LP switch still triggers, the LP alarm is released and the compressor is definitely switched off. Using the optional evaporation pressure sensor you can adjust in the medium column of the same line a threshold ❺**a** which marks the lower limit for the permissible pressure range.

The corresponding commands:

```
❺  comp 1 wac epmintries 6
❺a comp 1 wac epmin 4.6
❺b comp 1 wac epminint 2
```

With a condensation pressure sensor (either part of G-valve or separate option) high pressure alarms can be equally managed for the same reasons as LP alarms.
You can limit the number of allowed compressor restarts in "RESTARTS" ❻ within a time space you can adjust in the left column of the sixth line. You can define the time space in the right column of the same line ❻**b**.

If the threshold ❻**a** of the HP within this time space is excessed at least the adjusted number of times, the measure which you have adjusted in "mode" ❼ is taken.

off - 0: A high pressure alarm is triggered and the compressors of this refrigerant circuit are stopped. A compressor restart is possible after the reset of the alarm.

on - 1: The high pressure management is listed in the event-log and the compressors of this refrigerant circuit are stopped. After the compressor pause has elapsed, the compressors can be started again.

NOTICE

An LP or HP management is possible for on/off-compressors only.

For A/C units with more than one compressor per refrigerant circuit the following is valid:

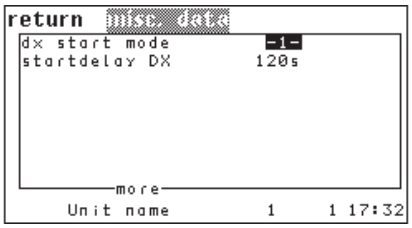
Compressor 1, 3 and 5 are assigned to the first refrigerant circuit, compressor 2, 4 and 6 to the second refrigerant circuit.
The parameters, which concern the LP- and HP management of compressor 1 are also valid for compressor 3 and 5 and automatically change after the setting of compressor 1 in the menu of compressor 3 and 5 also.
Such an interconnection also exists between compressor 2, 4 and 6.

The corresponding commands:

❻ `comp 1 wac cpmaxtries 3`
❻**a** `comp 1 wac cpmax 21`
❻**b** `comp 1 wac cpmaxint 2`
❼ `comp 1 wac hpmode 1`

Compressor characteristics at unit start

Config **Values/Miscellaneous Data**



For A/C units with EC compressor (ICC) and two refrigerant circuits a quick start function ❶ can be set.
The enabled quick start function is effective for on/off compressors after the unit start immediately after switching on the operating voltage (also for restart after power failure). (not for removal of a stop condition, e.g. local stop, sequencing stop etc.).

Description of the quick start function:
Independent from the EC compressor start, also the on/off compressor(s) of the second refrigerant circuit is(are) started according to its (their) start value(s) and stopped according to its (their) hysteresis value(s), to achieve a high cooling capacity fast.
Once the EC compressor (ICC) has completed its start-up phase, the on/off compressors are started and stopped again in dependency of the EC compressor.
The quick start function has priority over the compressor start delay that is described in the following.

For units with free cooling a compressor start delay ❷ can be set.
The compressor start delay is effective for all compressors after the unit start immediately after switching on the operating voltage (also for restart after power failure). (not for removal of a stop condition, e.g. local stop, sequencing stop etc.), if free cooling is possible.
In this way, the controller tries to avoid a compressor start and to achieve a cooling by water instead.

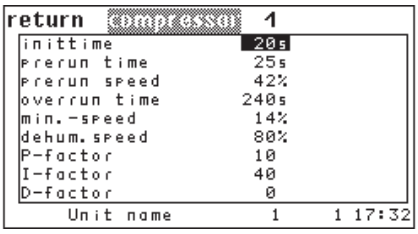
It is also possible to block the start of on/off compressors by a digital input.
The digital input can be adjusted via the following command:

```
comp 1 blockdin 9
```

The corresponding commands:

❶ `dxstart quickstart 1`
❷ `dxstart delaybyfc 180`

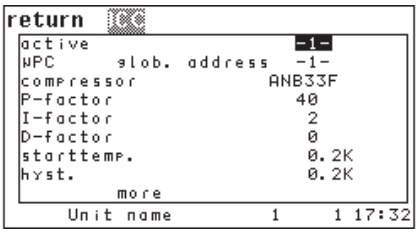
Compressor, external **Config** **Components/Cooling Compressor/more/more**



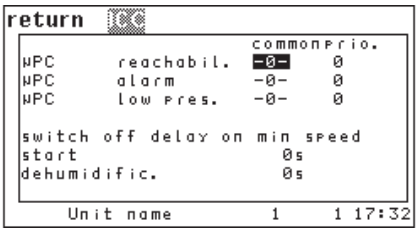
In this menu you can set parameters which serve exclusively to configure an external compressor.
These parameters are explained in detail in the controller manual for the EC tower.

Config

Components/Cooling
ICC



In the first line you can add an integrated cooling circuit (ICC) to the configuration by entering "1". With "0" you disable the ICC although all settings concerning the ICC are kept. ❶
The ICC control unit communicates with the C7000 by the RS485 component bus. The precondition for this is the identification by a global address.
In the second line you can set a global address for the ICC. ❷
In the third line the compressor model is displayed.
In the following lines you can set the P-factor ❸, the I-factor ❹ and the D-factor ❺ for specifying the control characteristics. For return air control a big P-factor and a small I-factor is recommended, for supply air control a small P-factor and a big I-factor instead.
In the seventh line you can adjust the start temperature ❻ for the ICC as positive offset to the temperature setpoint.
The compressor is switched off, when the temperature setpoint is passed under and the speed is equal to minimum speed.
In the last line you can adjust the hysteresis ❼, which is decisive for the compressor characteristics after the start phase (3 min.) and after ceasing of dehumidification request. See detailed description of start phase below.



Alarm parameters availability alarm in the first line:
- common alarm release ①**a** - alarm priority ①**b**

Alarm parameters for all 18 ICC alarms in the second line:
- common alarm release ②**a** - alarm priority ②**b**

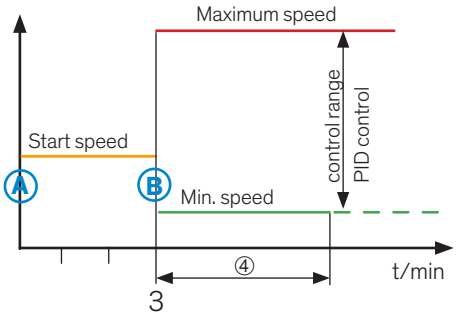
Alarm parameters for the low pressure alarm in the third line:
- common alarm release ③**a** - alarm priority ③**b**

The corresponding commands:

❶ `icc 1 conf 1`
❷ `icc 1 id 27`
❸ `icc 1 pid kp 40`
❹ `icc 1 pid ki 2`
❺ `icc 1 pid kd 0`
❻ `icc 1 starttemp 0,3`
❼ `icc 1 hysteresis 0.5`

①**a** `icc 1 commonalarmna 1`
①**b** `icc 1 alarmpriona 3`
②**a** `icc 1 commonalarmicc 1`
②**b** `icc 1 alarmprioicc 4`
③**a** `icc 1 commonalarmlp 1`
③**b** `icc 1 alarmpriolp 4`
④ `icc 1 lowafterstart 240`

Start phase - time dependant

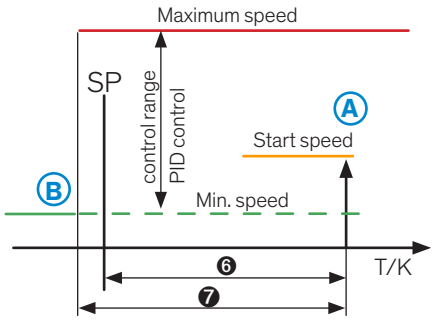


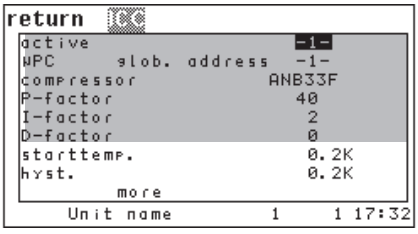
Start phase

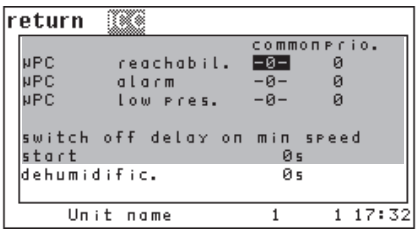
After the compressor was started because the start temperature has been reached, it first runs 3 minutes with a fixed speed of 50 revolutions / s (3000 rpm).
If actual temperature value < setpoint + start temperature ❻ - hysteresis ❼, the compressor runs with minimum speed for an adjustable time lapse.
If actual temperature value ≥ setpoint + start temperature - hysteresis, PID-control for the compressor gets active.

With low thermal load, especially with supply air control it may happen that the air temperature is so low after the initial stage, that the compressor would be turned off again. To avoid such an on/off operation, you can adjust a time ④, in which the compressor runs with a fixed minimum speed (20 rev/s, 1200 rpm). If the temperature is still too low at the end of the specified time, the compressor is switched off. However, should the temperature rise within this time onto the set point, PID control for the compressor is activated.

Start phase - temperature dependant







Dehumidification

For a dehumidification request, the speed of the compressor is increased and is controlled in the range between "pmax" (upper limit) and "cmswd" (lower limit).
Just like after the start-up phase, it is possible that the air temperature is too low.
If actual temperature value < setpoint + start temperature ❻ - hysteresis ❼, the compressor runs with minimum speed for an adjustable time lapse.
If actual temperature value ≥ setpoint + start temperature - hysteresis, PID-control for the compressor gets active.
To equally avoid an on/off pulsing you can adjust a time ⑤, in which the compressor runs with a fixed minimum speed.
Here also, the compressor is switched off when the temperature is still too low at the end of the specified time and the PID control is enabled, if the temperature rises within the time onto the set point.

The compressor speed will never pass under minimum speed (20 rev/s, 1200 rpm) during PID control.

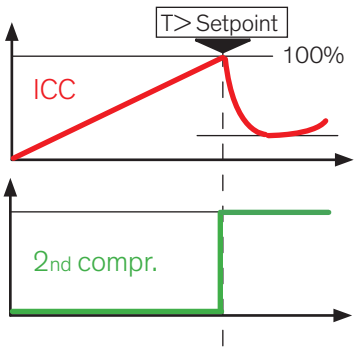
For each refrigerant circuit a high pressure alarm can be configured, see menu Config/values/refrigerant/HP management.

The corresponding commands:

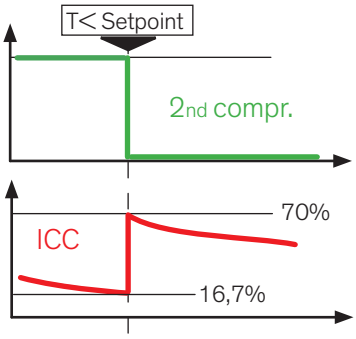
⑤ `icc 1 lowafterdehumi 240`

`icc 1 pmin 19`
`icc 1 pmax 80`
By these commands you can limit the power of the speed controlled compressor.
The minimum/maximum power is entered in %.

`icc 1 cmswd 20`
for the EC compressor you can set a minimum speed for dehumidification.

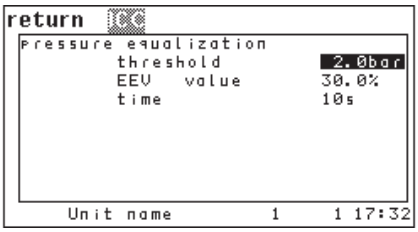


In **units with two refrigerant circuits** the ICC is always assigned to the first refrigerant circuit. The second refrigerant circuit is equipped with an on/off compressor which has to be configured in the compressor menu. A "compressor 1" for the first refrigerant circuit may not be configured.
As soon as the compressor of the ICC has reached its maximum speed (120 rev/s, 100%) and the temperature lies above the setpoint, compressor 2 is switched on and the speed of the first compressor is correspondingly reduced. Then the speed of the first compressor is controlled according to the cooling requirement.



When the second compressor is in operation, the temperature is beneath the setpoint and the first compressor (ICC) has reached the minimum speed, the second compressor is switched off and the first compressor is raised to 70% of its maximum speed. Then the speed of the first compressor is controlled according to the cooling requirement.
The start values and hysteresises in the compressor menu are not evaluated by the control.

Config **Components/Cooling**
ICC/more/more



The following parameters are relevant for **CyberRow units, version AS** only:

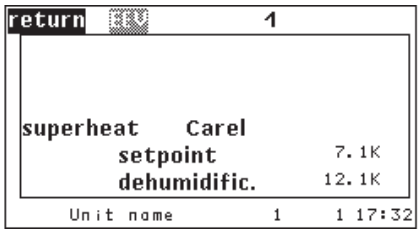
If a CyberRow unit of the AS version is switched off at very low temperatures, it can happen that after a certain time the refrigerant is displaced into the condenser. The little amount of refrigerant in the liquid receiver is shut off by the non-return valve towards the condenser and by the electronic expansion valve (EEV) towards the evaporator.

When the unit will be started after a few days, it can happen that there is only a slight amount of refrigerant in the evaporator at low pressure, such as to cause a low pressure alarm within a short time. As the required pressure difference across the compressor can not be established due to the low pressure, the EEV does not open either, so that there is no way for the refrigerant in the liquid receiver to flow into the evaporator.

To prevent such a malfunction, a minimum pressure ❶ for the refrigerant circuit can be set.
When the pressure as well on the suction side as on the discharge side is lower than the adjusted minimum pressure while the compressor is to be started, the EEV is opened before the compressor start request for an adjustable time ❸ on an adjustable opening degree ❷.
During this time the refrigerant pressure in the circuit increases. After the EEV has been closed (this is the pre-condition for the compressor start), the compressor may start.

The corresponding commands:

❶ `icc 1 pet 6`
❷ `icc 1 peog 50`
❸ `icc 1 pep 20`

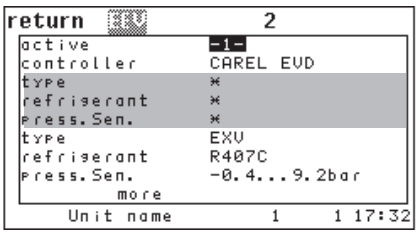


Operate

Components/Cooling/Valves
EEV (Electronical Expansion Valve)
Setting for Carel valve

Here you can adjust the setpoint for the superheating in normal operation ❶ and the setpoint for the superheating in case of dehumidification ❷. Both values must be entered as differences to the evaporation temperature.

Config



The suction gas pressure and temperature are measured by a pressure sensor and a temperature sensor and these values are transmitted via an EEIO board to the controller. With these parameters the superheat is controlled by the expansion valve.

❶. By the setting 1 the valve is configured and the failure of the pressure sensor, the temperature sensor and the stepper motor for the valve control are monitored and displayed by an alarm.
Setting 0 means: the valve is not configured.

❷. By this parameter the valve controller is determined. "ALCO VCM" and "CAREL EVD" can be selected. Depending on the controller adjusted here different parameters can be adjusted. The parameters on a grey background are not adjustable for the Carel controller.

❸. Here the valve type is determined.
❹. Setting of the refrigerant in use.
❺. Setting of the pressure sensor in use.

The corresponding commands:

Controller type
0: ALCO VCM
1: Carel EVD

Valve type:
1: Carel EXV
2: Alco EX4
3: Alco EX5
4: Alco EX6
5: Alco EX7
6: Alco EX8 330 Hz
7: Alco EX8 500 Hz
8: Sporlan SEI 0.5-11
9: Sporlan SER 1.5-20
10: Sporlan SEI 30
11: Sporlan SEI 50
12: Sporlan SEH 100
13: Sporlan SEH 175
14: Danfoss ETS 25B
15: Danfoss ETS 50B
16: Danfoss ETS 100B
17: Danfoss ETS 250
18: Danfoss ETS 400
19: 2 Carel EXV switched in parallel
20: Sporlan SER(I)

Refrigerant:
1: R22
2: R134a
3: R404A
4: R407C
5: R410A
6: R507A
7: R290
8: R600
9: R600a
10: R171
11: R744
12: R728
13: R1270
14: R417A
15: R422D
16: R413A
17: R422A
18: R423A
19: R407A
20: R427A

Pressure sensor:
1: —1..4,2 barg
2: —0,4..9,3 barg
3: —1..9,3 barg
4: 0..17,3 barg
5: 0,85..34,2 barg
6: 0..34,5 barg
7: 0..45 barg
8: —0,5..7 barg
9: 0..10 barg
10: 0..18,2 barg
11: 0..25 barg
12: 0..30 barg
13: 0..44,8 barg
14: remote —0,5..7 barg
15: remote 0..10 barg
16: remote 0..18,2 barg
17: remote 0..25 barg
18: remote 0..30 barg
19: remote 0..44,8 barg
20: ext. signal 4..20 mA

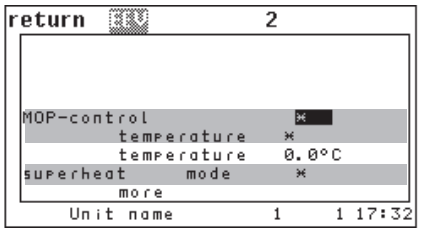
Config

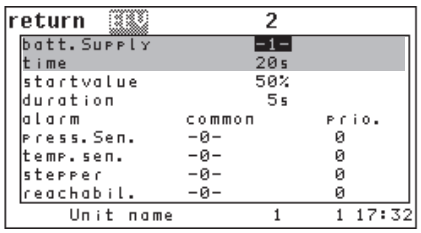
❶ `eev 1 conf 1`
❷ `eev 1 con 1`
❸ `eev 1 type 5`
❹ `eev 1 refrig 4`
❺ `eev 1 sentype 2`

Operate

❶ `eev 1 supset 6.5`
❷ `eev 1 supsetdehum 7.2`

Config **Components/Cooling/Valves**
EEV/more





❶. Temperature limit for MOP control. Above this evaporation temperature the expansion valve is not opened further.

Following menu:
❸. Start opening degree for the expansion valve
❹. Advanced start time for the expansion valve. The compressor start is delayed by this time in order that the expansion valve can obtain its start opening degree.

Alarm parameters:
Four alarms exist:
❺. Pressure sensor alarm,
❻. Temperature sensor alarm,
❼. Stepper motor alarm,
❽. Reachability alarm, Modbus connection not established or faulty.

❺a, ❻a, ❼a, ❽a: common alarm release.
❺b, ❻b, ❼b, ❽b: alarm priority.

NOTICE

The EEV is not configured neither in the basic setting nor in any loaddefault setting. If required it must be configured in this menu.

Config

The corresponding commands:

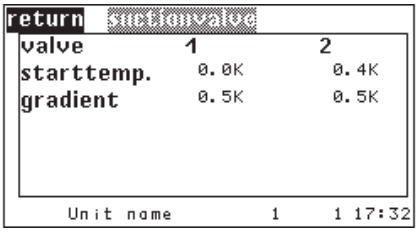
```
❶  eev 1 moptemp 23.3

❸  eev 1 preopen 60
❹  eev 1 pretime 15
❺a eev 1 commonalarmpress 0
❻a eev 1 commonalarmtemp 1
❼a eev 1 commonalarmmotor 1
❽a eev 1 commonalarmna 1

❺b eev 1 alarmpriopress 18
❻b eev 1 alarmpriotemp 17
❼b eev 1 alarmpriomotor 19
❽b eev 1 alarmpriona 10
```

Setting of the network address only by C7000 command:

```
eev 1 id 198
```

5.4.3 Refrigerant circuit, optional components

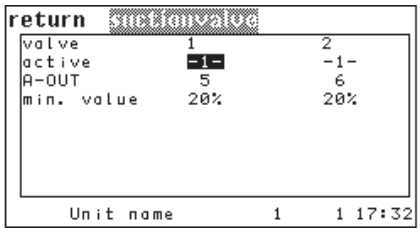
Operate **Components/Cooling/Valves**
Suction valve



The start temperature for the suction valve is entered as a positive difference to the room temperature setpoint. ❶
You can adjust a gradient, which determines the temperature range in which the valve opening increases from 0 to 100%.❷

If the A/C unit is equipped with two refrigerant circuits, both refrigerant circuits can be equipped with a suction valve.
Depending on how you choose the start point for the valve, the compressor starts with partial or full capacity.
If only one circuit is equipped with a suction valve in an A/C unit with two refrigerant circuits, the start values of the compressors and the suction valve must be set so that the compressor with suction valve starts first.

Config **Suction valve**



In the first line you add the suction valve to the configuration by entering "1". With "0" you disable the suction valve. ❶
With the parameter "A-OUT" you adjust the analog output of the proportional signal for the suction valve. ❷
In the third line you can set the minimum opening degree ❸. This setting serves to determine the lower limit for the refrigerant mass flow. Below this limit the possibility exists that an LP alarm will occur.
By setting the minimum opening degree the effective proportional range is reduced.

Example:
With a gradient of 1 K and a minimum opening degree of 20% the effective proportional range reaches 0,8 K.
With a gradient of 1 K and a minimum opening degree of 50% the effective proportional range reaches 0,5 K.

The corresponding commands:

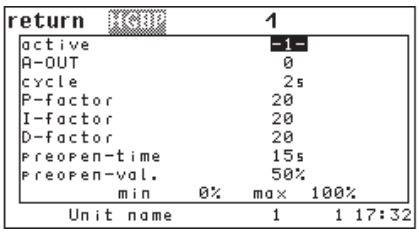
Operate

❶ `suctionv 1 start 0.2`
❷ `suctionv 1 grad 0.9`

Config

❶ `suctionv 1 conf 1`
❷ `suctionv 1 aout 3`
❸ `suctionv 1 min 20`

Config **Components/Cooling/Valves**
HGBP-valve



In the first line you add the HGBP-valve to the configuration by entering "1". With "0" you disable the valve. ❶
With the parameter "A-OUT" you adjust the analog output of the proportional signal for the HGBP-valve. ❷

The opening degree of the HGBP valve is controlled according to the air temperature. If the actual temperature is below the setpoint, the opening degree rises to the adjustable maximum opening degree. If the actual temperature is above the setpoint, the opening degree falls to the adjustable minimum opening degree.
A proportional factor ❹, an integral factor ❺ and a differential factor ❻ can be adjusted for the precise control. In the third line you can adjust the control cycle ❸.

The pre-runtime serves to softstart the compressor. When compressor operation is requested, the HGBP valve opens and the compressor start is delayed by the pre-runtime. ❼
The pre-opening is the valve opening degree to which the valve is opened during the pre-runtime. ❽
In the last line you can set a minimum and a maximum opening for the HGBP valve. The minimum opening ❾**a** limits the cooling capacity. The maximum opening ❾**b** avoids a 100% short circuit of the refrigerant flow in case of a fully opened HGBP valve. The compressor would operate in short circuit and trigger an HP alarm.
In case of a dehumidification request the HGBP valve is instantly closed in order to keep a 100% refrigerant mass flow available.
The maximum refrigerant mass flow is needed for the effect of passing under the dew point by partial cut-off of the evaporator (Mini-Space without EC fan) but also for fan speed reduction and dehumidification by the EEV (CyberAir 2/3).

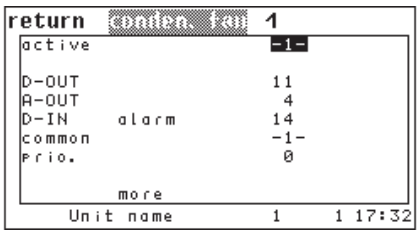
Note for MiniSpace units
A/C units of the MiniSpace series are equipped with a mechanically controlled HGBP valve (if this option has been selected).
For correct function the solenoid valve in the HGBP line must be configured, see description for menu Config/dehumidification.

The corresponding commands:

❶ `hgbp 1 conf 1`
❷ `hgbp 1 aout 4`
❸ `hgbp 1 concyc 3`
❹ `hgbp 1 pfact 5`
❺ `hgbp 1 ifact 5`
❻ `hgbp 1 dfact 5`
❼ `hgbp 1 pretime 10`
❽ `hgbp 1 preopen 40`
❾**a** `hgbp 1 min 20`
❾**b** `hgbp 1 max 80`

Components
Cooling/Conden. fan

Config/....

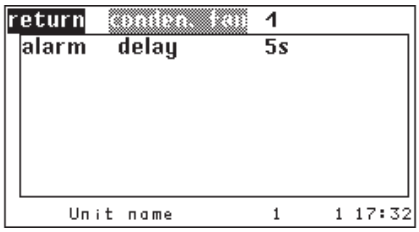


If condensers with proportionally controlled fans are used for the condensation of the refrigerant, these can be controlled by the C7000 using a PID control.

By setting the parameter "ACTIVE" on 1 in the first line you add a condenser fan to the configuration ❶.
By the digital output ❷, which you can set in the second line, the enabling signal for the condenser fan is output.
In the third line you can determine the analog output ❸.

Operate/....

As for any alarm the following parameters can be determined.



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

In the Operate menu:
❼ Alarm delay

The corresponding commands:

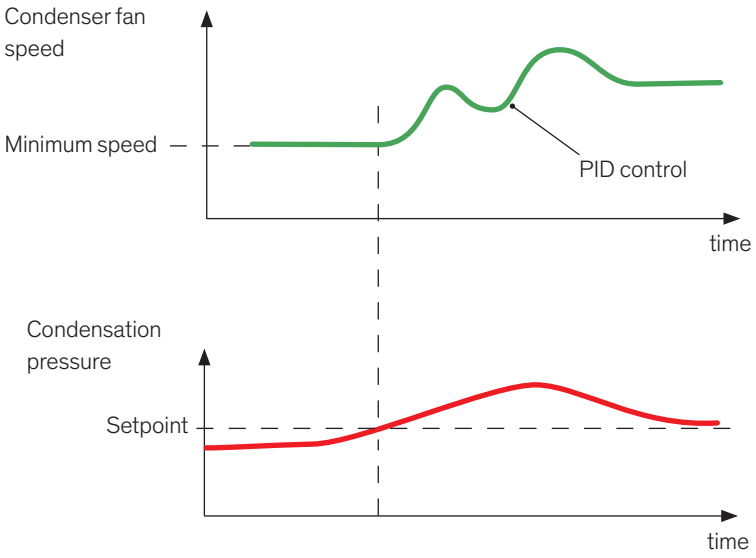
❶ `cond 1 conf 1`
❷ `cond 1 dout 8`
❸ `cond 1 aout 2`
❹ `cond 1 alarm 13`
❺ `cond 1 commonalarm 1`
❻ `cond 1 alarmprio 19`
❼ `cond 1 alarmdelay 5`

Config

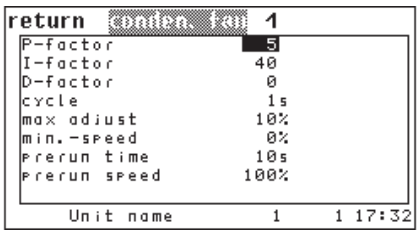
Components
Cooling/Conden. fan/more

The condenser fan speed is controlled by the condensation pressure.

You can set two setpoints for the condensation pressure in the menu "Operate/values/refrigerant". A setpoint for mixmode and another setpoint for DX mode = summer mode.



As long as the condensation pressure is lower than the setpoint, the condenser fan runs with minimum speed.
By reaching the setpoint the control accordimg to PID parameters begins.



In the second Config menu you can adjust the following parameters:

❶. Proportional factor
❷. Integral factor
❸. Differential factor

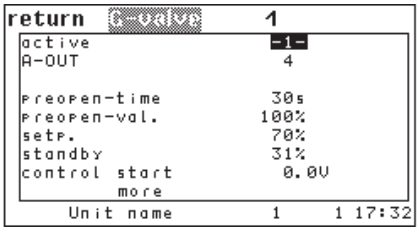
The control cycle ❹ in which the fan speed is calculated can be adjusted in seconds in the fourth line. The control swiftness is hereby determined.
To avoid a drastical change you can adjust a maximum control correction ❺ for each control cycle.
Corresponding to the recommendation of the fan manufacturer a minimum speed ❻ can be set in the sixth line.
The prerun time serves to avoid an accumulation of hot air at the condenser, after a longer period of inactivity. When compressor operation is requested the condenser fan starts and the compressor start is delayed by the pretime. ❼
The prerun speed is the speed by which the condenser fan runs during the prerun time. ❽

The corresponding commands:

❶ `cond 1 pid cp 40`
❷ `cond 1 pid ci 2`
❸ `cond 1 pid cd 0`
❹ `cond 1 concyc 1`
❺ `cond 1 maxc 10`
❻ `cond 1 min 10`
❼ `cond 1 pretime 10`
❽ `cond 1 prespeed 100`

5.4.4 Cooling water circuit, internal components

Config **Components/Cooling/Valves**
G-valve



In the first line you add the G-valve to the configuration by entering "1". With "0" you disable the G-valve. ❶
With the parameter "A-OUT" you adjust the analog output of the proportional signal for the G-valve. ❷

The pre-start serves to provide a sufficient flow for the heat absorbing medium and to pre-cool the heat absorbing medium. When compressor operation is requested, the G-valve opens and the compressor start is delayed by the pre-start time. ❸
The pre-open value is the G-valve opening degree which should be obtained during the pre-start time. ❹

The setpoint for the valve opening is entered in the fifth line. ❺ This setpoint is relevant for DFC control only. The DFC control is described in the manual "GE systems".

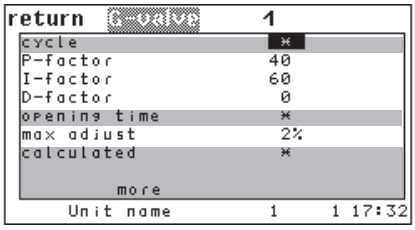
In the sixth line you can set a value for the valve opening ❻, which will be kept during the sequencing stop in order to maintain a constant cooling water flow. This measure avoids warming up the cooling water to ambient temperature.

In the seventh line you can set a start voltage ❼, which will be output on the analog output. This voltage at least must be applied at the actuator so that the actuator begins to move. It is the lower limit of the control voltage. This value must be determined from the technical data of the actuator. The valve is still closed when this voltage is applied. The maximum output voltage continues to be 10V and corresponds to an opening of 100%.

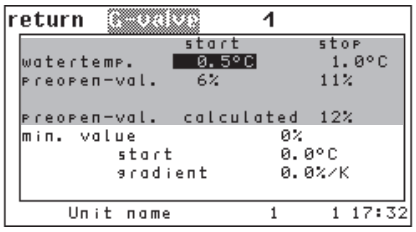
The corresponding commands:

❶ `gvalve 1 conf 1`
❷ `gvalve 1 aout 4`
❸ `gvalve 1 pretime 30`
❹ `gvalve 1 preopen 100`
❺ `gvalve 1 opensp 70`
❻ `gvalve 1 ows 31`
❼ `gvalve 1 bias 1.4`

Config **Components/Cooling/Valves**
G-valve/more

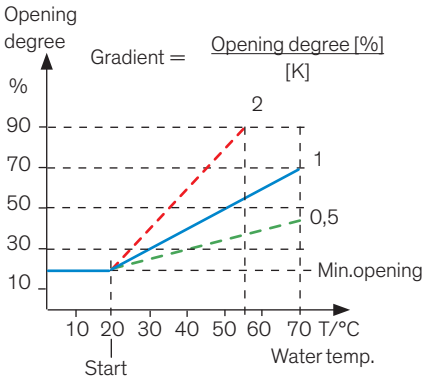


The setpoint for the G valve is the condensation pressure, which can be set in the menu "Operate/Values/Refrigerant".
In this menu you can adjust the proportional factor ❶, the integral factor ❷ and the differential factor ❸.
To avoid a drastical change you can adjust a maximum control correction ❹ per control cycle (fixed cycle 1 second). This control correction relates to the old actuating variable in each cycle.



In the fourth line you can enter a value for the minimal opening ❺ of the G-valve. The minimal opening is only respected when a compressor request exists and can be used to prevent a HP alarm.

The G valve minimum opening can be set so, that it changes in dependance on the cooling water temperature. The warmer the cooling water, the bigger gets the minimum opening.



This function is useful in the following case:
After the start of a compressor it may be that the adjusted condensation pressure setpoint is not attained at once so that the G valve closes to its minimum opening degree. If in this case the pressure increases rapidly, especially with warm cooling water, the G valve, due to its mechanical inertia, can not react fast enough to the rising pressure.
To avoid a high pressure alarm in such a case, the minimum degree of opening can be adapted to the water temperature.
To enable this function you must set a cooling water start temperature ❻ and a gradient ❼.

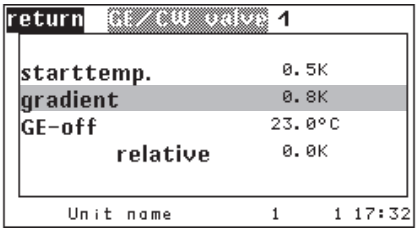
ICC
For speed controlled compressors this function should not be used, as the risk of rapid pressure variations is low with these compressors and secondly the compressor in case of warm cooling water may possibly not be kept inside the pressure envelope (zone 1a - 1c). A compressor error would be the consequence.

The corresponding commands:

❶ `gvalve 1 pid kp 50`
❷ `gvalve 1 pid ki 4`
❸ `gvalve 1 pid kd 2`
❹ `gvalve 1 maxc 2`
❺ `gvalve 1 min 20`
❻ `gvalve 1 minstart 20`
❼ `gvalve 1 mingradient 1`

Operate

Components/Cooling/Valves
GE/CW valve



*the GE/CW valve can also be used for heating, see config menu.

Up to 2 GE/CW valves can be configured in an A/C unit of the CW2 type. The parameters, which concern the function method of the GE/CW valve, are distinguished in parameters which are valid for a specific valve and parameters which are equally valid for both valves (GE/CW valve 1 and GE/CW valve 2). These can be found in the menu "CW-control".

The start temperature ❶ for the GE/CW valve is entered as a positive difference to the temperature setpoint and serves to enable cooling or heating*. If the actual temperature falls to or below the start temperature, the valve opening is controlled to zero.

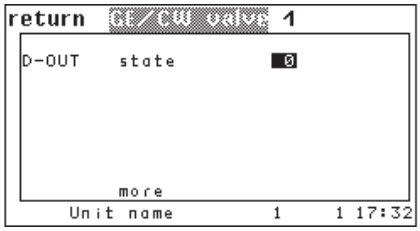
With the GE-off value ❷ you determine a water temperature which establishes the limit for GE-operation. If this value is exceeded, the GE-operation is switched off by closing the valve and stopping the glycol pump. In CW2 units this can also be water temperature 2.

The GE-off value can also be defined as a negative offset ❸ to the return air temperature in relation to the water inlet temperature 1.

If $T_{water} \geq T_{return\ air} - GE\text{-}off_{rel.}$ GE operation is disabled.

Config

Components/Cooling/Valves
GE/CW-valve

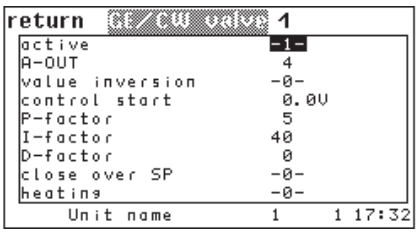


You can define a digital output ❹ in this menu on which the opening state of the GE valve is output. If the valve opening is bigger than zero, the relay of the digital output is active. This signal can be used to control an external chiller.

The corresponding commands:

❶ `gecwv 1 start 0.2`
❷ `gecwv 1 off 22`
❸ `gecwv 1 offrel 2`
❹ `gecwv 1 dout 2`

Config **Components/Cooling/Valves**
GE/CW-valve/more



In the first line you add the GE/CW-valve to the configuration by entering "1". With "0" you disable the GE/CW valve. ❶
With the parameter "A-OUT 1" you adjust the analog output of the proportional signal for the GE/CW-valve. ❷
You can also direct the output of the analog signal to a Uk24mod gateway, to control a component like e.g. a pressure independent control valve.
For this you need the command:

```
gecwv 1 uk24modmpvalve 1
```

You find a detailed description of the Uk24mod gateway in chapter 6.14.

In the third line you can adjust, how the valve will be controlled ❸.
Setting 0: Valve closed at 0V at the output, valve open at 10V at the output.
Setting 1: Valve closed at 10V at the output, valve open at 0V at the output.

In the fourth line you can set a start voltage ❹, which will be output on the analog output. This voltage at least must be applied at the actuator so that the actuator begins to move. It is the lower limit of the control voltage. This value must be determined from the technical data of the actuator. The valve is still closed when this voltage is applied. The maximum output voltage continues to be 10V and corresponds to an opening of 100% (0% with inverse control).

In the following lines you can set the proportional factor ❺, the integral factor ❻ and the differential factor ❼.

In the eighth line you can adjust, whether the valve shall close as soon as the water temperature exceeds the air temperature setpoint ❽.

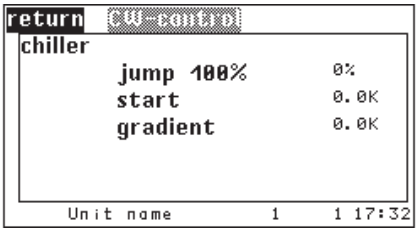
In the ninth line you can adjust, whether the valve shall be used for heating ❾. The control characteristics will be changed by this setting. When the air temperature falls the valve opens, a rising air temperature will close the valve gradually.

The corresponding commands:

```
❶ gecwv 1 conf 1
❷ gecwv 1 aout 3
❸ gecwv 1 inv 1
❹ gecwv 1 bias 1.4
❺ gecwv 1 pid kp 50
❻ gecwv 1 pid ki 4
❼ gecwv 1 pid kd 2
❽ gecwv 1 spclose 1
❾ gecwv 1 heating 1
```

Operate **Components/Cooling/Valves**
CW-control/more

Chillersaver Function



For units which are equipped with a GE/CW valve (unit versions GE, ACW, GCW, CW and CW2) it is possible to output an analog control signal 0-10V, which is used by a chiller to raise the water temperature setpoint, a measure which reduces the energy needed by the chiller.
At the consumer side, which means at the A/C unit that requires chilled water, the GE/CW valve is fully opened at an adjustable value, so that the heat rejection with a higher water temperature is assured by a higher water flow.
The chillersaver function is enabled by the assignment of an analog output to the chiller saver signal and by setting a start and stop value for the signal under the condition that the stop value is bigger than the start value.
Of course the chillersaver function must also be enabled at the chiller.

In the GE/CW valve Config menu you can adjust the analog output for the chillersaver signal. In the second line of the menu beside you can set the start value as a temperature difference to the GE/CW valve start value ❽ (temperature setpoint of A/C unit + start temperature). At this value 0V are output on the assigned output and the chiller sets its highest water temperature setpoint.

In the third line you can set the stop value ❾ as a temperature difference to the start value. At this value 10V are output on the assigned output and the chiller sets its lowest water temperature setpoint. Between the start and stop value the chillersaver signal rises linearly. The WT setpoint at the chiller is reduced respectively.

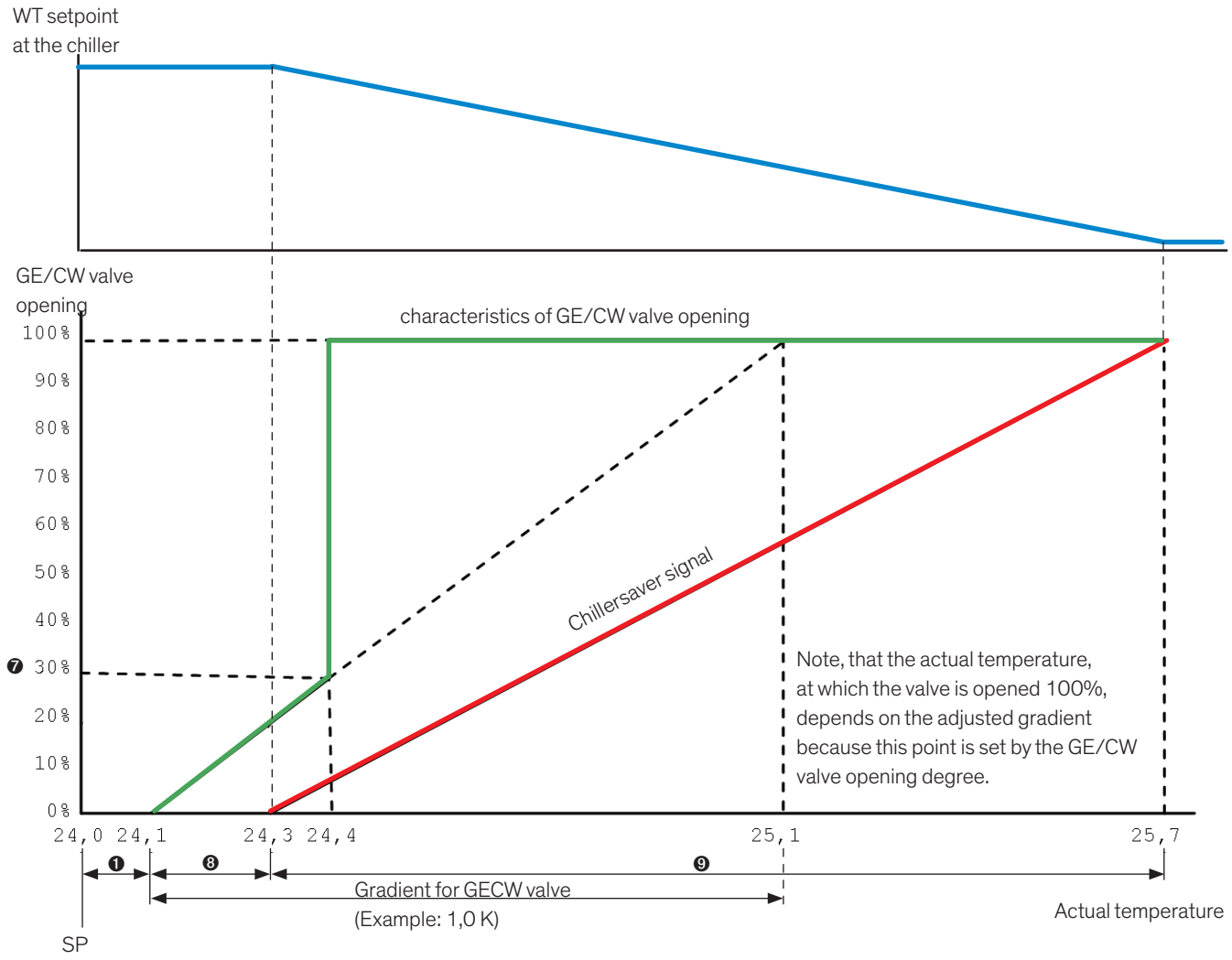
Adjusting an opening degree different from zero, at which the GE/CW valve is opened 100% is not necessary indeed for enabling the chillersaver function, however expedient. You can set this opening degree in the first line ❼.

When the A/C unit is in dehumidifying mode and the water temperature is appropriate for dehumidification, the GE/CW valve is opened 100% and the chillersaver signal is switched off. (0% = 0V = highest chiller WT setpoint).

The corresponding commands:

❼ `cw sav100 30`
❽ `cw savstart 0.2`
❾ `cw savend 1.4`

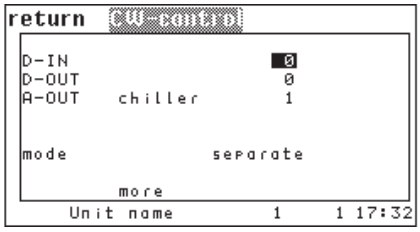
Chillersaver Function



For unit version CW2:

In additional operation the chillersaver signal is not available (0% = 0V = highest chiller WT setpoint).
In changeover operation the chillersaver signal is not available, when a changeover takes place (0% = 0V).

Config **Components/Cooling/Valves**
CW-control



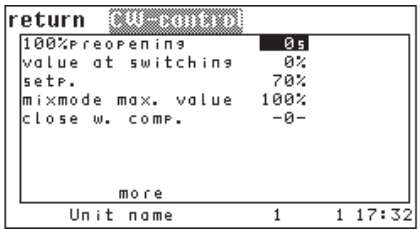
The digital input, which receives the signal for the commutation from valve 1 to valve 2, can be assigned in the first line. ❶
(relevant only for A/C units type CW2)

In the second line you can set the digital output ❷ at which the actual state of the changeover is output.
(relevant only for A/C units type CW2)

In the third line you can adjust the analog output ❸ for the chillersaver signal.

In the fourth line you can adjust the operating mode ❹ by which the valves of CW2 units are controlled. (See chapter 6.4.)

.../more



In the first line you can set a time delay ❶ which must pass until the control of the GE/CW valve begins and the water limit alarms are monitored. Until this time has elapsed, the valve is fully (100%) opened.

The parameter in the second line is only important for CW2 units.
Here you can set an opening degree ❷ for the CW valve of the first water circuit. This opening degree is kept by the valve while the cooling is produced by water circuit 2. By this, a minimum water flow is guaranteed in circuit 1, which is necessary to measure the water temperature. With a sufficiently low water temperature the cooling production can be switched back to circuit 1. Without a cooling request in circuit 1 the valve is completely closed.

Following parameters are only relevant for A/C units type GE:
In the third line you can adjust a setpoint ❸ for the opening degree of the GE valve. This parameter is relevant only for the DFC control. For this a separate manual exists.
By the parameter in the fourth line ❹ you can define a maximum opening degree for the GE valve. This value is only valid during mix mode and serves to limit the water volume flow through the GE valve, so that a sufficient waterflow runs through the G valve.
In the fifth line you can prevent mixed operation of free cooling and compressor cooling by setting the "Close at comp" value ❺ to "1".

The corresponding commands:

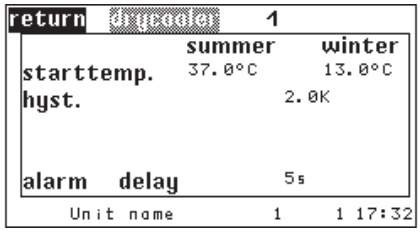
CW-control

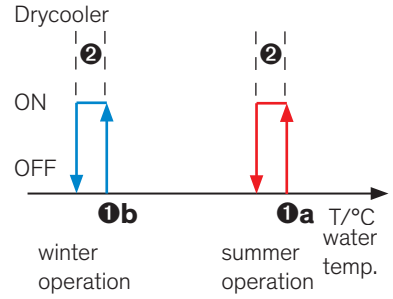
❶ `cw din 17`
❷ `cw dout 9`
❸ `cw savaout 5`
❹ `cw oper 0` → 0: separate, 1: added, 2: DFC, 3: DTC

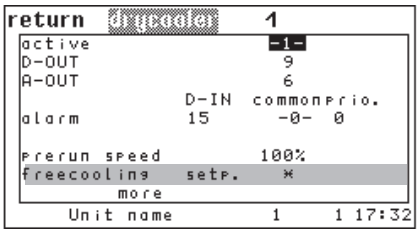
.../more

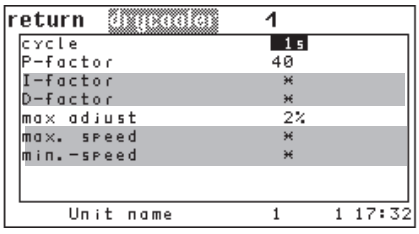
❶ `cw 100 30`
❷ `cw switchopen 10`
❸ `cw opensp 70`
❹ `cw maxmix 65`
❺ `cw compoff 1`

5.4.5 Cooling water circuit, external components









Operate

Components/Cooling
Drycooler

The start temperature for the drycooler is entered as an absolute value for the water temperature.
Two different start temperatures for summer ❶**a** and winter ❶**b** operation + hysteresis ❷ can be entered.
The summer/winter operation depends on the setting in the menu Config/ Values GE-mode.

Alarm parameters:
Drycooler alarm delay. ❸

Config

In the first line you add the drycooler to the configuration by entering "1". With "0" you disable the drycooler. ❶
With the parameter "D-OUT" you determine a digital output for the drycooler on/off signal. ❷
With the parameter "A-OUT" you determine an analog output for the proportional drycooler control. ❸

Alarm parameters:
digital input ❹**a**
common alarm release ❹**b**
alarm priority ❹**c**

The parameters:
- A-OUT ❸
- pre-speed ❺
- control cycle ❻
- P-factor ❼
- max. adjust ❽

are only necessary for the DFC control, which is explained in the manual GE systems.

Note:
For the dry cooler control, the configuration of an outside temperature sensor and a water temperature sensor is required.

The corresponding commands:

Operate

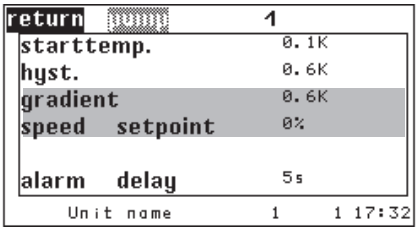
❶**a** `drycool 1 startsum 32.0`
❶**b** `drycool 1 startwin 15.0`
❷ `drycool 1 hys 3.0`
❸ `drycool 1 alarmdelay 3`

Config

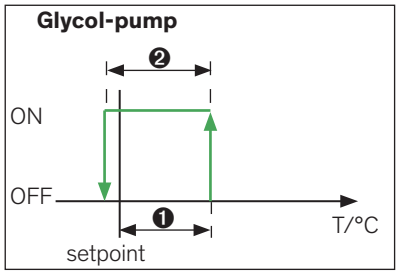
❶ `drycool 1 conf 1`
❷ `drycool 1 dout 10`
❸ `drycool 1 aout 4`
❹**a** `drycool 1 alarm 5`
❹**b** `drycool 1 commonalarm 1`
❹**c** `drycool 1 alarmprio 3`
❺ `drycool 1 prespeed 100`
❻ `drycool 1 concyc 10`
❼ `drycool 1 fact 3`
❽ `drycool 1 maxc 4`

Operate

Components/Cooling Pump



The start temperature ❶ for the pump is entered as a positive difference to the room temperature setpoint.
The corresponding hysteresis ❷ for the pump stop is only valid for pumps with on/off-control as the glycol pump. If the hysteresis is set zero, the pump is switched on when a water request exists. The value for the start temperatur will be ignored in this case.



G- or GCW unit
The pump is started and stopped depending on compressor operation.
With speed controlled compressors there may be an overruntime of compressors after the unit has been stopped.

GE unit
Pump operation depends on G- and GE valve. It starts if at least one valve is opened and stops when all valves are closed.

CW2 unit with DFC control
Pump operation depends on CW valve in the free cooling circuit (circuit 2).

CW unit (from version 6.78)
A pump which is configured in the C7000IOC is controlled depending on the CW valve, although the chilled water is usually provided by a chiller which has its own pumps.

The speed setpoint ❹ will only be used for the DFC control. For this a separate manual (GE systems) exists.

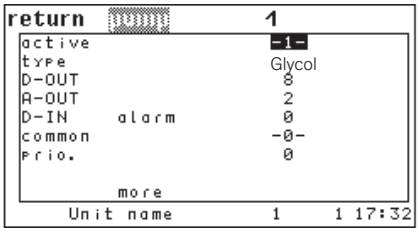
Alarm parameter:
Alarm delay ❺

The corresponding commands:

❶ `pump 1 start 0.1`
❷ `pump 1 hys 0.7`

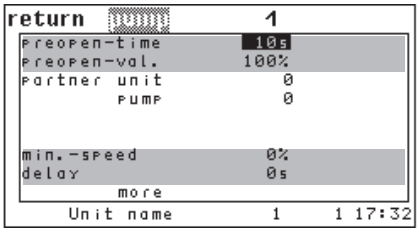
❺ `pump 1 alarmdelay 6`

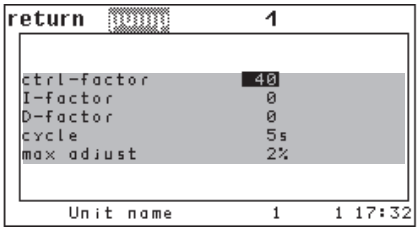
Config — Components/Cooling Pumps



By setting the parameter "ACTIVE" on 1 you add a pump to the configuration. With "0" you disable the pump. ❶
In the next line you determine which type the pump shall belong to (Glycol = Glycol-pump - all pumps for G-, GE units which are located outside the A/C unit). ❷
With the parameter "D-OUT" you determine a digital output for a glycol pump on/off signal. ❸ In case of a proportionally controlled pump the enabling signal is available at this output.
With the parameter "A-OUT" you adjust the analog output of the proportional signal for a glycol pump with DFC control. ❹

Alarm parameters:
Digital input ❺
Common alarm release ❻
Alarm priority ❼





2nd menu:
For the pumps you can enable a sequencing based on time and failure. With "partner pump" ④ you select the number of the other pump (0-4).
for example: `pump 1 partpump 2`
`pump 2 partpump 1`

Setting "0" disables the pump sequencing. Both pumps must be in the same unit. For this the same bus address must be entered for the parameter "Partner unit" ③. The sequencing is based on a runtime evaluation. In case of a runtime difference of more than 20 hours the pump with the shorter runtime is put into operation.

The corresponding commands:

1st menu

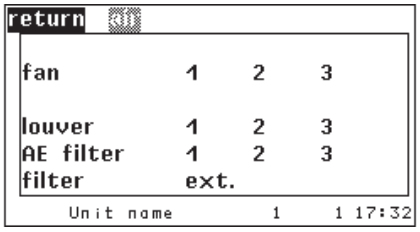
❶ `pump 1 conf 1`
❷ `pump 1 type 2`
❸ `pump 1 dout 3`
❹ `pump 1 aout 4`
❺ `pump 1 alarm 3`
❻ `pump 1 commonalarm 0`
❼ `pump 1 alarmprio 3`

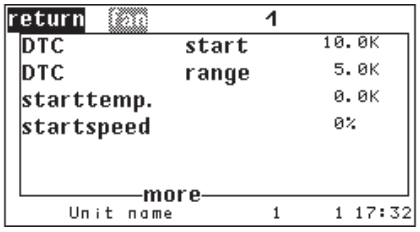
2nd menu

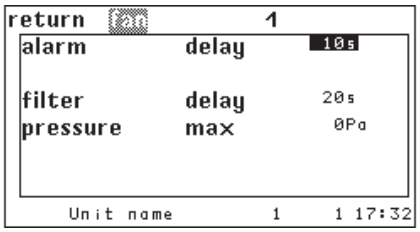
③ `pump 1 partunit 3`
④ `pump 1 partpump 1`

5.4.6 Air circuit, internal standard components

Operate **Components/Air Fan**







In the unit series CyberRow three fans can be individually controlled.

The parameters "DTC Start" and "DTC range" are described in the context of the differential temperature control in chapter 6.7.

Reduction according to the temperature

Enter the start temperature ❶ as a negative difference to the air temperature setpoint.

Determine the fan start speed by setting the parameter "startspeed" as a percentage of reduction ❷ from the maximum speed.

Example:

Startspeed = 70%

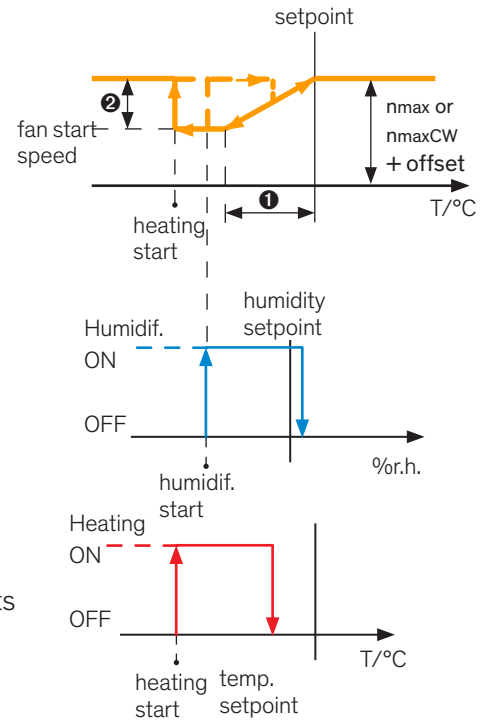
The fan start speed is calculated as follows:

$n_{start} = n_{max} - 70\% \cdot n_{max}$

$n_{start} = 30\% \cdot n_{max}$

The start fan speed is gradually obtained with a decreasing temperature from the room temperature setpoint to the adjusted temperature difference ❶ below the setpoint. However, when heating or humidification is requested, the airflow is increased to its original value.

Fan speed



Alarm parameters:

airflow alarm delay ❸

filter alarm delay ❹

Pressure drop control of an internal air filter

For an analog differential pressure sensor, which controls the pressure loss through the pre-filter you can set a maximum value ❺ which generates an alarm when it is exceeded.

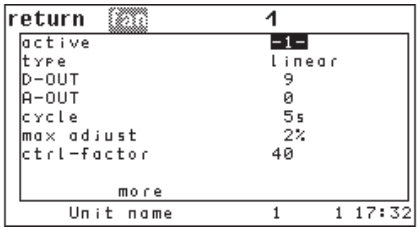
To assign the differential pressure sensor correctly you must configure the sensor with the purpose 24, 25 or 26.

The corresponding commands:

❶ `fan 1 start 3`
❷ `fan 1 speed 15`
❸ `fan 1 alarmdelay 6`
❹ `fan 1 filteralarmdelay 6`
❺ `fan 1 filterpress 70`

Config **Components/Air Fan/...**

.../general

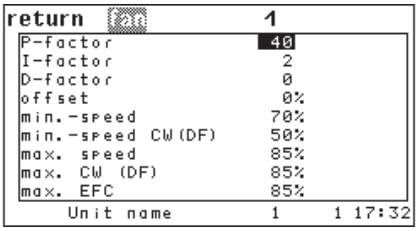


By setting the parameter "ACTIVE" on 1 you add a fan to the configuration. With "0" you disable the fan. ❶
In the next line you determine the fan type (2-point: fan with on/off control, Linear: EC-fan with proportional speed control). ❷
With the parameter "D-OUT" ❸ you determine a digital output for an on/off fan. In case of a proportionally controlled fan the enabling signal is available at this output.
With the parameter "A-OUT" you adjust the analog output of the proportional signal for a speed controlled fan. ❹

The parameters:
- control cycle ❺
- max. control correction ❻
- control factor ❼

are only necessary for the DFC control, which is explained in a separate manual and for the differential pressure control. With these parameters the characteristics of an integral control can be performed.

.../general/more



In the first lines of the following menu you can set the P-factor ❶, the I-factor ❷ and the D-factor ❸ for specifying the control characteristics. These three parameters are exclusively valid for differental temperature control (see chapter 6.7).
The offset is used to adapt the airflow to unexpected conditions on the site (lower/higher pressure loss).❹

The minimum speeds, which you can adjust in line 5 and 6, can only be bypassed by the adjustment in "REDUCE SPEED". The maximum speeds should be adjusted according to the required layout airflow.
The minimum speed ❺ in line 5 and the maximum speed ❼ in line 7 are valid for 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 are valid for CW operation in dual fluid units.

For dual fluid units the speed selection depends on the cooling priority. In case of a malfunction changeover the corresponding speed is taken. For a detailed description of the conditions for a malfunction changeover see page 53.
The parameter "max. EFC" ❾ is only necessary for the DFC control.

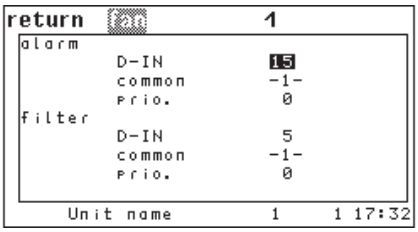
The corresponding commands:

❶ `fan 1 conf 1`
❷ `fan 1 type 1`
❸ `fan 1 dout 11`
❹ `fan 1 aout 11`
❺ `fan 1 concyc 8`
❻ `fan 1 maxc 2`
❼ `fan 1 fact 2`

Type 1: On/off control
Type 2: Proportional control

❶ `fan 1 pid kp 10`
❷ `fan 1 pid ki 4`
❸ `fan 1 pid kd 2`
❹ `fan 1 offset -5`
❺ `fan 1 min 60`
❻ `fan 1 nmincw 40`
❼ `fan 1 nmax 85`
❽ `fan 1 nmaxcw 90`
❾ `fan 1 nmaxefc 85`

Config **Components/Air Fan/Alarm**



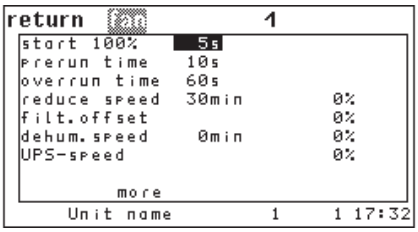
Alarm parameters:
Digital input airflow alarm ❶
Common alarm release ❷
Alarm priority ❸

Digital input filter alarm ❹
Common alarm release ❺
Alarm priority ❻

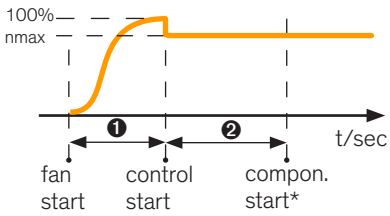
A special alarm treatment is applicated for units in which three fans are configured. In case of malfunction of a fan the speed of the two remaining fans is increased to 100%.
In case of malfunction of two fans the third fan is also switched off.

The corresponding commands:

❶ `fan 1 alarm 2`
❷ `fan 1 commonalarm 1`
❸ `fan 1 alarmprio 3`
❹ `fan 1 filteralarm 6`
❺ `fan 1 commonalarmfi 1`
❻ `fan 1 filteralarmprio 4`

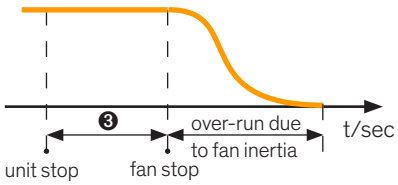


Fan start phase

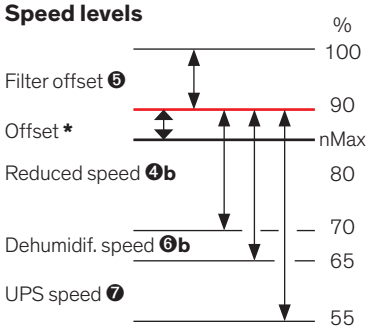


*start of all other control-relevant components except the glycol pump, which can be started earlier.

Fan stop phase



Speed levels



*this item refers to the previous page.

Config

Components/Air Fan/special

With the parameter "START 100%" ❶ you adjust a time which must elapse before the fan control begins. This way an airflow alarm is avoided which could occur due to the fan inertia. During this time the fan is operated with 100% speed.

By the "PRERUN" parameter ❷ you adjust the delay for the inhibited start of all components, except the glycol pump, in relation to the control start with alarm monitoring. By different pre-runtimes for different units it is avoided that the most current consuming components start simultaneously and overcharge the power supply of the building.

The fan over-run time ❸, which you can adjust, serves to reject hot or cold air in the A/C unit and avoids an accumulation of heat at the reheat or of cold at the evaporator.
The over-run time begins, after all compressors are shut down.

If during a time which you adjust with "REDUCE TIME" ❹**a** no action (cooling, heating, humidification, dehumidification) has been taken, the fan speed is reduced by the percentage which you adjust with "REDUCE SPEED" ❹**b**.

The "FILTER OFFSET" ❺ is entered as a positive difference to the maximum speed. If a filter alarm is released, the maximum speed will be increased by the filter offset in order to overcome the higher resistance of a clogged filter.

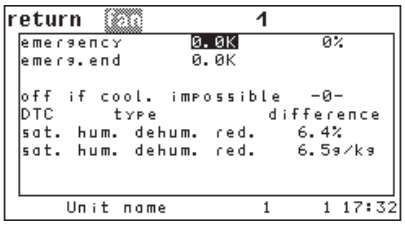
If during the time until the dehumidification reduction comes into effect ❻**a** a dehumidification request exists, the dehumidification is carried out by fan speed reduction. This time delay allows to control the humidity by a dehumidification by the expansion valve in the meantime. For units without electrical expansion valve this parameter should be set to "0".
The "DEHUM.SPEED" ❻**b** is entered as a negative difference in % to the maximum speed. This is the fan speed for the first way of dehumidification.

The "UPS SPEED" ❼ is also entered as a negative difference in % to the maximum speed. Receiving a UPS-signal the controller will apply this reduced speed for an emergency operation.

The corresponding commands:

❶ `fan 1 100 5`
❷ `fan 1 pre 15`
❸ `fan 1 after 20`
❹**a** `fan 1 redtime 30`
❹**b** `fan 1 redspeed 20`
❺ `fan 1 filteroffset 15`
❻**a** `fan 1 dehumtime 26`
❻**b** `fan 1 dehum 25`
❼ `fan 1 ups 35`

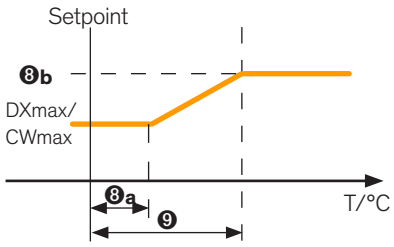
Config **Components/Air Fan/special/more**



If the A/C unit is operated during nominal operation with a low airflow, the fan speed can be raised, when the temperature setpoint is exceeded. The fan speed increase depends on the temperature difference to the setpoint.

For this you adjust a positive temperature difference ❽a to the setpoint, which represents the start point of the speed increase.
Then you adjust a maximum speed ❽b for the overload operation and another temperature difference ❾ to the setpoint, which marks the end of the proportional fan speed increase. Having attained the second temperature difference, the fan is operated with the maximum speed for the overload operation.This speed is kept even if the temperature continues to rise.

Fan speed



In the fourth line you can disable fan operation when cooling is not possible due to a compressor alarm or because the cooling water is too warm ❿ by setting a "1".
This setting is especially useful for CyberRow units because of the big temperature difference between cold aisle and warm aisle. Fan operation in case of a cooling malfunction would unnecessarily convey warm air into the cold aisle.

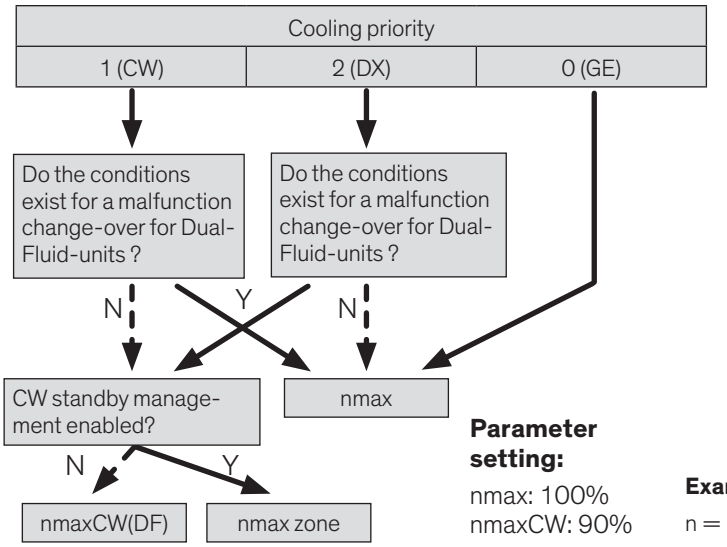
By the parameter "DTC Type" the differential temperature control mode can be set. For details see chapter 6.7.

The following two parameters serve to configure an operating mode which is only used for E-Shelter units. The value "0" disables this operating mode. These parameters concern the proportional dehumidification by changing the fan speed.

The corresponding commands:

❽a `fan 1 emerstart 0.7`
❽b `fan 1 emernmax 95`
❾ `fan 1 emerend 2.0`
❿ `fan 1 cestop 1`
⓫ `fan 1 dtctype 0`
`fan 1 dehumisat 6.4`
`fan 1 dehumisatsp 6.5`

Calculating the fan speed



The following processes are passed through by the controller for the fan speed calculation.
The fan speed nmax or possibly nmaxCW(DF) for dual fluid units is chosen according to the cooling priority and the conditions for a malfunction change-over.
After the check whether an emergency service is necessary, 4 queries are passed, which entail a speed reduction or increase.
Finally the algorithm checks whether the minimum speed is kept and whether the conditions for the REDUCE SPEED are kept, which can bypass the minimum speed as the sole reduction.

Parameter setting:	**Example 1:**	**Example 2:**
nmax: 100% nmaxCW: 90%	n = nmax	n = nmaxCW(DF)
	supposing: condition not ok n = nmax = 100%	supposing: condition not ok n = nmaxCW = 90%
Is $T_{air} \geq T_{set}$ + EMERSTART ? (overload service)		
Do the conditions for STARTSPEED exist? — 10%	supposing: condition ok n = 100% - 10% n = 90%	supposing: condition ok n = 90% - 10% n = 80%
Does a dehumidification request exist with the speed reduction DEHUMSPEED? — 20%	supposing: condition ok n = 90% - 20% * 90% n = 72%	supp.: condition not ok n = 80%
Does the unit run in UPS operation with the speed reduction USV-SPEED? — 30%	supposing: condition ok n = 72% - 30% n = 42%	supp.: condition not ok n = 80%
Has a filter alarm occurred and must the speed be increased by the filter offset ? — 10%	supposing: condition ok n = 42% + 10% n = 52%	supposing: condition ok n = 80% + 10% n = 90%
Is the minimum speed kept ? — 60%	condition not ok because n ≤ 60% so n = 60%	condition ok so n = 90%
Can a speed reduction REDUCE-SPEED be made due to the non-request of climatic functions within the REDUCE TIME ? — 50%	condition not ok because of dehumidific. n = 60%	supposing: condition ok n = 90% - 50% * 90% n = 45%

Legend: yes, no, next step

Dehumidification

There are four ways of realizing a dehumidification:

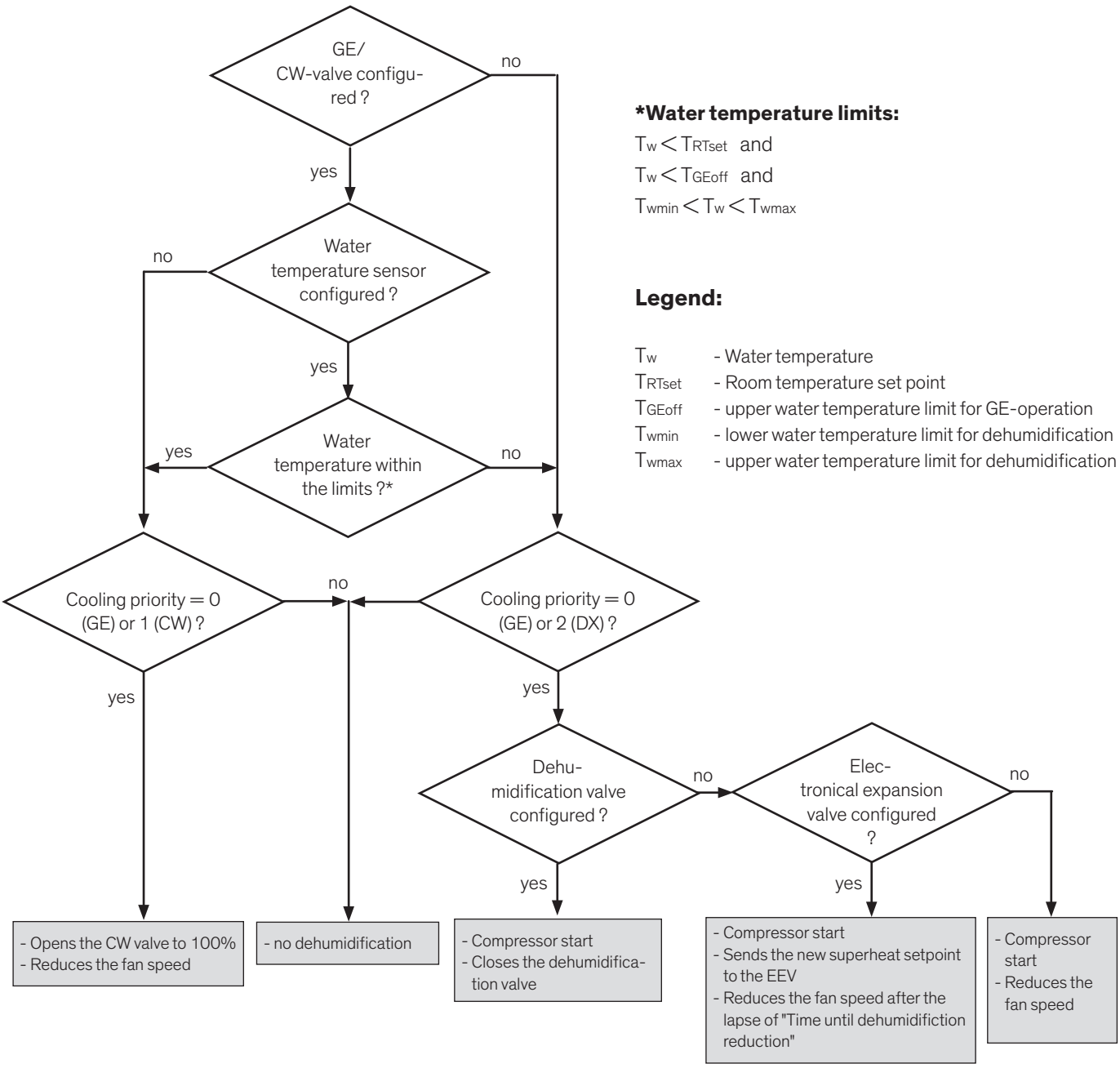
1. by reducing the fan speed and CW valve operation, this is the only way of dehumidification for CW-units.
2. by reducing the fan speed and compressor operation.
3. by the electronic expansion valve (only in CyberAir 2/3 units)
4. by shutting down a part of the evaporator via a solenoid valve. (not for CyberAir 2/3 units)

The choice of the dehumidification type is made by the controller according to the following conditions: The priority lies on reducing the fan speed. This is the case for ACW/GCW/GE-units in mixed operation. Only if the compressor is actually in operation and if a dehumidification valve is present, the 4th way of dehumidification is chosen. The two dehumidifying ways are never applicated simultaneously.

If no dehumidification valve is present as in units of the series CyberAir 2/3, dehumidification is carried out by the electronic expansion valve. If this is insufficient, the fan speed is reduced additionally after a time delay.

In A/C units with two refrigerant circuits only one compressor is used for the dehumidification.

The procedures of the controller are displayed in detail in the scheme below.



***Water temperature limits:**

$T_w < T_{RTset}$ and

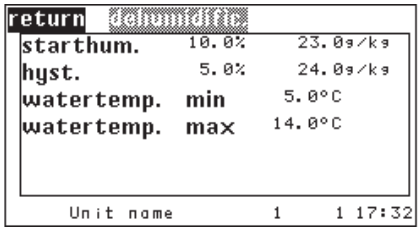
$T_w < T_{GEoff}$ and

$T_{wmin} < T_w < T_{wmax}$

Legend:

T_w	- Water temperature
T_{RTset}	- Room temperature set point
T_{GEoff}	- upper water temperature limit for GE-operation
T_{wmin}	- lower water temperature limit for dehumidification
T_{wmax}	- upper water temperature limit for dehumidification

Operate **Components/Humidity**
Dehumidification

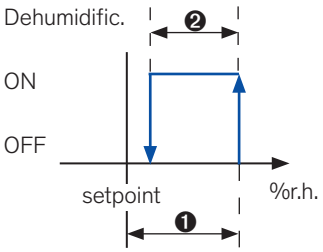


Enter the start humidity for dehumidification as a positive difference to the relative humidity setpoint ❶ or to the setpoint for specific humidity ❶**a**.
To lock the dehumidifying function, set the start humidity on 100%.
Enter the hysteresis for the dehumidification stop in the second line ❷ (for specific humidity ❷**a**).

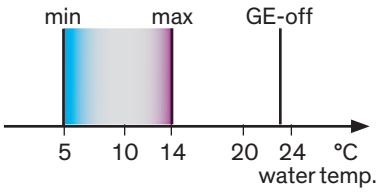
Adjusting the water temperature limits for the dehumidification refers to the possibility of dehumidifying the air by the free cooling coil through fan speed reduction. ❸❹
If the water temperature limits are exceeded, the controller commutes to dehumidification by compressor operation.
See detailed description precedent page.

Note:
The dehumidification fan speed is adjusted in the Air/Fan-menu.

On/Off-control



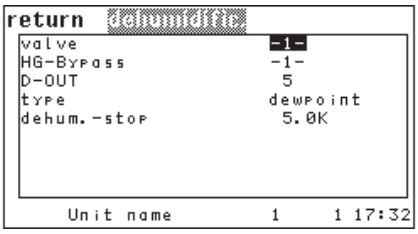
Dehumidification range



The corresponding commands:

❶ `dehumi start 7.0`
❶**a** `dehumi startsp 8.0`
❷ `dehumi hys 7.0`
❷**a** `dehumi hyssp 2.0`
❸ `dehumi min 4`
❹ `dehumi max 10`

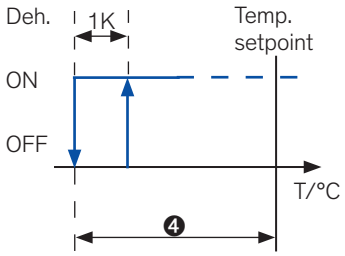
Config **Components/Humidity**
Dehumidification



The first three parameters are irrelevant for units of the CyberAir2/3 series. For these units the parameter "VALVE" must be set "0".
Other units (CyberAir 1, Compact DX, Mini-Space) can contain a dehumidification valve and a mechanically controlled HGBP valve incl. solenoid valve.

By setting the parameter "VALVE" on 1 you add a dehumidification valve to the configuration. With "0" you disable the dehumidification valve. ①
In the second line you can configure a hotgas bypass for the compressor by entering a "1". ②
When dehumidification with compressor operation is requested, the solenoid valve in the hotgas bypass line is closed, because the maximum refrigerant mass flow is needed for the effect of passing under the dew point.
This is also valid for dehumidification by compressor operation with fan speed reduction.
With the parameter "D-OUT" you determine a digital output for the dehumidification (solenoid valve for partial evaporator cut-off). ③

Dehumidif. -Stop



By the next parameter ④ you can set the humidity control: "relative", "dewpoint" or "specific". Dewpoint control is described in detail on the following page.
The following menu item is only relevant for dehumidification by relative humidity.
Here you can adjust a stop temperature ⑤, which is entered as a negative difference to the air temperature setpoint and avoids dehumidification when it is passed under.
By this, you avoid a feedback circle of dehumidification and cooling, where the sinking temperature produces an increased relative humidity which entails a new dehumidification request. With a fixed hysteresis of 1 Kelvin the dehumidification is switched on again, when the room temperature rises above the stop temperature.

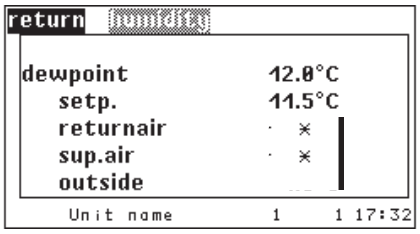
The corresponding commands:

```
① dehumi confvalve 1
② dehumi confbypass 1
③ dehumi dout 12
④ dehumi type 0
⑤ dehumi stop 2.0
```

Type 0: dehumidification by relative humidity
Type 1: dew point control
Type 2: dehumidification by specific humidity

Dewpoint control

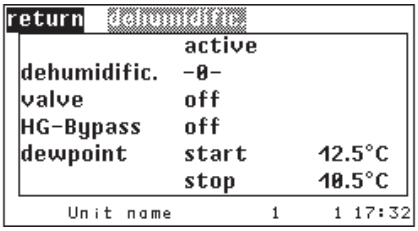
Info/Values/Humidity/more



The dewpoint control as the control according to specific humidity are especially suited for the supply air control.
A feedback of dehumidification and cooling (described under dehumidification according to relative humidity) is avoided here.

The actual dewpoint is calculated out of the actual temperature and humidity values.

Info/Components/Dehumidific.



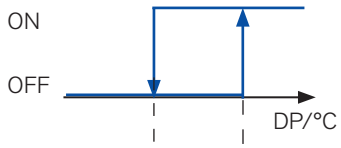
- Dehumidification

The dewpoint control calculates the start dewpoint out of the set temperature and the start humidity (for dehumidification) and the stop dewpoint out of the set temperature, the start humidity and the hysteresis.
If the actual dewpoint is bigger than the start dewpoint, dehumidification is switched on. If the actual dewpoint is smaller than the stop dewpoint, dehumidification is switched off.

For a dehumidification of the air with water as cooling medium, the water temperature must be smaller than the dewpoint of the actual values minus 1,0 K and bigger than the lower limit value for the water temperature.

Dewpoint control

Dehumidification



DP: dew point

If a dewpoint can not be calculated because a value which is necessary for the calculation (start humidity, actual temperature, actual humidity etc.) is lacking, the water temperature must be in the range within the min/max limit values to enable dehumidification.

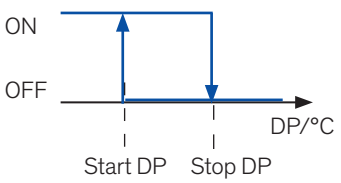
The start and stop dewpoints for dehumidification are displayed in the Info menu.
In another Info menu the dewpoints of the actual values and setpoints are displayed.

These values are also displayed if the dewpoint control is deactivated.

- Humidification

Dewpoint control

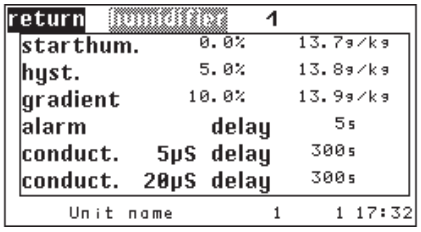
Humidification



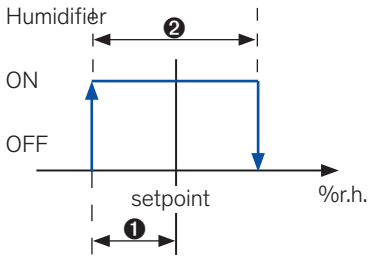
The dewpoint control calculates the start dewpoint out of the set temperature and the start humidity (for humidification) and the stop dewpoint out of the set temperature, the start humidity and the hysteresis.
If the actual dewpoint is smaller than the start dewpoint, humidification is switched on. If the actual dewpoint is bigger than the stop dewpoint, humidification is switched off.

5.4.7 Air circuit, internal optional components

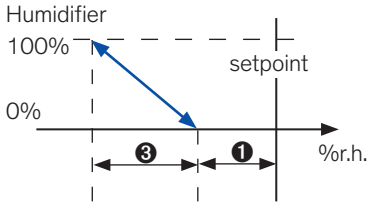
Operate **Components/Humidity Humidifier**



On/Off-control (type 1)



Proportional (type 2)



Depending on which humidifier type you have, different parameters are decisive.
Enter the start humidity for every humidifier as a negative difference to the relative room humidity setpoint ❶ or to the setpoint for specific humidity ❶**a**.
The hysteresis for the humidifier stop is only valid for humidifiers with on/off-control ❷ (for specific humidity ❷**a**).
For proportional humidifiers you can adjust a gradient, which determines the humidity range in which the humidifying capacity increases from 0 to 100%❸ (for specific humidity ❸**a**).

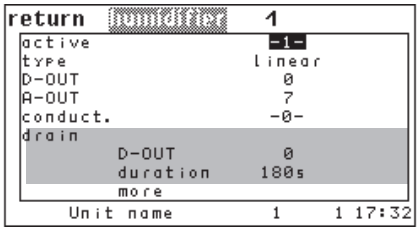
Alarm parameters:
Humidifier alarm delay ❹
Delay for the conductivity alarm at 5µS ❺ and at 20µS ❻

These alarms are available with the application of a conductivity measuring instrument, which is required to control the water conductivity for Ultrasonic humidifiers.

The corresponding commands:

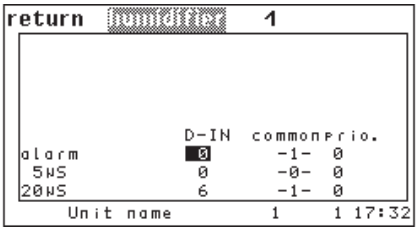
❶ `humi 1 start 7.3`
❶**a** `humi 2 startsp 1.5`
❷ `humi 1 hys 9.0`
❷**a** `humi 2 hyssp 0.5`
❸ `humi 1 grad 10.0`
❸**a** `humi 2 bandsp 2.0`
❹ `humi 1 alarmdelay 6`
❺ `humi 1 alarmdelay5 6`
❻ `humi 1 alarmdelay20 6`

Config — Components/Humidity Humidifier



By setting the parameter "ACTIVE" on 1 you add a humidifier to the configuration. With "0" you disable the humidifier. ❶
In the next line you determine the humidifier type (2-point: humidifier with on/off control, Linear: humidifier with proportional control). ❷
With the parameter "D-OUT" you determine a digital output for an on/off humidifier. ❸
With the parameter "A-OUT" you adjust the analog output of the proportional signal for a humidifier. ❹
In the fifth line you can configure a conductivity meter which is required to monitor the water conductivity when using Ultrasonic humidifiers. ❺

The following 2 parameters are only relevant for the drain valve of Ultrasonic humidifiers (CyberSonic).



Alarm parameters humidifier alarm in the sixth line:

digital input ❻**a**
common alarm release ❻**b**
alarm priority ❻**c**.

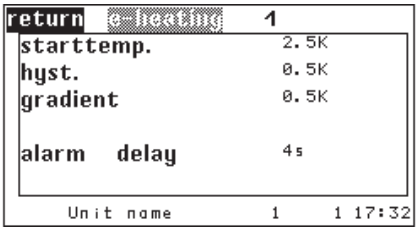
In the seventh line these parameters can be adjusted for the conductivity alarm at 5µS ❼**a-c** and in the last line for the conductivity alarm at 20µS ❽**a-c**.

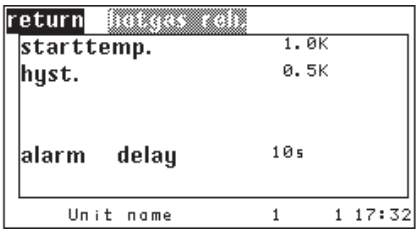
These alarms are available with the application of a conductivity meter.

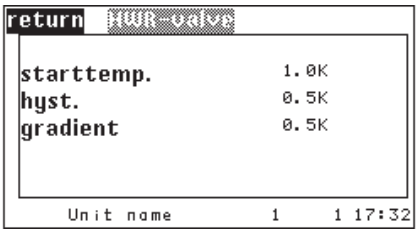
The corresponding commands:

❶ `humi 1 conf 0`
❷ `humi 1 type 2`
❸ `humi 1 dout 11`
❹ `humi 1 aout 4`
❺ `humi 1 confcon 1`
❻**a** `humi 1 alarm 7`
❻**b** `humi 1 commonalarm 1`
❻**c** `humi 1 alarmprio 5`
❼**a** `humi 1 alarm5 7`
❼**b** `humi 1 commonalarm5 1`
❼**c** `humi 1 alarmprio5 5`
❽**a** `humi 1 alarm20 7`
❽**b** `humi 1 commonalarm20 1`
❽**c** `humi 1 alarmprio20 5`

Operate — Components/Heating
E-heating/Hotgas reheat/Hot water reheat



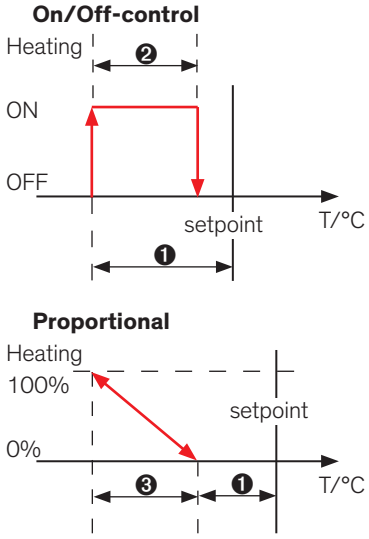


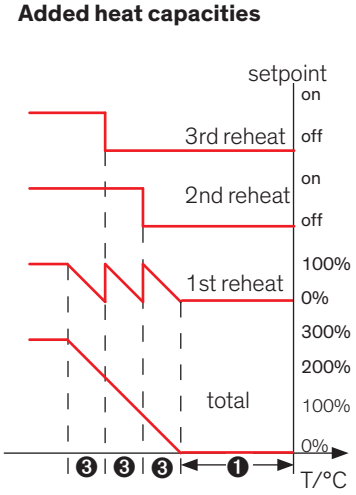


Depending on which type of reheat you have configured, different parameters are decisive.
The start temperature for every heating is entered as a negative difference to the room temperature setpoint. ❶ The hysteresis for the heating stop is only valid for heatings with on/off-control.❷
For proportional e-heatings/hot water reheats you can adjust a gradient, which determines the temperature range in which the heating capacity increases from 0 to 100%.❸

Alarm parameter:
e-heating alarm delay ❹

Only the first heating can be proportional. If this is the case and if there are several heatings (up to 3), only the start value and the gradient of the first heating are decisive for the control. Each time the proportional heating reaches 100% heating capacity another reheat is added and the first heating is reset to 0%. This way up to three individual heatings act as one proportional heating.





The e-heating(s) are cut off if at least one fan runs below the minimum speed or is switched off.

The corresponding commands:

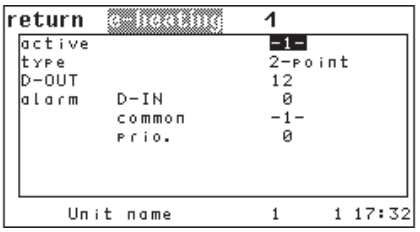
❶ `eheat 1 start 0.2`
❷ `eheat 1 hys 0.7`
❸ `eheat 1 grad 0.9`
❹ `eheat 1 alarmdelay 3`

❶ `gasheat start 1.3`
❷ `gasheat hys 0.6`
❸ `gasheat alarmdelay 5`

❶ `pwwheat start 1.3`
❷ `pwwheat hys 0.6`
❸ `pwwheat grad 0.5`

Config

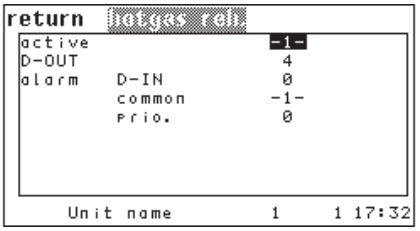
Components/Heating
E-heating



By setting the parameter "ACTIVE" on 1 you add a reheat to the configuration. With "0" you disable the electric reheat. ❶
In the next line you determine the reheat type (2-point: reheat with on/off control, Linear: reheat with proportional control). ❷
With the parameter "D-OUT" you determine a digital output ❸ for the electric reheat. The proportional electric reheat is controlled by pulse width modulation and the reheat receives the control signal by a fixed PWM output. A digital output has not to be set for the proportional electric reheat.

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

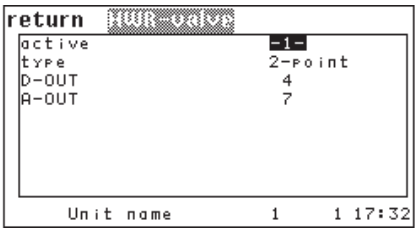
Hotgas reheat



By setting the parameter "ACTIVE" on 1 you add a reheat to the configuration. With "0" you disable the hotgas reheat. ❶
With the parameter "D-OUT" you determine a digital output for the hotgas reheat. ❷

Alarm parameters (only for OTE operation):
Digital input ❸
Common alarm release ❹
Alarm priority ❺

Hot water reheat



By setting the parameter "ACTIVE" on 1 you add a hot water valve to the configuration. With "0" you disable the valve. ❶
In the next line you determine the valve type (2-point: solenoid valve with on/off control, Linear: 3-way valve with proportional control). ❷
With the parameter "D-OUT" you determine a digital output for the solenoid valve. ❸
With the parameter "A-OUT" you adjust the analog output of the proportional signal for the valve of a hot water reheat. ❹

The corresponding commands:

E-heating

❶ `eheat 1 conf 1`
❷ `eheat 1 type 1`
❸ `eheat 1 dout 3`
❹ `eheat 1 alarm 7`
❺ `eheat 1 commonalarm 1`
❻ `eheat 1 alarmprio 3`

Hotgas reheat

❶ `gasheat 1 conf 1`
❷ `gasheat 1 dout 10`
❸ `gasheat 1 alarm 7`
❹ `gasheat 1 commonalarm 1`
❺ `gasheat 1 alarmprio 3`

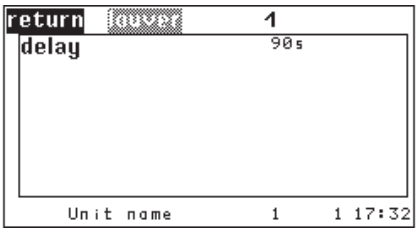
Hot water reheat

❶ `pwwheat 1 conf 1`
❷ `pwwheat 1 type 1`
❸ `pwwheat 1 dout 5`
❹ `pwwheat 1 aout 8`

Type 1: On/off control
Type 2: Proportional control

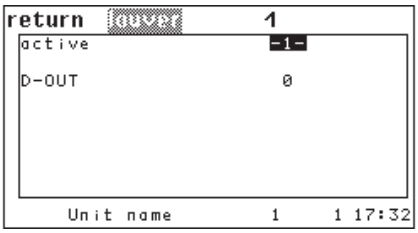
5.4.8 Air circuit, external optional components

Operate — **Components/Air Louver**



If a louver is configured, this one is opened after the A/C unit control has been switched on by the start/stop key.
The adjustable pre-start serves to open the louver before the fan operation starts. This way a fan operation against a closed louver is avoided. ❺
When the A/C unit control is switched off, the louver will be closed after the overruntime of the fan has elapsed.

Config — **Components/Air Louver**



By setting the parameter "ACTIVE" on 1 you add a louver to the configuration. With "0" you disable the louver. ❶
With the parameter "D-OUT" you determine a digital output for the louver. ❷

The corresponding commands:

Operate

❺ `louver 1 pretime 100`

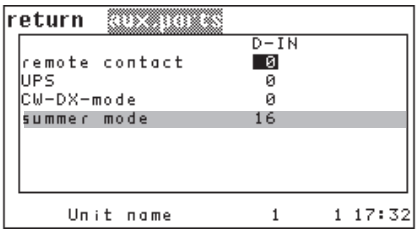
Config

❶ `louver 1 conf 1`
❷ `louver 1 dout 11`

5.4.9 Auxiliary Ports

Config **Components**
Aux. Ports/...

.../D-IN

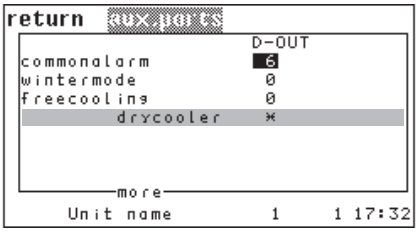


This window serves to assign external signals to digital inputs.

Following you can adjust the digital inputs for the remote contact ❶, for the ups operation ❷ and for the external cooling priority ❸.

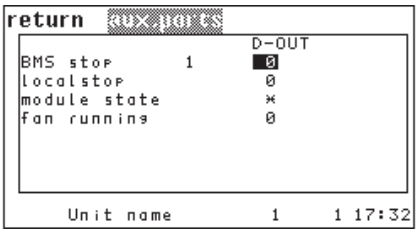
Summer operation setting is only relevant for DFC² control.

.../D-OUT



This window serves to adjust digital outputs for non-component-related alarms or messages.
In detail you can adjust the digital output for the common alarm ❶ and for the wintermode (= enabled FC) ❷. The wintermode signal can be forwarded to a BMS system.

.../D-OUT/more



The state of the free cooling mode ❸ (free cooling exists also in mixmode) of free cooling with drycooler ❹ (with chiller software only), of the BMS stop 1 (control has been switched of by BMS) ❺ and of the local stop ❻ (Control switched off by start/stop key) can be output on a digital output.

For the parameter "module state" you can adjust the digital output ❼, by which the start/stop state of the unit is output. In the last line you can adjust the digital output ❽, by which the start/stop state of the fan is output.

The corresponding commands:

.../D-OUT

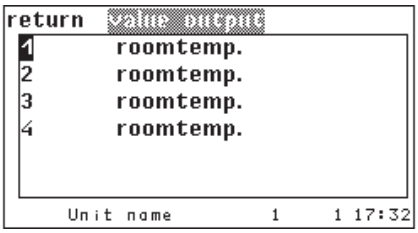
❶ `calarm dout 7`
❷ `winter dout 17`
❸ `fcm dout 4`
❹ -
❺ `bmsstop 1 dout 5`
❻ `localstop dout 8`
❼ `onoff dout 1`
❽ `econ dout 3`

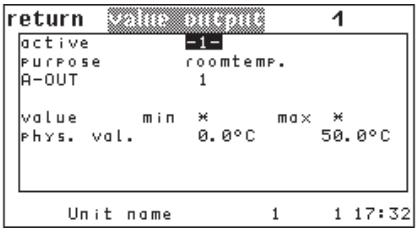
.../D-IN

❶ `remote din 11`
❷ `ups din 13`
❸ `cwoff din 16`

Config

Components
Aux. Ports/A-OUT





In this window you can output analog values on analog outputs so that they can be used by a BMS.
Select one of the 4 value outputs which are adjusted with the sensor purpose "Room temp." as standard.

Then a window will appear, in which you can adjust parameters for the value output. In the first line you can activate the value output. You can do the settings in line 2 to 4 in advance and save them, without having the value output be come into effect. Only if you set the parameter in the first line to "1", the value output begins. When several sensors with the same purpose exist, the average value is calculated.

In line 2 you determine the actual value which will be output. The sensor is selected by the purpose ❶ (as listed for the sensors). If you select a purpose for which no sensor exists, the output value is 0V. In the third line you set the analog output ❷.

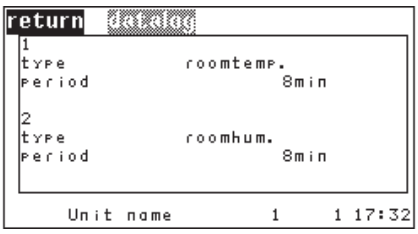
The parameters in line 5 serve to calibrate the output. If you have selected a sensor with the purpose "water temperature, inlet 2" and set the value 5.0 for the "min" parameter ❸**a** in line 5, you define the lower limit by this. At 5,0°C a voltage of 0V will be output. At 4,0°C also 0V will be output. By the "max" parameter ❸**b** you define the upper limit, at which 10V will be output.

The corresponding commands:

❶ `valout 1 use 2`
❷ `valout 1 aout 6`
❸**a** `valout 1 min 5.0`
❸**b** `valout 1 max 35.3`

5.5 Statistics

Config **Statistics**
Data logger



TYPE (for C7000 command) :

1 - unit room temperature
2 - unit room humidity
3 - unit supply temperature
4 - unit supply humidity
5 - water temperature, inlet 1
6 - outside temperature
7 - outside humidity
8 - condensation pressure 1
9 - hotgas temp. 1
10 - evaporation pressure 1
11 - suction gas temp. 1
12 - zone room temperature
13 - zone room humidity
14 - zone supply temperature
15 - zone supply humidity
16 - zone outside temperature
17 - water temperature, inlet 2
18 - water temperature, outlet 1
19 - water temperature, outlet 2

Here you can adjust the basic conditions for the data logger.
To this belongs sensor type ❶ and cycle ❷, the interval in which measure values of the corresponding sensor are stored.
Each data logger can store 1440 datapoints maximum. The 1441st datapoint deletes the first datapoint etc.. If you adjust a cycle of 1 minute you obtain a graphic for a lapse of time of 1440 minutes which corresponds exactly to 24 hours. With a cycle of 2 minutes, datapoints for a lapse of 2 days are stored etc..
Regarding the fact that the graphic represents a width of 180 pixels, we recommend to choose the cycle depending on the lapse of time (Info menu) to be represented.

Lapse (Info menu)	Cycle
- Hour	1 Min.
- Day	8 Min.
- Week	60 Min.
- Month	240 Min.
- Year	2880 Min.

NOTICE

At the modification of a parameter (type or cycle) or when the controller is de-energized all data of the corresponding data logger is deleted.

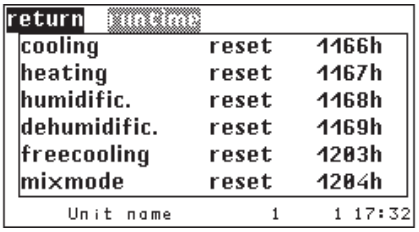
The corresponding commands:

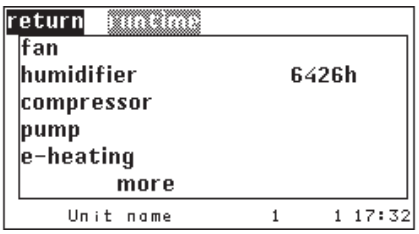
❶ `log 1 cycle 15`
❷ `log 1 type 2`

The first numeral designates the number of the data logger (1 or 2).
The second numeral stands for:
- the cycle in minutes
- the measure values listed left top.

Config

Statistics
Runtime



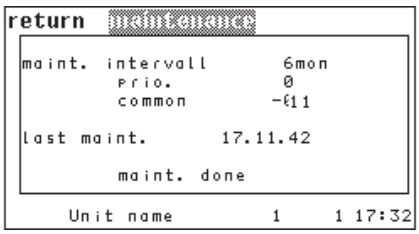


This summary of runtimes exists only for the C7000AT. Being an exact copy of the homonymous branch in the Info menu, the Config runtime menus provide the possibility to reset the runtimes.

In contrast to the C7000IOC, you can reset the runtimes of the global unit functions in the C7000AT.

Handling:
1. select function (cooling, heating, etc.) by the selector key.
2. confirm by the OK key.
3. the cursor is now in the middle column on a case which indicates "return". By the selector key you can choose between the options "reset" and "return".
4. confim selected function by the OK-key.

Statistics
Maintenance



This functionality helps you to maintain the A/C unit in a good condition by monitoring the service intervals.
In case the service interval is expired the symbol is displayed in the standard window.
In the first line you enter the service interval you consider as suitable. Possible values are 0-24 months, with 0 months you avoid the monitoring ❶.
In the second line you can assign the maintenance alarm to an alarm relay ❷.
If a maintenance alarms occurs, it is displayed when the internal IOC clock displays 8:00 AM.
In the third line you can set, whether the maintenance alarm shall trigger a common alarm ❸ (1-yes, 0-no).
If you are on the field "MAINT. DONE" and you press the OK-key, you confirm the executed maintenance ❺. The controller then sets the actual date in the fourth line and saves it.

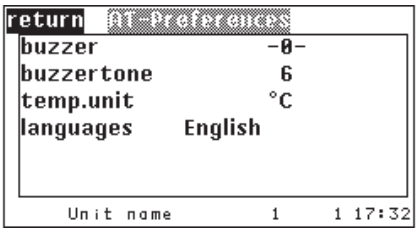
The corresponding commands:

❶ `comp 1 runtime 4100`
❷ `fan 1 runtime 0`
❸ `eheat 1 runtime 0`
❹ `pump 1 runtime 0`
❺ `humi 1 runtime 0`
❻ `drycool 1 runtime 0`

At the command level it is possible to set the runtime manually.
When you change the controller you can continue the runtimes this way and set the past runtimes in the new controller.
In order to reset a runtime set runtime to "0".

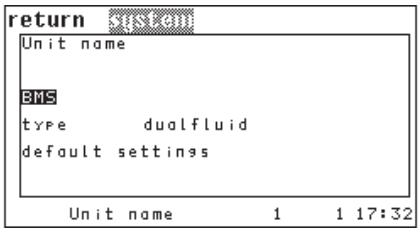
❶ `service int 4`
❷ `service alarmprio 4`
❸ `service commonalarm 1`

❺ `service 1` ← By "1" you confirm the executed maintenance.



Operate System

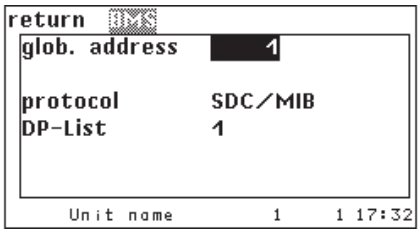
Explanation of menu items see page 12.



Config System/...

In the first menu line you can enter a unit name ❺ with up to 16 characters. A system name with up to 16 characters can only be entered by a command ❻. A unit or system name may not contain blanks.
In the third line the unit type which you can set in the submenu "Default setting" is displayed. Several pre-configurations for several unit types are stored in the I/O controller.

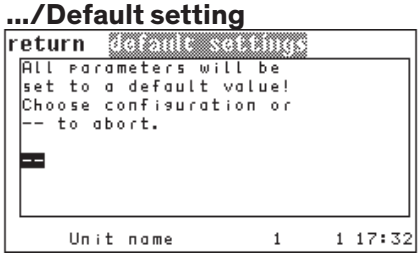
.../BMS



In this menu in the first line you can set the global address ❶ of the A/C unit. This address serves to identify the unit within a BMS.
In the second line you can adjust the protocol ❷ for the communication with a BMS.
In the third line you can select the data point list ❸ in case the protocol "Modbus" is adjusted.
By the following command, you can enter a time in seconds, that indicates, how long sensor values supplied by a BMS are valid for the control. After the time has elapsed without a write command by the BMS, the BMS sensor values get invalid.

```
bms time 240
```

.../Default setting



The default setting is 0s and means that the BMS sensor values remain valid without a time limit.

By selecting a pre-configuration ❹ the settings which are specified for the unit type come into effect. These settings are shown in the table in chapter 11.1.

The corresponding commands:

❶ `globaddr 233`
❷ `protocol 1`
❸ `dplist 1`
❹ `loaddefault`

0: none
1: SDC/MIB (WIB8000)
2: Modbus

0: none
1: Classic
2: Full
3: Custom

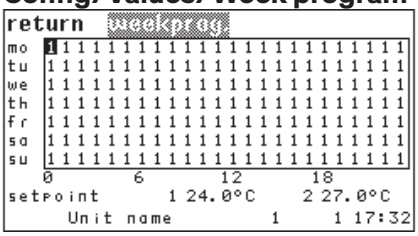
The configuration for customer specific data point lists can contain 256 entries.

❺ `unitname text xxxxxx`
❻ `systemname text xxxxxx`

6. Special operation modes

6.1 Week program

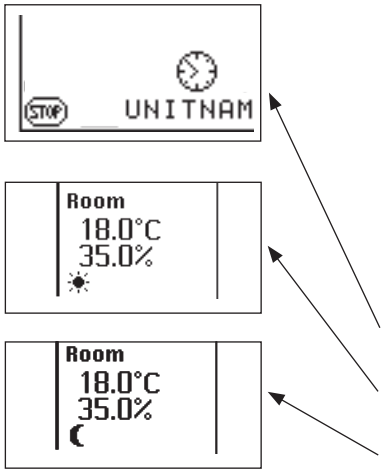
Menu:
Config/Values/Week program



The week timer is based upon two different temperature setpoints which you have already adjusted in the menu "Operate/Values/Air/Temperature". Setpoint 1 is represented by a "1", setpoint 2 by a "2".

The setting is user-friendly. Each digit represents an hour of the day. The week-days are displayed in lines. With the selector key you can jump between the hours of the day. At the end of a line the cursor jumps to the beginning of the next line.

Display in the main menu when the timer program is executed:



With the OK key you modify the value of the digit where the cursor is placed. Three values are possible: 0, 1 and 2. By pressing the OK key these values appear in rising order and will then begin at "0" again.

By pressing the key combination selector key + OK key the value, on which the cursor is placed, will be copied to the next digit (corresponding to the selected direction of the selector key). This way you can easily adjust several hours or days.

For each hour of each day of the week you choose among three settings:

	Display:
1. A/C unit off	0
2. A/C unit on with setpoint 1	1
3. A/C unit on with setpoint 2	2

The corresponding commands:

`wprg mo 12 0` — sets the timer stop mode for monday from 12:00 to 12:59

Day:
mo = monday
tu = tuesday
we = wednesday
th = thursday
fr = friday
sa = saturday
su = sunday

Hour:
0 = from 0:00 to 0:59
1 = from 1:00 to 1:59
2 = etc.

Status:
0 = A/C unit off (timer stop)
1 = A/C unit on with setpoint 1
2 = A/C unit on with setpoint 2

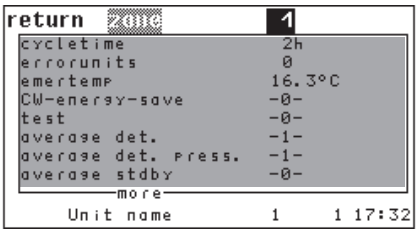
6.2 Zone control

The zone concept is based on the idea to obtain homogeneous room conditioned within a determined space by distributed generation of conditionned air.
Within an IO bus up to 20 zones can be defined. A zone is defined if at least one unit is assigned to this zone. The assignment of a unit to a zone is done by setting a zone number in the main line of menu Z1. This assignment must be done individually for each unit (each IOC).

Although the set values can be individually adjusted for each unit, they should If at all, only slightly vary.

Setting the zone number 1-20

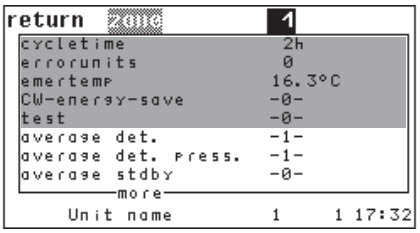
Config/Zone (Z1)



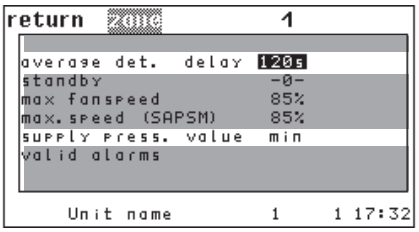
Average value determination

A basic principle of the zone control is the calculation of average values of the measured values. Within a zone only one room temperature exists which is calculated as the average value of all connected room temperature sensors.
The same applies for the room humidity, supply temperature, supply humidity, outside air temperature, water inlet temperature 1 and differential pressure, if existant.
The determination of average values for all above mentioned parameters except the differential air pressure can be disabled by the parameter in the sixth line of menu Z1 (0 = off, 1 = on). The determination of average values for the room air pressure of the differential pressure control can be en-/disabled in the seventh line.
By the parameter in the eighth line of the same menu you can set whether standby units shall take part in the calculation of average values. (0 = no, 1 = yes).
A/C units which have been locally switched off (e.g. by the start/stop key at the C7000AT) take part in the calculation of average values.

Config/Zone (Z1)



Config/Zone/more/more (Z2a)



If the following conditions exist:
- the zone encloses only a few units
- a standby unit, which has long been out of service, is additionally switched on.
- the determination of average values for temp./humidity is acitvated.
- the A/C units are equipped with free cooling functionality.
- free cooling is enabled.

it can occur, that the calculated average value increases so much by the accumulation of heat in the standby unit (the water in the standby unit cooling water lines takes on the room temperature), that free cooling is disabled (GEoff parameter), although the system water temperature is actually appropriate for it. To avoid this problem, you can set a delay time for the evaluation of the average value, in which the heat accumulation in the standby unit can dissipate.

Selection of the supply air pressure value

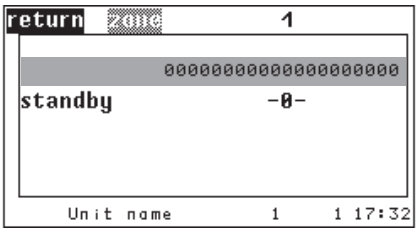
In the fifth line of menu Z2a you can select the supply air pressure value, which serve as measure value for the comparison with the set value.
The following values can be set:

1. unit - each A/C unit calculates a fan speed change according to its own measuring value. Nevertheless, a speed equalization within the zone is carried out. Because of the speed equalization within the zone, this setting ist not useful.
2. average - an average value is calculated of the measured supply air pressure values of all units. The fan speed of all units is controlled according to the comparison between average value and setpoint.
3. min - the fan speed of all units is increased or reduced, until the smallest measured supply air pressure in the zone has reached the setpoint.
4. max - the fan speed of all units is increased or reduced, until the biggest measured supply air pressure in the zone has reached the setpoint.

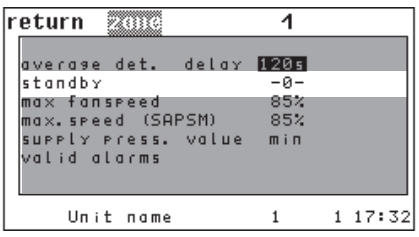
Standby units

In the menus Z0 or Z2a you can put the unit in standby by setting the parameter in the third line "1".
The existence of standby units in a zone increase the air conditioning operating security and provides the possibility to replace defective units by standby units.

Operate/Zone (Z0)



Config/Zone/more/more (Z2a)



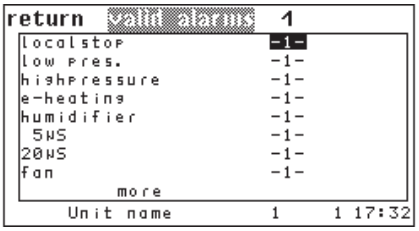
Alarm changeover

In order to changeover units in the event of an alarm, you can define alarms as valid by setting the corresponding parameter „1“ in the menus Z3a, Z3b, Z3c and Z3d. If such an alarm (defined as valid) occurs, the defective unit is switched off and the standby unit with the next higher bus address is switched on. If another unit with a valid alarm occurs in the zone, the next standby unit (if existant) is switched on.

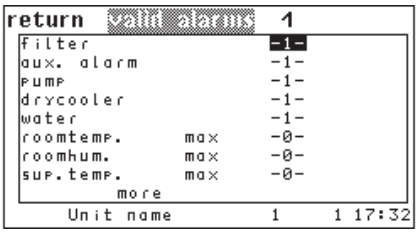
Some alarms cause the cut-off of the defective unit or the deactivation of functions even if the alarm has not been defined valid. (for details see chapter 8.4 alarm messages).
The alarm „unit not available“ can not be deleted from the alarm list. This alarm is always part of the valid alarms and appears in case of a bus failure or when the unit has been de-energized.

```
Valid alarms:
--.Not available                  01.Local stop
02.replaced by 30, 31, 32         03.replaced by 30, 31, 32
04.E-heating Failure              05.Humidifier Failure
06.Humidifier 5uS                 07.Humidifier 20uS
08.Fan error                      09.Filter clocked
10.External alarm                 11.Pump Failure
12.Drycooler Failure              13.Water detector
14.Roomtemp too high              15.Roomhumidity too high
16.Supplytemp too high            17.Supplyhumidity too high
18.Roomtemp too low               19.Roomhumidity too low
20.Supplytemp too low             21.Supplyhumiduty too low
22.replaced by 37, 38, 39         23.replaced by 40, 41, 42
24.Fire/smoke detector            25.Sensor Failure
26.Sensor broken                  27.Hotgas reheat 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.Watertemp. in 1 high
38.Watertemp. in 2 high           39.Watertemp. in 1 & 2 high
40.Watertemp. in 1 low            41.Watertemp. in 2 low
42.Watertemp. in 1 & 2 low
```

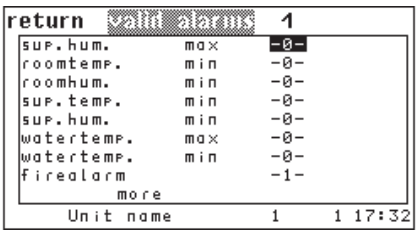
Config/Zone/more/valid alarms (Z3a)



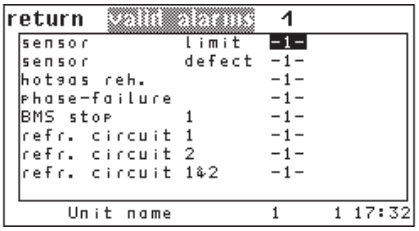
.../valid alarms (Z3b)



.../valid alarms (Z3c)

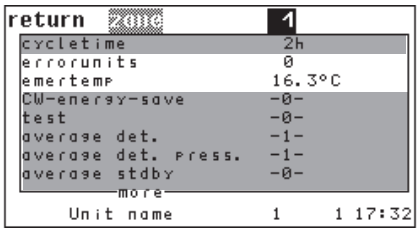


.../valid alarms (Z3d)



Emergency operation

(Z1)



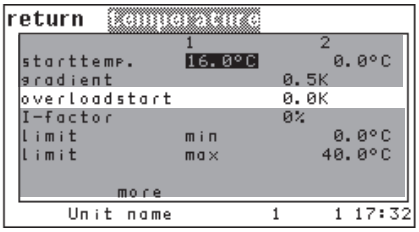
With the parameter in the second line of menu Z1 you can enable an emergency operation. If this parameter is set "0", emergency operation is disabled. By this parameter you set the number of defective units in this zone which are necessary to enable emergency operation.
Emergency operation means that each A/C unit of the IO bus applies the zone-specific emergency temperature as new temperature set value. The emergency temperature is set for each zone with the parameter in the third line of menu Z1.

Function of standby units

Even if the failing unit capacity of one zone is completely equalled by the start of standby units, the defective units are counted as lacking. To start an emergency operation just when the 100% unit capacity (without standby units) is not reached anymore, the adjusted number of defective units should be higher than the number of a zone's standby units.

Additional capacity - Cooling (previously: Temperature)

Config/values/air/temperature (T)

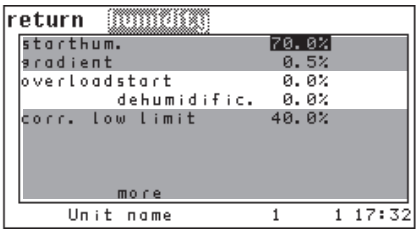


Command:
`load cool 2.5`

The excess of the setpoint can be adjusted by the parameter in the third line of menu T in the shape of a temperature difference. Setting "0" disables the additional capacity function.
When the temperature sinks again, the additional capacity unit is switched off with a hysteresis of 1K.

Additional capacity - Humidifying (previously: Humidity)

Config/values/air/humidity (H)



You can have started a standby unit if the air humidity setpoint is passed under by the zone humidity (Average value or unit humidity, when average value determination is disabled).
As the treshold („overloadstart“) for the additional capacity is individually set in each A/C unit, this function is essentially appropriate for N+1 operation. Otherwise, it may happen that several units are started simultaneously (at the same threshold value).
The undercut of the setpoint can be adjusted by the parameter in the third line of menu H in the shape of a humidity difference. Setting "0" disables the additional capacity function.
When the humidity rises again, the additional capacity unit is switched off with a hysteresis of 3% relative humidity.

Command:

```
load humi 10.5
load dehumi 5.5
```

Additional capacity - Dehumidifying

You can have started a standby unit if the air humidity setpoint is exceeded by the zone humidity (Average value or unit humidity, when average value determination is disabled).
As the treshold („overloadstart“) for the additional capacity is individually set in each A/C unit, this function is essentially appropriate for N+1 operation. Otherwise, it may happen that several units are started simultaneously (at the same threshold value).
The excess of the setpoint can be adjusted in the shape of a humidity difference. Setting "0" disables the additional capacity function.
When the humidity reduces itself, the additional capacity unit is switched off with a hysteresis of 3% relative humidity.

Precondition:
The additional capacity unit must be set as standby unit and must be assigned to a zone. Moreover the corresponding parameter (temperature or humidity) "Overload" must have a value different from zero.

The zone control comprises three specific functions:

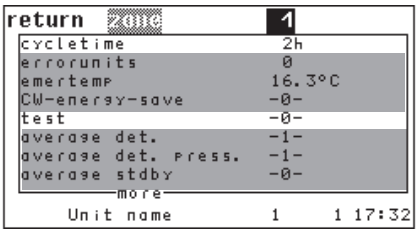
1. **Sequencing,**
2. **CW Standby Management,**
3. **Zone for DFC control**

6.2.1 Sequencing

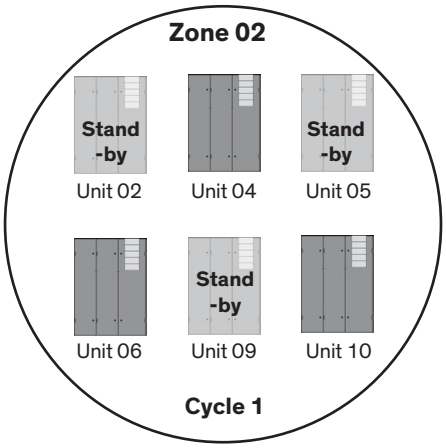
The sequencing provides a time dependent unit changeover. By the use of standby units, a high operating reliability the same as an even unit exploitation is achieved.
By setting the cycle time (parameter in the first line of menu Z1) you adjust the lapse of time, after which a changeover is done periodically. This means that the standby status is changed over the units one by one. With the setting 0 (hrs) no sequencing is made.

Setting the cycletime causes the sequencing start.

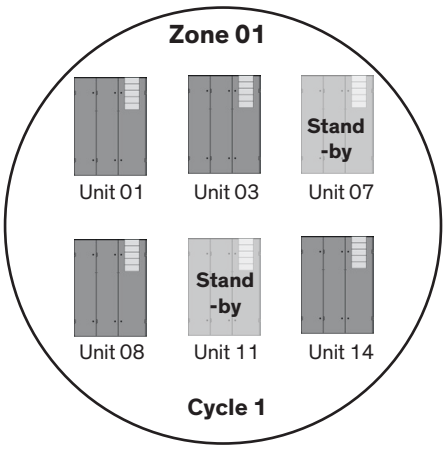
(Z1)

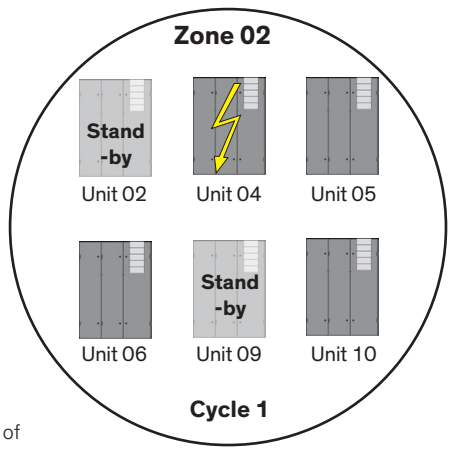


Failure dependent change-over

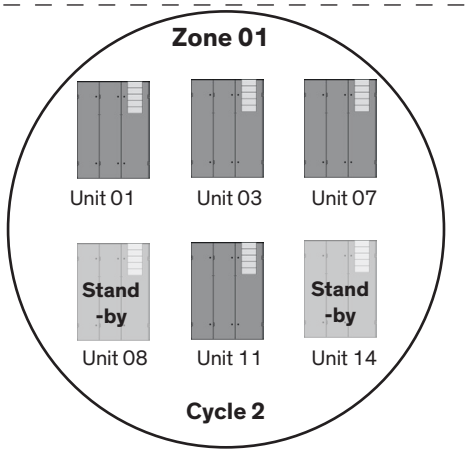


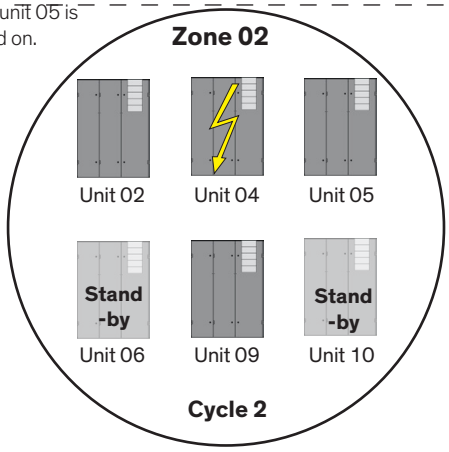
Time dependent change-over
(normal sequencing)
e. g. with 2 standby units:
1. cycle unit 07, 11 standby
2. cycle unit 08, 14 standby
3. cycle unit 11, 01 standby
etc.





Due to a failure of unit 04 unit 05 is switched on.





Enabling the test sequencing (parameter in the fifth line of menu Z1) with the fixed cycletime of 5 minutes helps you to check the sequencing function.

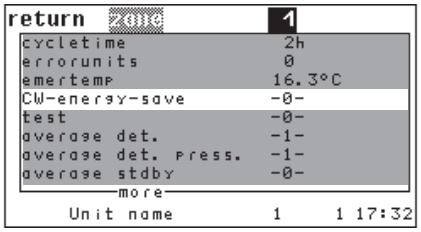
All basic zone functions which have been described on the previous pages are also available when the sequencing is enabled.

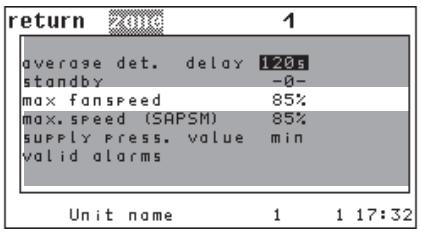
a. Average value determination or deactivation
b. Alarm changeover
c. Emergency operation
d. Additional capacity

The sequencing runs independently from an additional capacity function and independently from defective units.
Even a defective unit can be set standby by the sequencing. Only when the unit has to be switched on due to the changeover, the control detects that the unit is defective and the unit remains switched off. Then the standby unit with the next higher bus address is switched on.
The unit, which is provided as additional capacity, can only be switched on during the cycles, in which it is in standby.

6.2.2 CW Standby Management

(Z1)





The CW standby management can be carried out with CW units and Dualfluid units with CW cooling priority. The basic idea is to share the heat load permanently with as many as possible units in order to reduce the fan speed of all units and thus to save energy. For this the provided standby units must constantly take part in the cooling process. The total airflow is below the airflow which is possible at most and is equalled in case of failure of one or more units by increasing the fanspeed of the remaining units.

By "MAXFANSPEED" you adjust the fan speed which is to be kept in the zone when all units are running. By "CW-ENERGY-SAVE" the CW-standby management is enabled and in the same moment all standby units of the zone are switched on. Both parameters are related to the zone and have only to be adjusted at one unit of the zone.

The table beside displays how many units in a zone are necessary to keep the total airflow at the indicated fan speed in the left column, when "f" units have failed.

This correlation is represented by the following formula.

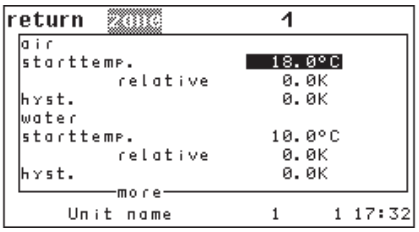
$$n \geq f \cdot \left(\frac{100}{100 - nMax} \right)$$

nMax / %	n - units		
	f = 1	f = 2	f = 3
60	3	5	8
65	3	6	9
70	4	7	10
75	4	8	12
80	5	10	15
85	7	14	20
90	10	20	30

An A/C unit is switched off as defective unit if a valid alarm occurs at this unit, in the same way as for the sequencing.
When a Dualfluid unit changes over to DX operation due to a fault like a "water temperature too high" alarm , this unit applies the nmax fan speed which is higher than the MAXFANSPEED of the CW standby management.
The fan speed of the other units is not affected by this.

6.2.3 Zone for DFC control

Config/Zone/more(Z2)



If a relative start value different from 0 K is set, this value takes priority of the absolute start temperature.

Such a zone consists of GE type A/C units, drycoolers and external glycol pumps. Concerning the hardware, the zone exists in the shape of a common cooling water circuit and a common control of dry coolers and external glycol pumps.

On the software level the zone operation is carried out by assigning the A/C unit to the same zone and by setting the parameters "start temperature, hysteresis" or "water start temperature (=water inlet temperature 1*), hysteresis" different from "0". By this setting the proportional GE control is activated. The zone parameters are transmitted to all units/controllers of the zone and are assumed by these.

* water inlet temp. 2 in CW2-units.

The start temperature can also be entered as negative offset to the return air temperature.
Either in relation to the outside air temperature:

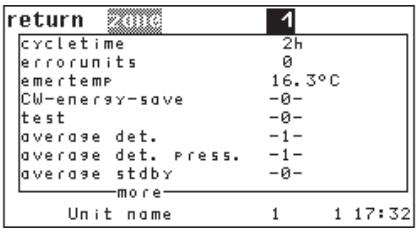
If $T_{outside} \leq T_{return\ air}$ – Start temp.$_{air\ rel.}$ free cooling for DFC operation is enabled.

or in relation to the water inlet temperature 1:

If $T_{water} \leq T_{return\ air}$ – Start temp.$_{water\ rel.}$ free cooling for DFC operation is enabled.

Some parameters as sequencing cycle and standby state are only operative in DX mode. DFC control is described in detail in the manual "GE systems".

Config/Zone



Summary of Menu Items

Here you can see an overview over the adjustable parameters. Zone parameters must only be set at one unit of the zone. Unit parameters must be set individually at each unit.

❶. **Unit assignment** (unit parameter)
A zone is defined by the assignment of units to this zone. Maximum 20 zones can be defined with the adjustments from 1 to 20. Zone 0 means that the unit is assigned to no zone. The assignment is made individually for each unit.

❷. **Cycle time** (zone parameter)
The cycletime determines the lapse of time after which a changeover will periodically take place. With the setting "0" the sequencing is disabled.

❸. **Number of defective units** (zone parameter)
The entry is optional. If the number, adjusted here, is reached, the emergency operation will be put into force. With the setting "0" the emergency operation is disabled.

❹. **Emergency temperature** (zone parameter)
This temperature is the new sepoint when emergency operation is enabled.

❺. **CW standby management** (zone parameter)
With the setting "1" the CW standby management is enabled.

❻. **Sequencing Test** (zone parameter)
With the setting "1" the sequencing test with the fixed cycletime of 5 minutes is enabled.

❼. **Average value determination** (zone parameter)
With the setting "1" the calculation of average values for all parameters* except the room air pressure is enabled.

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

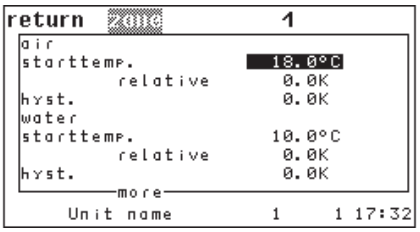
The corresponding commands:

❶ `zone 1 + 7` assigns unit 7 to zone 1
`zone 1 - 7` deletes unit 7 from zone 1
❷ `zone 1 seqtime 10`
❸ `zone 1 emernum 3`
❹ `zone 1 emertemp 15.7`
❺ `zone 1 cwmode 1`
❻ `zone 1 test 1` en- (1) or disables (0) test sequencing
❼ `zone 1 average 1`
❽ `zone 1 avgp 1`
❾ `zone 1 sbaverage 0`

❽. **Average value determination - Room air pressure** (zone parameter)
With the setting "1" the calculation of average values for the room air pressure is enabled.

❾. **Average value determination including standby units** (zone parameter)
With the setting "1" also sensors from units, which are in standby mode, are taken into account for the calculation of average values.

Config/Zone/more



By setting one of the two following parameters or the parameters "water start temperature or water hysteresis" different from zero the DFC control is enabled.

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

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

❸. **Hysteresis** (zone parameter)
With this hysteresis the operating modes FC, EFC and MIX are blocked. Only the DX operating mode is enabled in this case.

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

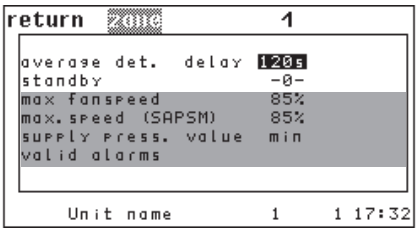
❺. **Water start temperature** (zone parameter)
Below the return air temperature reduced by the relative start temperature, the operating modes FC, EFC and MIX are enabled.

❻. **Water hysteresis** (zone parameter)
With this hysteresis the operating modes FC, EFC and MIX are blocked. Only the DX operating mode is enabled in this case.

The corresponding commands:

❶ `zone 1 gestart 18.0`
❷ `zone 1 gestartrel 2,0`
❸ `zone 1 gehys 2.0`
❹ `zone 1 gewstart 12.0`
❺ `zone 1 gewstartrel 2,0`
❻ `zone 1 gewhys 2.0`

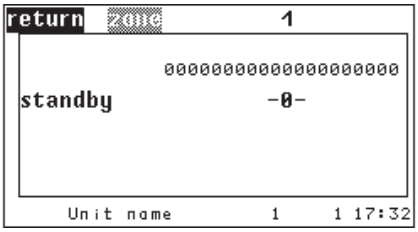
Config/Zone/more/more



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

❽. **Standby units** (unit parameter)
A zone, in which a sequencing shall be carried out, must contain at least one standby unit. With the setting "1" the actual unit is defined as standby unit. This setting defines the initial state of the sequencing and changes according to the actual state of the sequencing.

Operate/Zone



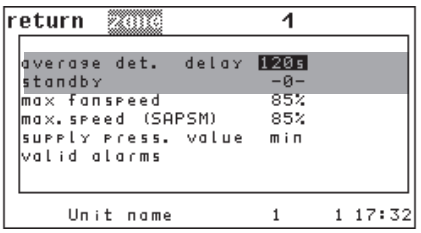
The operating status of all units which are assigned to zone 1 is displayed in the top line. From left to right the operating states of the units with the bus address from 19 to 0 are displayed. 0 stands for normal operation, 1 stands for standby operation.

In the line below you can define the operating status of the unit.
0 means normal operation, 1 means standby operation. as above item ❸

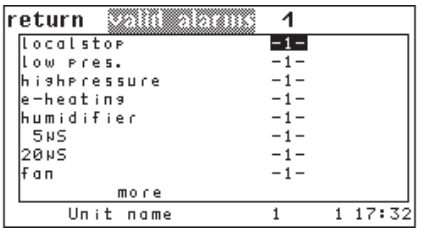
The corresponding commands:

❼ `zone 1 avgdelay 60`
❽ `zone 1 unit 3 0` puts unit 3 into standby
`zone 1 unit 3 1` switches unit 3 on

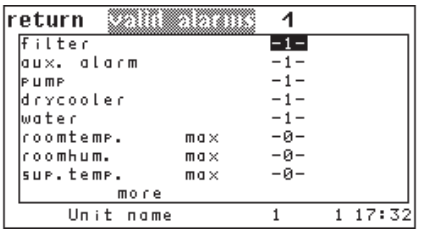
Config/Zone/more/more



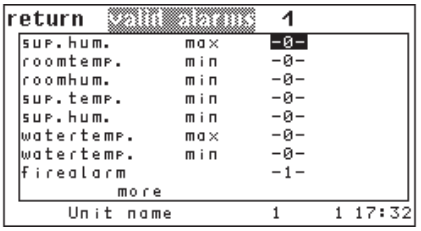
❾. Maximum fan speed (nMaxZone) (zone parameter)
The adjusted speed is valid for each unit of the zone, if the standby management is enabled and when all units are running. In case of failure of one unit the remaining units increase their fan speed so that the total air volume flow is kept constant.
With DFC control or enabled Ecocool function the nMaxZone speed is valid FC mode and is initial speed in EFC mode.



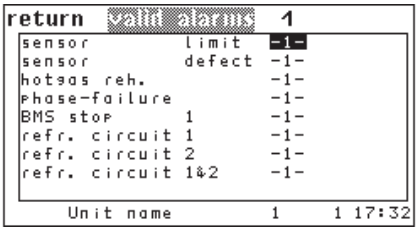
❿. Maximum fan speed (SAPSM) (zone parameter)
see chapter 6.6 supply air pressure standby management.

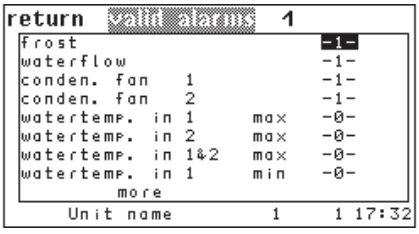


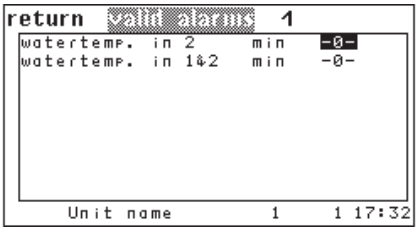
⓫. Supply air pressure value (zone parameter)
There are four possibilities for the setting of the supply air pressure value.



⓬. Valid alarms (zone parameter)
With the setting "1" the corresponding alarm is defined as a valid alarm for the zone, which entails that the unit is de-energized and the unit is registered as defective.







The corresponding commands:

❾ `zone 1 nmax 85`
❿ `zone 1 nmaxsapsm 40`
⓫ `zone 1 sapsel 0`
⓬ `zone 1 alarm 2 0` deletes valid alarm 2
`zone 1 alarm 2 1` adds alarm 2 as valid alarm
`zone 1 alarm h` displays list of all available alarms

0 - unit
1 - average
2 - min, smallest value in the zone
3 - max, biggest value in the zone

6.3 Ecocool

NOTICE

The Ecocool control can not be used for the GE and GES unit versions and can neither be combined with DFC control nor with DFC² control.

The Ecocool control enables a "Free cooling" with outside air, which is directed by a louver system. Three louvers are necessary, which will be controlled in parallel by a single analog output.

1. Fresh air louver for the inlet of fresh outside air
2. Circulating air louver for the circulation of the room air
3. Exhaust air louver for the outlet of warm room air

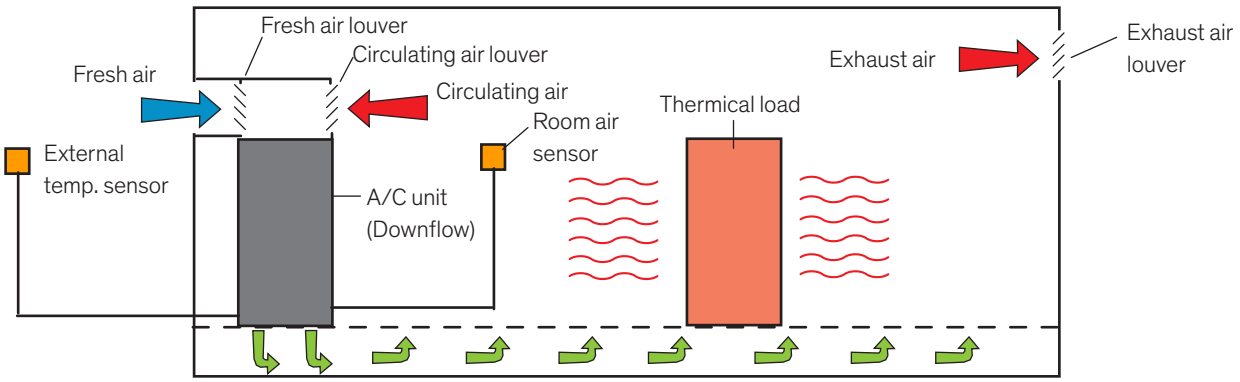
The fresh air and exhaust air louver are operated in parallel, the circulating air louver is operated in a reverse sense to these louvers. The setting is done by determinating the sense of rotation at the louver actuators.

The Ecocool control works with room air control the same as with supply air control. In both cases the control requires a room air sensor to determine the temperature difference between the room air and the outside air.

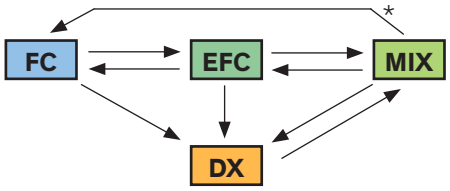
NOTICE

The return air sensor must be installed out of the A/C unit in the room.

Installation example



The Ecocool function is subdivided into the four operating modes FC, EFC, MIX and DX. The diagram displays the possible commutations between the operating modes, the conditions for a commutation are described on the following pages.



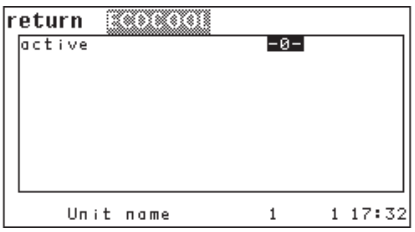
* in A/C units with a compressor the MIX mode can directly commute to the FC mode, if the compressor stop temperature is below the setpoint.

Activation

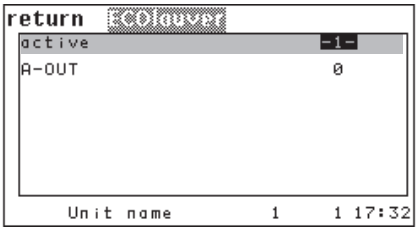
By setting the parameter "ACTIVE" ❶ on 1 you acitvate the Ecocool function. By this, an ECO louver system is configured automatically. By "0" you deactivate the Ecocool function.
With the parameter "A-OUT" ❷ you determine an analog output for the ECO-louvers.
With the activation of the Ecocool function the ECO louver system control is activated, the standard fan control is modified and the compressor resp. the CW valve is additionally controlled by an enabling process.

Config

.../Values/ECOCOOL



.../Components/cooling/ECOlouver

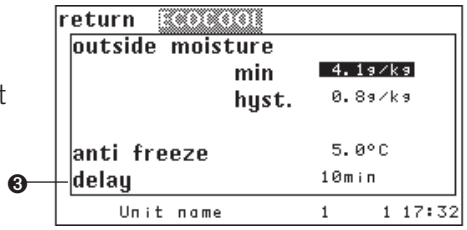


❶ `eco conf 1`
❷ `eco lv aout 11`

Operate

.../Values/ECOCOOL/more

To allow the Ecocool control to start from a stable condition (room temperature is near the setpoint), you can set a delay ❸ to the unit start in the bottom line of the menu at the end of this page. After the delay (during which the unit is in DX/CW mode) has elapsed, free cooling can be enabled according to the conditions listed on the next page.



❸

`eco delay 10`

FC mode

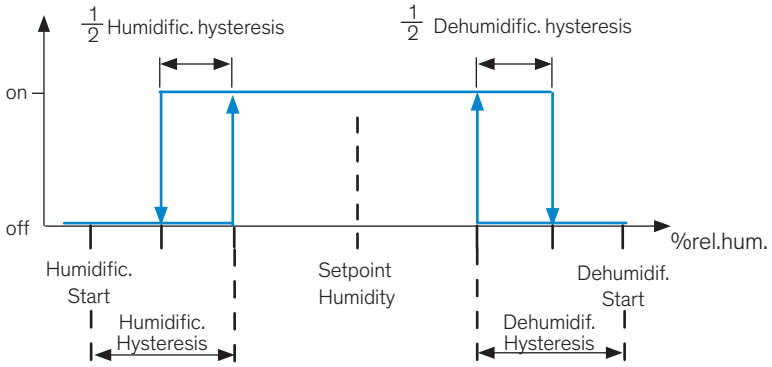
Free cooling is enabled, when:

1. room humidity is within determined limits (see diagram).

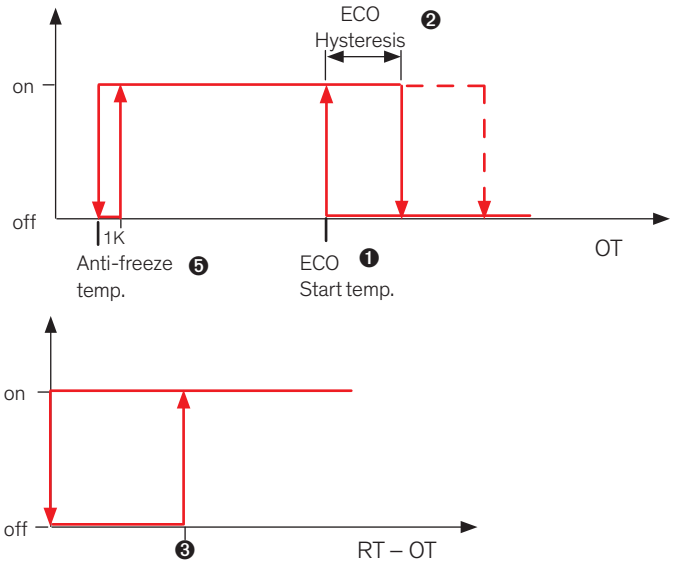
2. outside air temperature is within defined limits.
   - upper limit: EcoCool start temperature ❶.
     respectively: Ecocool start temperature ❶ + Eco hysteresis ❷.
   - lower limit: anti-freeze temperature ❺
     respectively: anti-freeze temp. ❺ + fix hysteresis of 1K.

Above the upper outside air temperature limit the enabling is possible as soon as the outside air temperature is lower than the room temperature by an adjustable temperature difference ❸ .

1st Enabling condition

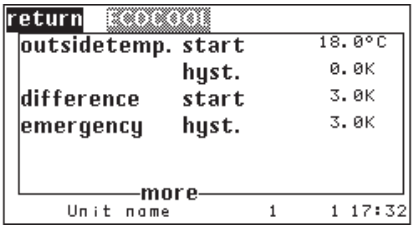


2nd Enabling condition



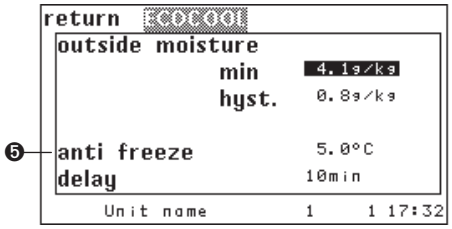
Operate

.../Values/ECOCOOL



❶ `eco temp 18.0`
❷ `eco hys 2.0`
❸ `eco diff 3.0`

❺ `eco frost 5.0`



The Ecocool function requires the setting of start values and hysteresises for the humidifier and the dehumidification.

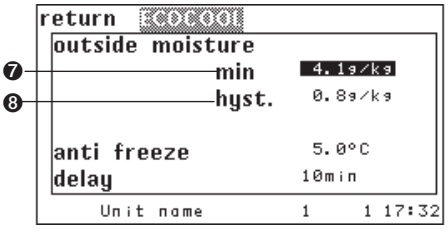
```
humi 1 start 10,0
humi 1 hys 1,0
dehumi start 10,0
dehumi hys 1,0
```

RT: Room air temperature
OT: Outside air temperature

3rd Enabling condition (optional)

A third enabling condition can be defined on request. In the menu beside a value for the outside moisture content can be defined, which, if passed under, disables the free cooling.
Only when this value plus the adjustable hysteresis is exceeded, free cooling is again enabled.
To measure the outside moisture content you need a sensor with the parameterised sensor purpose "outside moisture content".

Operate
.../Values/ECOCOOL/more



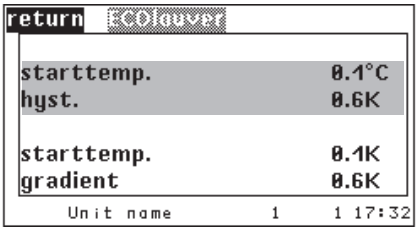
❼ `omc min 4,0`
❽ `omc hys 1,0`

Control in FC mode

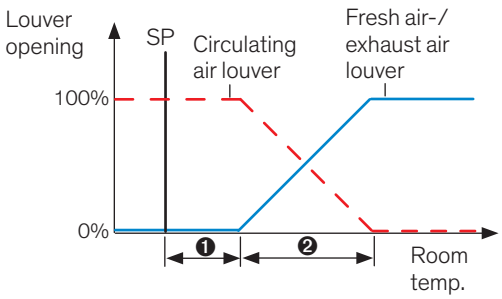
The room temperature is controlled by the opening of the Ecocool louvers. The fan runs with the constant basic speed[1].

The start temperature ❶ for the control must be entered as a positive difference to the air temperature setpoint. In the fourth line you can set the gradient ❷, which defines the range, in which the fresh air and exhaust air louver opens from 0 to 100% and the circulating air louver closes in the same way.

Operate
.../Components/cooling/ECOlouver



Control



SP: Room temperature setpoint

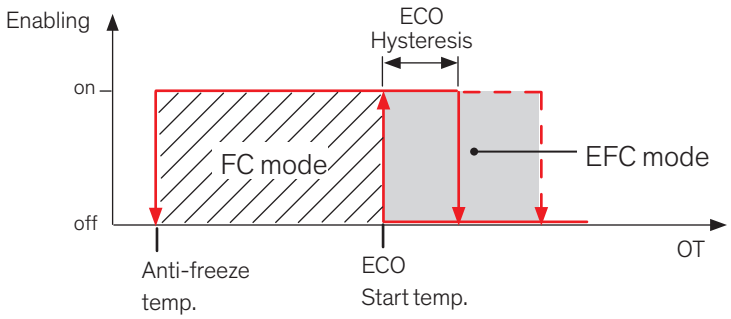
❶ `eco lv start 0.1`
❷ `eco lv grad 0.6`

[1] **Fan speed table**

Fan speed	Stand alone	Zone oper.
Basic speed	nmax	nmaxZone
Maximum speed	100%	nmax

EFC mode

The FC mode changes to the EFC mode, when the outside temperature is higher than the ECO start temperature and when the room temperature is above the setpoint.
In general the EFC mode is applied within the shaded area in the diagram below.



Control in EFC mode

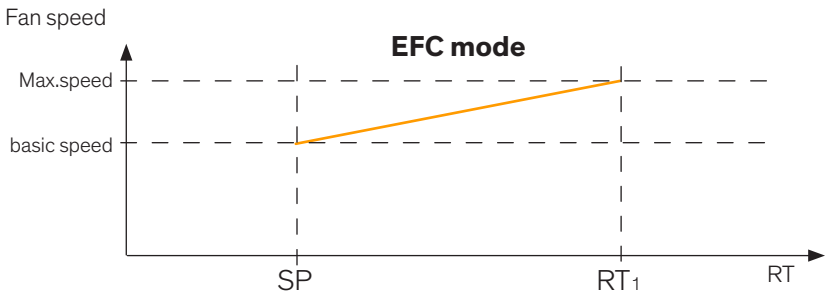
The room temperature is controlled by the airflow by modifying the fan speed. Starting from the basic speed[1], the fan speed is raised proportionally in relation to the temperature difference RT - SP up to maximum speed[1].
The ECO louvers are fully opened.
You can set the room temperature RT_1 at which the fan shall reach 100% speed by setting the control factor for the fan correspondingly. (see menu "components/air/fan/general)

[1] see Fan speed table

$$\text{Control factor} = \frac{\text{Max. sp.} - \text{basic sp.}}{RT_1 - SP} \cdot \frac{K}{\%}$$

Example: basic speed = nmax = 70%, Max speed = 100%, SP = 24°C, RT_1 = 25°C

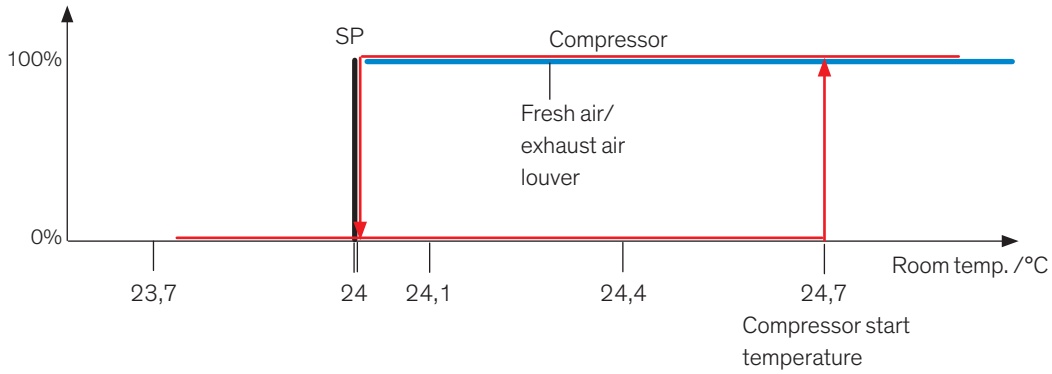
results in a control factor of 30.



MIX Mode

The MIX mode is enabled, when the fan has attained the maximum speed[1].
In the MIX mode the compressor can be switched on according to its winter start temperature or the CW valve can be opened according to its parameters. The ECO louvers (fresh air/exhaust air) are completely opened. The fan runs with maximum speed[1].

In units with speed-controlled compressor the MIX mode can also be triggered by the start of the speed-controlled compressor, as the compressor is not locked during FC and EFC mode. When MIX mode is triggered by the start of the speed-controlled compressor the fresh air louver will be opened 100% and the fan speed will be increased to the maximum speed.

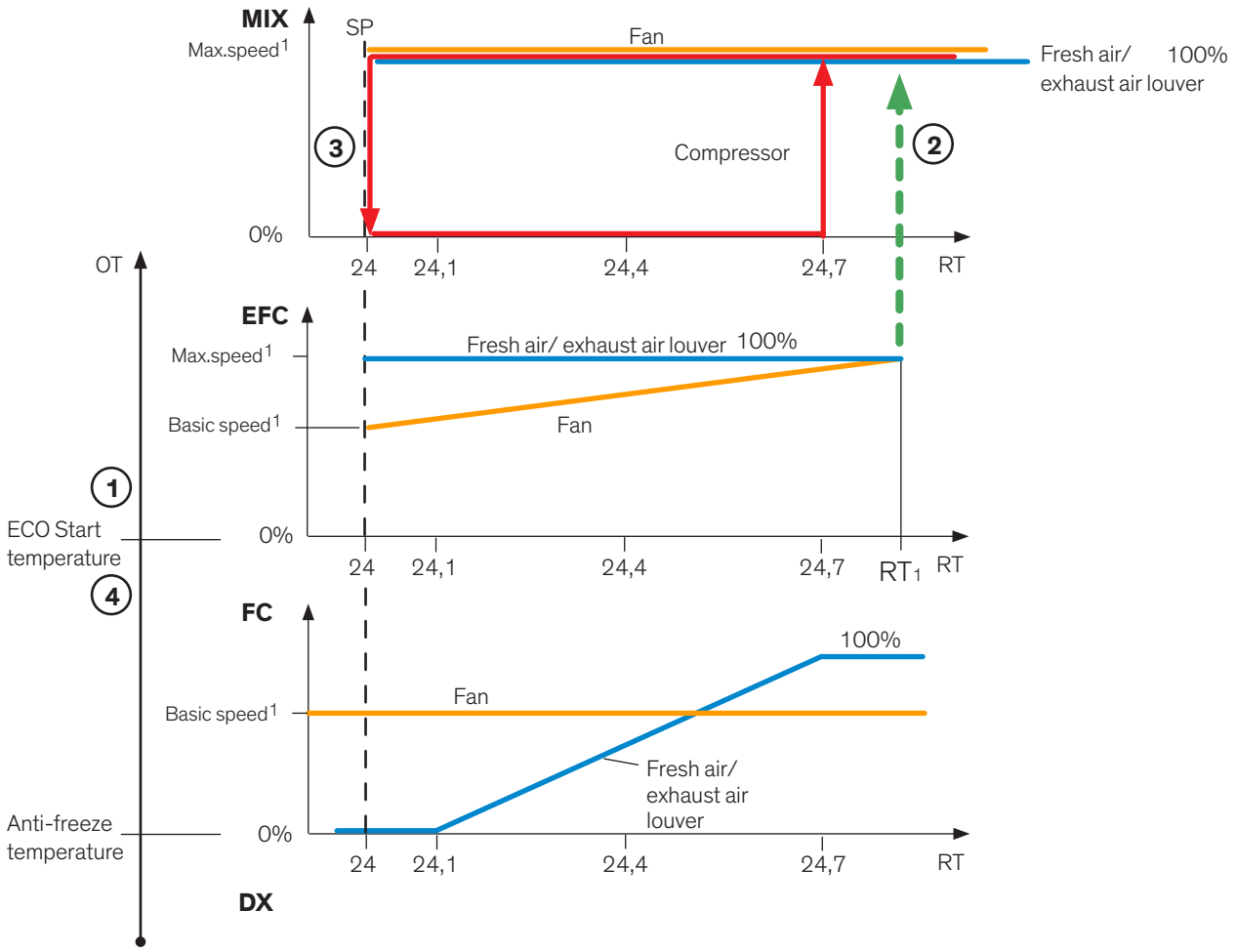


DX Mode

DX mode is always chosen when at least one of the general enabling conditions for free cooling does not exist anymore.

[1] see Fan speed table

Total view - operating modes



1 see Fan speed table

①FC → EFC
if OT > ECO start temp.
(and RT > SP)

②EFC → MIX
if n_{fan} = max. speed
(with RT = RT_1)

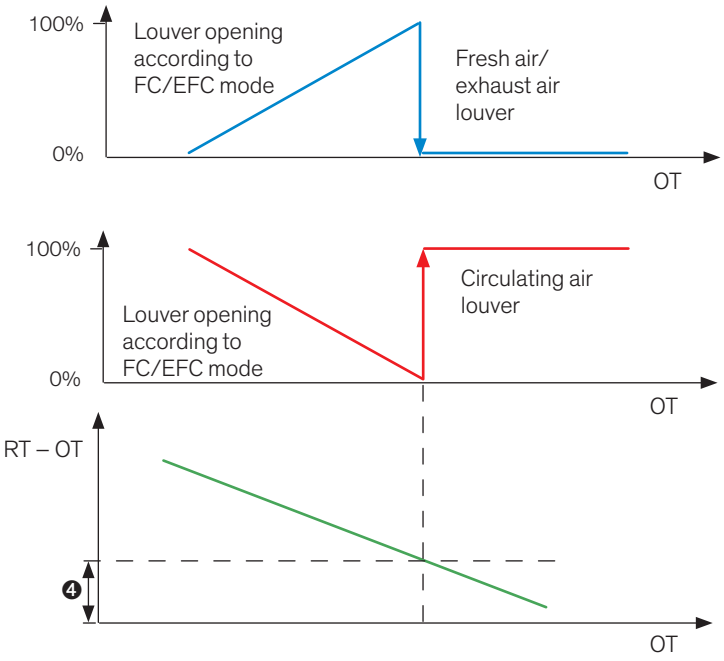
③MIX → EFC
if RT = SP + comp.-start temp – hysteresis

④EFC → FC
if OT ≤ ECO start temp.
(or RT ≤ SP)

Emergency operation

If in an A/C unit every configured compressor has an alarm, emergency operation is enabled. For CW units there is no emergeny operation. During emergency operation the humidity limit values are not relevant for the control.

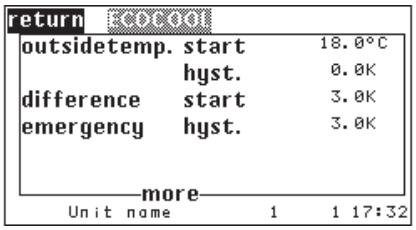
The room temperature is controlled according to the following principle:
If the temperature difference RT – OT is bigger than the adjusted emergency hysteresis ❹, the air is cooled by controlling the opening of the fresh air/exhaust air louver.
Otherwise the circulating air louver is completely opened and the fresh air/exhaust air louver is completely closed. The fan then runs with maximum speed. (see Fan speed table)



RT: Room air temperature
OT: Outside air temperature

Operate

.../Values/ECOCOOL



❹ eco emerhys 2.5

Zone operation

A zone operation can be established in the shape that an A/C unit without Ecocool louver system and an A/C unit with Ecocool louver system (ECO LS) are assigned to a zone. The unit with ECO LS will be started whereas the unit without ECO LS will stay in standby.
In the unit without ECO LS an overload start must be configured so that the unit without ECO LS will be switched on in addition when the room air temperature setpoint is exceeded by an adjustable temperature difference.
In contrast to stand alone operation, other fan speeds are effective when zone operation is combined with the Ecocool function.

Mode	Stand alone	Zone oper.
FC	nmax	nmaxZone
EFC	until 100%	until nmax
MIX	100%	nmax
DX/CW	100%	nmax

nmaxZone can be set in Config/Zone.

Operation with Free cooling top FCP

The A/C unit can be equipped by the option Free Cooling Top FCP. The free cooling top contains a filter for the external air. The filter is equipped by a differential pressure switch, which can be connected at a digital input of the controller to indicate a filter alarm in case of a clogged filter. It can also be set that the filter alarm releases a commutation to circulation operation.

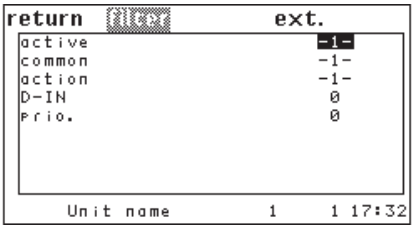
By setting the parameter "ACTIVE" ❶ on 1 the filter is configured in the C7000.
The common alarm parameters can be set for the filter (differential pressure switch).

Alarm parameters:
- Common alarm release ❷
- Digital input ❹
- Alarm priority ❺
- Alarm delay ❻

Moreover you can determine, whether the unit shall commute to circulation operation (circulating air louver fully opened, fresh air/ exhaust air louver fully closed) in case of a filter alarm (set parameter "action" on "1"). ❸

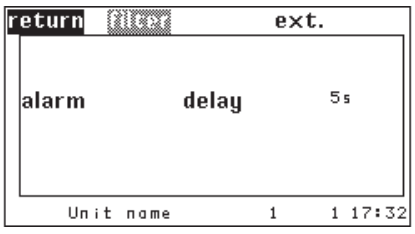
Config

.../Components/Air/Filter ext.



Operate

.../Components/Air/Filter ext.



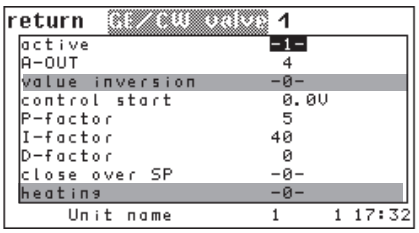
❶ filter conf 1
❷ filter commonalarm 1
❸ filter alarmact 1
❹ filter alarm 1
❺ filter alarmprio 19
❻ filter alarmdelay 5

6.4 Operation modes for CW2 units

In the menu C2 you can choose between two operating modes:

1. Changeover operation (parameter "Mode" : Separate)
2. Additional operation (parameter "Mode" : Added)
3. DFC control with CW2 units (parameter "Mode" : DFC)
   Description, see GE systems manual.
4. DTC control of CW valve 1 (parameter "Mode": DTC)

Config/Components/Cooling/Valves/GE/CW valve (C1)



Changeover operation

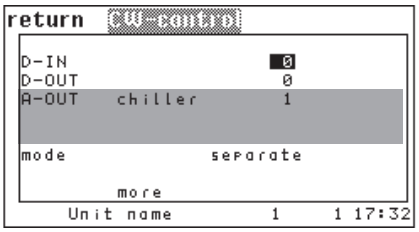
If one or several of the following conditions are complied, CW valve 2 is opened and CW valve 1 will be closed to the "value at switching" :

1. A voltage is present at the digital input (menu C2, parameter D-IN), which was assigned to the GE/CW valve.
2. DP 1025 is written with value "1" by a BMS.
3. DP 1025 is written with value "1" by inputting "1" for the parameter "CW2-changeover" in menu C4.
4. Water temperature in circuit 1 is higher than parameter "GE-off".
5. Water temperature in circuit 1 is higher than the air temperature setpoint, in case the parameter "Close over SP" (menu C1) has been set "1".

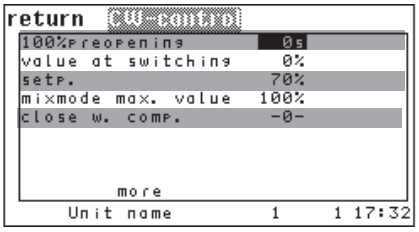
If none of the above listed conditions is true, the control is switched back from CW valve 2 to CW valve 1. CW valve 2 will be completely closed.

The changeover is displayed by the parameter "State" in the menu C4 of the Config level and is output by a freely adjustable digital output (menu C2, parameter D-OUT).
If a dehumidification request exists, the active valve will be opened 100% to provide maximum cooling capacity for dehumidification.

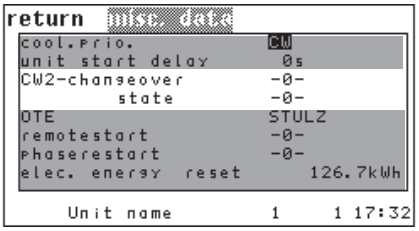
../CW-control (C2)



../CW-control/more (C3)



Config/Values/Misc. data/more (C4)



Additional operation

During additional operation both CW valves can be opened simultaneously. The PID parameters for both valves can be differently set (menu C1).

If one or several of the following conditions are complied, the start temperatures of both valves are swapped:

1. A voltage is present at the digital input (menu C2, parameter D-IN), which was assigned to the GE/CW valve.
2. DP 1025 is written with value "1" by a BMS.
3. DP 1025 is written with value "1" by inputting "1" for the parameter "CW2-changeover" in menu C4.
4. Water temperature in circuit 1 is higher than parameter "GE-off". Valve 1 will be closed to the "value at switching" in this case.
5. Water temperature in circuit 1 is higher than the air temperature setpoint, in case the parameter "Close over SP" (menu C1) has been set "1". Valve 1 will be closed to the "value at switching" in this case.

If condition 4 or 5 applies to circuit 2, the valve 2 is completely closed.
If none of the above listed conditions is true, the start temperatures of both valves are changed back.

The changeover is displayed by the parameter "State" in the menu C4 of the Config level and is output by a freely adjustable digital output (menu C2, parameter D-OUT).
If a dehumidification request and no condition for a swap of start temperatures exists, valve 1 is opened 100% to provide maximum cooling capacity for dehumidification.
If a dehumidification request and a condition for a swap of start temperatures exist, valve 2 is opened 100%

NOTICE

Using 2-way valves, the conditions 4 and 5 for the changeover must be avoided. This can be achieved by setting the "GE-off" parameter sufficiently high and by setting the parameter "Close over SP" to 0.

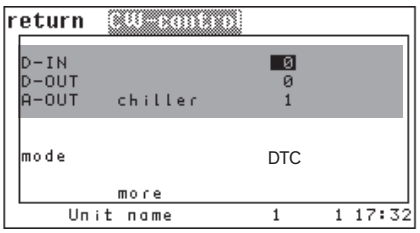
Differential temperature control of CW valve 1

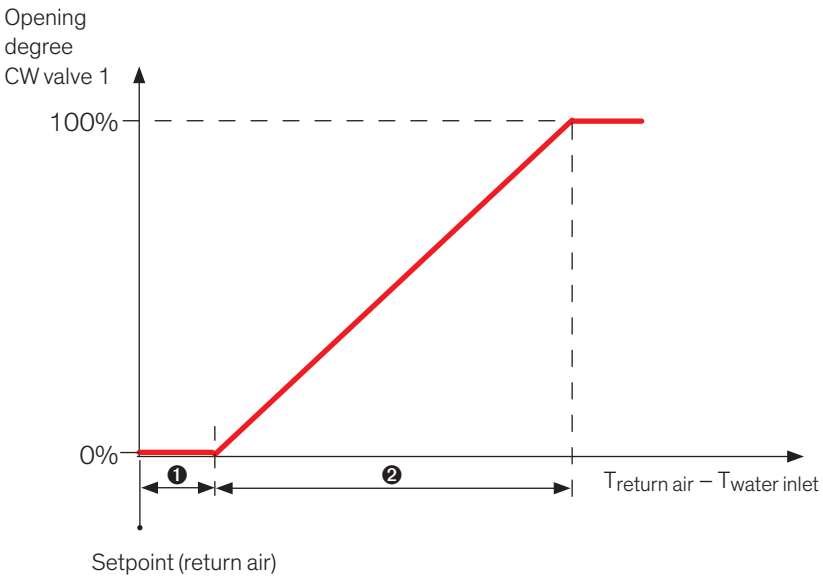
This variant of differential temperature control can be used for A/C units of the CW2 version for which the water circuit 1 is cooled by free cooling (dry cooler or cooling tower).
The valve opening degree is proportionally controlled according to the difference of the return air temperature and the water inlet temperature. Start temperature = setpoint + DTC start. The proportional range is determined by the parameter "DTC range". The PID factors for the CW valve 1 are not considered.
The CW valve 2 is controlled independently from the above control according to the air temperature setpoint by means of its PID parameters. Water circuit 2 can e.g be cooled by a chiller.

The following settings are necessary:

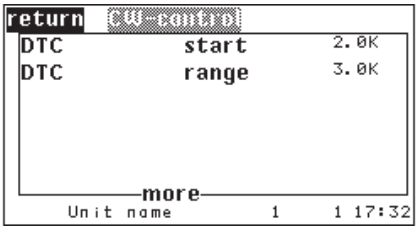
1. The parameter "mode" must be set on "DTC" (command: `cw oper 3`).
2. Setting of the parameter "DTC start" (can also be left on "0").
3. Setting of the parameter "DTC range"

Config/Components/Cooling/Valves/CW-control





Operate/Components/Cooling/Valves/CW-control



❶ `cw dtcstart 2.0`
❷ `cw dtcband 3.0`

NOTICE

If at least one of the values (Return air temperature or water inlet temperature) cannot be measured, CW valve 1 will be opened 100%.

6.5 Differential pressure control

The differential pressure control has the second highest priority as far as the fan speed control is concerned. The differential pressure control will be interrupted for emergency operation of the fan.
The pre-condition for this control is that at least one A/C unit in a zone is equipped with a pressure sensor.

This sensor must be calibrated in the menu D1.

```
sensor ## use 47
```

In case of several sensors, enable the calculation of average values.

```
zone ## avgp 1
```

The differential pressure control is enabled by a value in menu D2 which is different from zero.

```
setapress ##
```

The control tries to keep the adjusted setpoint for the surpressure in the raised floor or in the cold aisle compartment.
The control of the room air pressure is a special form of DFC² control.

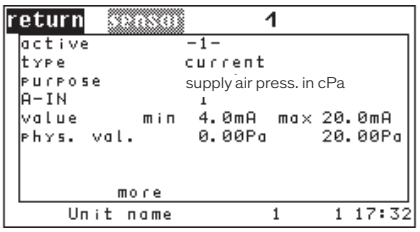
For this control a proportionally controlled fan with an analog output has to be configured (Setting: LINEAR).
The control begins after the lapse of the "START 100%" time and the pre-run time in menu D5 with the maximum speed (max. speed). An offset value, which serves to adapt the air volume flow to local conditions will not be considered.

Maximum speed serves only as an initial value for the control which starts now by measuring the difference to the air pressure setpoint and reduces the fan speed in case of exceeding the setpoint and increases fan speed when the setpoint is passed under.
By three parameters (cycle, maximum control modification and control factor) the characteristics of an integral control are achieved.
The adjusted minimum speed is not passed under during control.
With enabled differential pressure control only the DX values "min.-speed" and "max. speed" are effective for the fan.

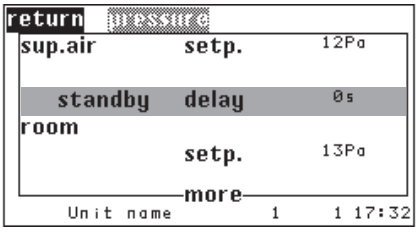
All speed increases or reductions for the fan are put out of force.

After the unit stop the fan runs during an overrun time, which serves to reject hot or cold air in the unit.

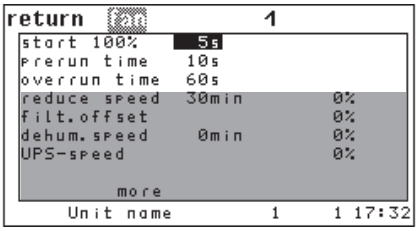
Config/Components/Sensor (D1)



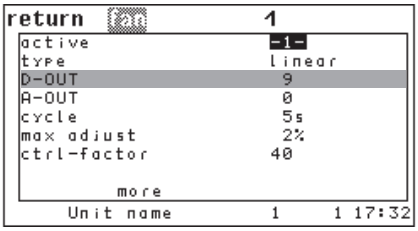
Operate/Values/Air/Pressure (D2)

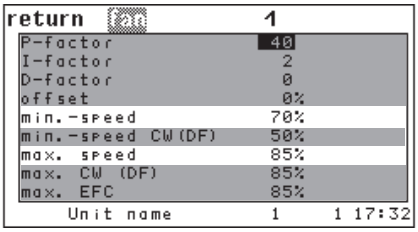


Config/Components/Air/Fan/Special (D5)



Config/Components/Air/Fan/General (D3)

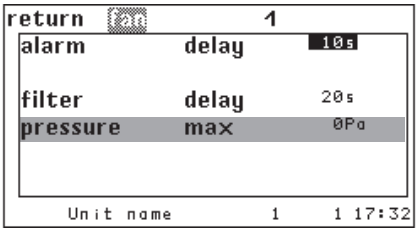




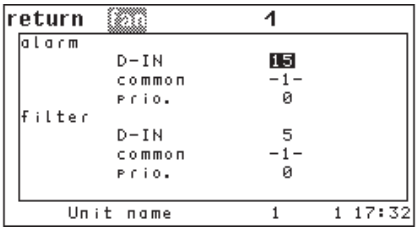
In the menus D6 and D7 you can configure the alarms "air flow alarm" and "filter alarm" with all corresponding parameters.

In the menu D8 of the Info level you can read and compare the actual and set value of the air pressure in the raised floor or cold aisle compartment.

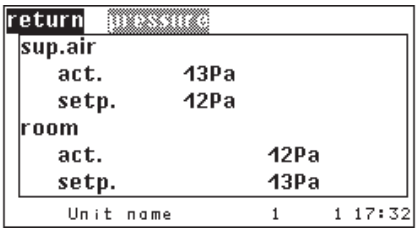
Operate/Components/Air/Fan (D6)



Config/Components/Air/Fan/Alarm (D7)



Info/Values/Air/Pressure (D8)



6.6 Supply air pressure standby management (SAPSM)

The SAPSM can control the supply air pressure in the raised floor with the participation of standby units. The SAPSM functions in the frame of the zone control and can be combined with DFC control and CW standy management.
The supply air pressure control will be interrupted for emergency operation of the fan.

The following parameters are evaluated for the SAPSM:

Nr.	Parameter	Unit value	Zone average value	Zone value	adjust equally for all units	adjust differently for each unit
1	supply air pressure setpoint	x			x	
2	supply air pressure actual value		x			
3	fan minimum speed	x			x	
4	fan maximum speed	x			x	
5	fan maximum speed for SAPSM			x		
6	actual fan speed		x			
7	SAPSM delay	x				x

Pre-conditions:
All units which participate in the SAPSM must be assigned to the same zone.
At least one sensor with the sensor purpose 47 (supply air pressure in cPa) must be configured for the SAPSM.

The parameters supply air pressure setpoint, fan minimum speed and fan maximum speed must be set on the same values for all units in the zone.

To enable a successive switching on and off of several standby units, the SAPSM delay must be set on different values at all standby units.

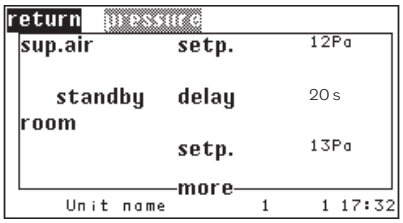
Activation:
The SAPSM is activated by the special software option 7.

Command: `option 7 1`

Additionally the SAPSM delay must be set on a value bigger than zero.

Command: `sapsmdelay 20` (in seconds)

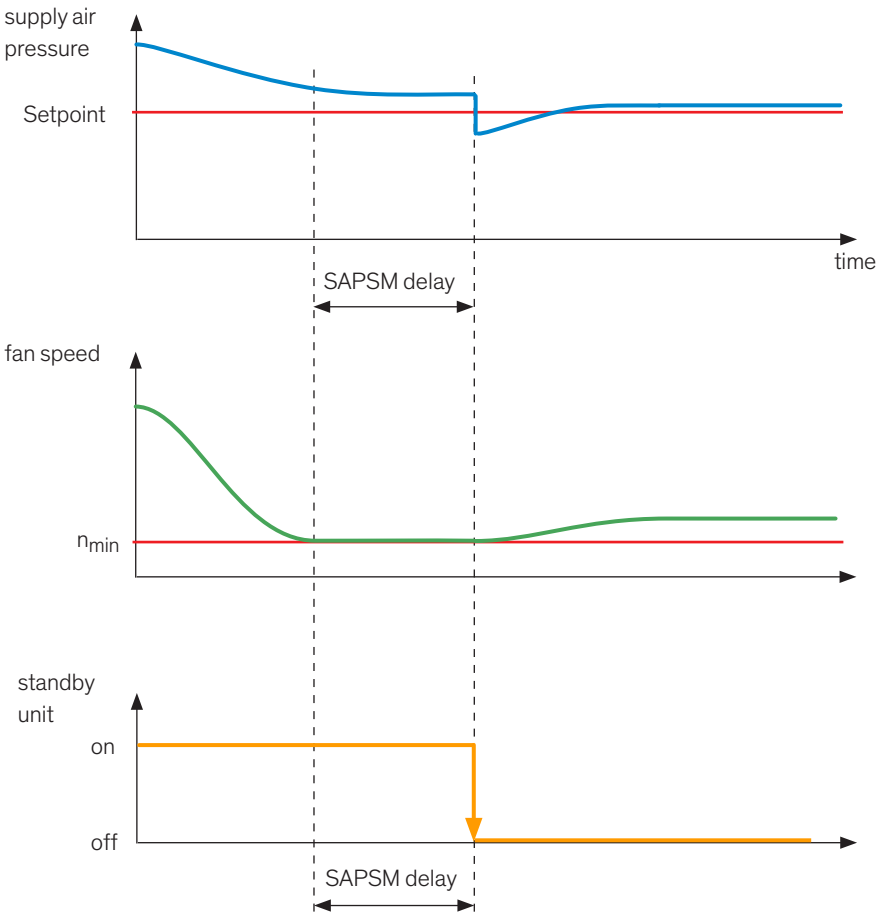
Operate/Values/Air/Pressure



The SAPSM reacts on deviations from the supply air pressure setpoint as follows:

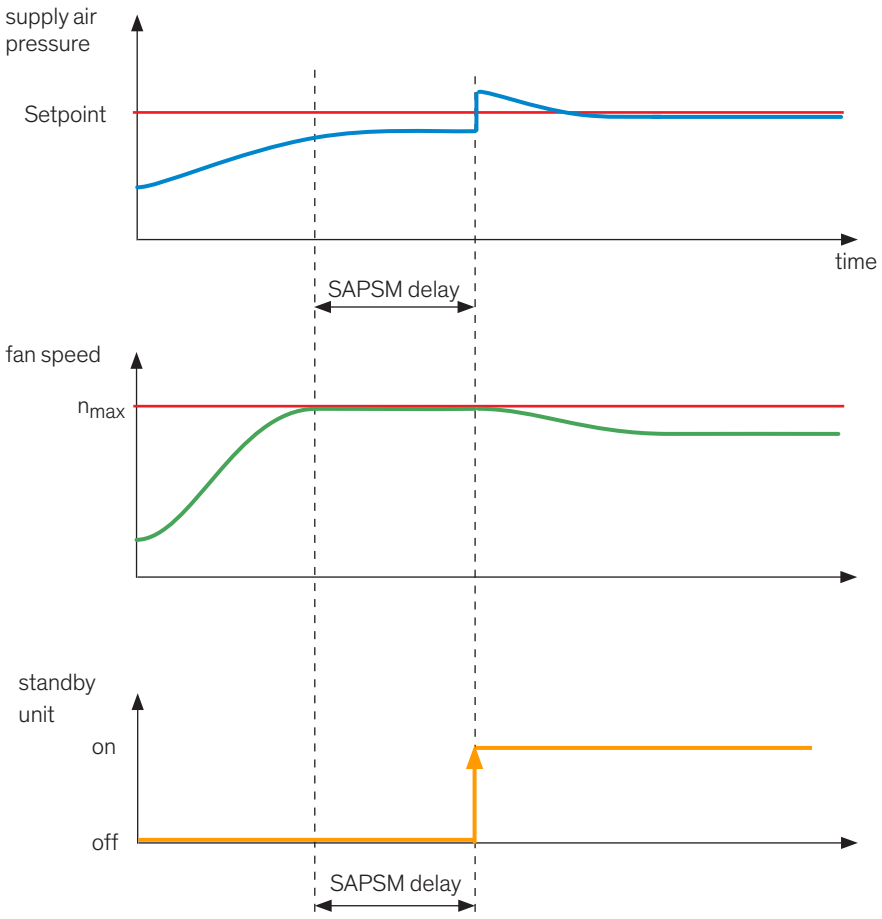
The supply air pressure is higher than the setpoint

The fan speed of all units in a zone is reduced to the minimum speed. As soon as the minimum speed is reached, the SAPSM delay is started. If the supply air pressure is still higher than the setpoint after the SAPSM delay has elapsed, while the fans run with minimum speed, the standby unit, whose SAPSM delay has elapsed, is switched off.



The supply air pressure is lower than the setpoint

The fan speed of all units in a zone is raised to the maximum speed. As soon as the maximum speed is reached, the SAPSM delay is started. If the supply air pressure is still lower than the setpoint after the SAPSM delay has elapsed, while the fans run with maximum speed, the standby unit, whose SAPSM delay has elapsed, is started.



The supply air pressure is equal to the setpoint

If the actual state has been caused by a pressure condition (e.g. the supply air pressure has been too low, that is why a standby unit has been started.) it does not change.

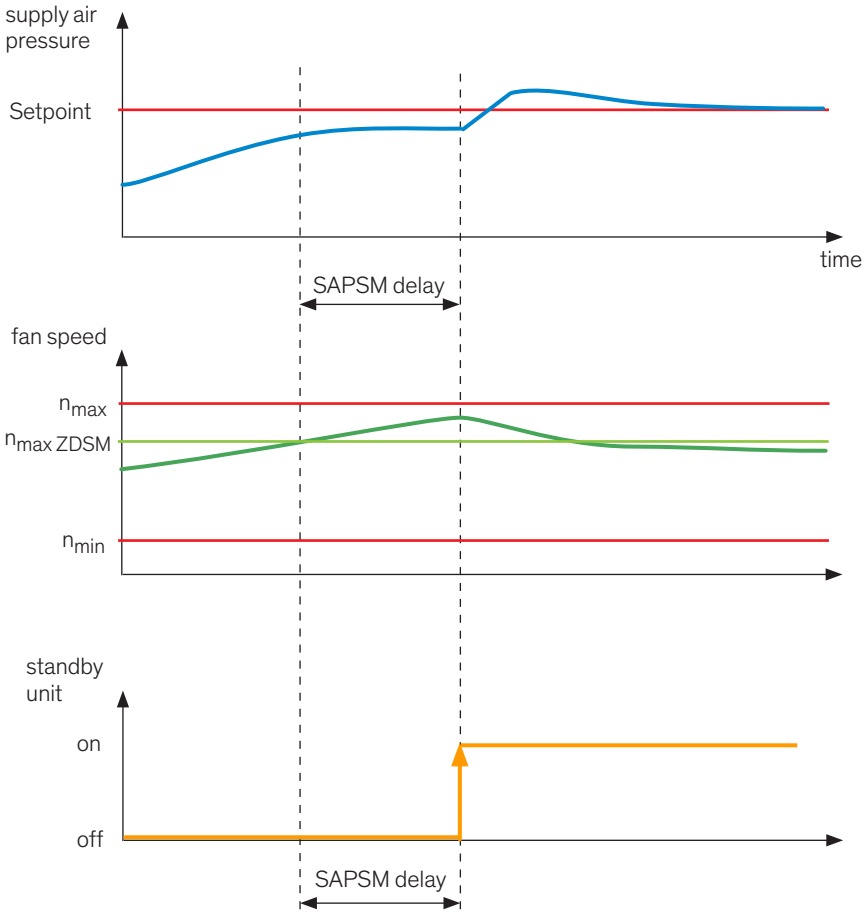
Otherwise the state is determined by the actual operating mode. If e-g- free cooling in the frame of DFC control is not possible anymore, the standby units are switched off. In the DX mode the control tries to match the supply air pressure setpoint by raising the fan speed.

Reduction of energy demand

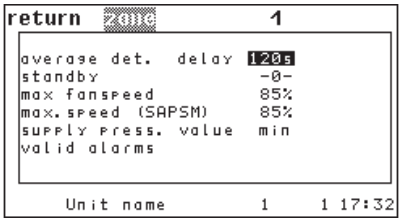
By the pre-set values when the pressure is too low, a standby unit is only switched on, if the fans run at maximum speed.

Under certain conditions it is favourable with regard to the energy demand to additionally put into operation one or more units. On one hand this increases the heat exchanger surface, on the other hand the required airflow is distributed on more units, so that the fan speed can be reduced.

By the maximum fan speed for SAPSM an additional switching on of standby units can be advanced or actually be enabled. For this the maximum fan speed for SAPSM must be adjusted to a value between the minimum and maximum fan speed. As soon as the fans have attained the maximum speed for SAPSM, the SAPSM delay is started. After the expiration of the SAPSM delay the first standby unit is started, if the supply air pressure is still too low.



Config/Zone/more/more



Command:

`zone 1 nmaxsapsm 40` (in %)

Restrictions:

Additional switching on for additional charge takes priority over switching off by pressure

A standby unit which has been started for an additional charge (cooling, humidification or dehumidification), will not be switched off, due to an excessively high supply pressure.

Switching off by pressure takes priority over free cooling

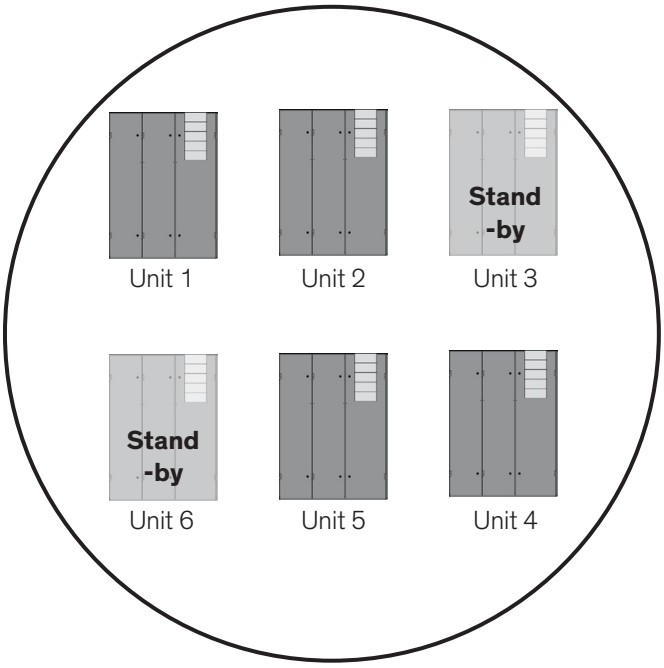
(in combination with DFC control or CW standby management)

A standby unit which has been stopped due to an excessively high supply pressure, is restarted only, if the supply air pressure is too low, even if free cooling is possible (and standby units would be normally switched on, as usual in DFC control or CW standby management).

SAPSM with sequencing

If the sequencing is enabled, the SAPSM delay must be set on different values on principle at all units in the zone, because the standby state moves over all units.
In the first example there are 6 units in a zone, two of which are standby units. Here two different SAPSM delays are sufficient, as always the same pairs of units are in standby.

Example 1:



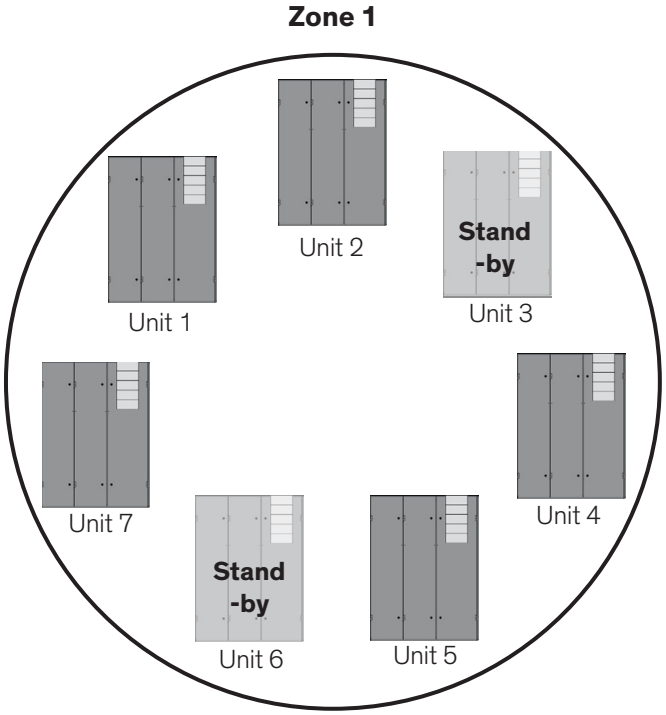
Standby state
Cycle 1: Unit 3 and 6
Cycle 2: Unit 4 and 1
Cycle 3: Unit 5 and 2
Cycle 4: Unit 3 ...
etc.

e.g.:
for unit 3, 4 and 5
SAPSM delay = 120 s

for unit 6, 1 and 2
SAPSM delay = 180 s

By the possible combinations of standby units you can determine how many different SAPSM delays are necessary.

Example 2:



Standby state
Cycle 1: Unit 3 and 6
Cycle 2: Unit 4 and 7
Cycle 3: Unit 5 and 1
Cycle 4: Unit 6 and 2
Cycle 5: Unit 7 and 3
Cycle 6: Unit 1 and 4
Cycle 7: Unit 2 and 5
etc.

e.g.:
for unit 1, 2 and 3
SAPSM delay = 120 s

for unit 4, 5 and 6
SAPSM delay = 180 s

for unit 7
SAPSM delay = 240 s

Hint:

Set the fan over-runtime and the pre-time of the louver on the same values for each unit in the zone. Set the SAPSM delay twice as big as the fan over-runtime.

Update to version 6.46 or higher
An update will automatically be detected. The supply air pressure setpoint will be adapted.
The sensors with the purpose 22 will automatically be changed to purpose 47.

NOTICE

However, the limit alarms for supply air pressure must be changed manually.

6.6.1 SAPSM and no supply air pressure control in case of sensor failure

Activation:
The SAPSM is activated by the special software option 9.

Command: `option 9 1`

The preceding description of the SAPSM applies with the following addition:
As soon as a supply air pressure sensor in the zone fails, the supply air pressure control is interrupted. The configured control with the next highest priority will be applied.

Order of priorities concerning the fan

Control according to:
1 = fixed speed (lowest)
2 = CW-standby-management
3 = Ecocool
4 = DFC
5 = temperature difference
6 = supply air pressure (highest)

6.7 Differential temperature control

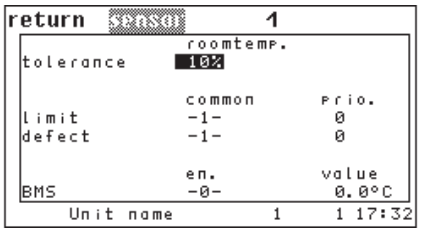
By the differential temperature control the speed of three fans can be separately controlled in dependance on the temperature difference between return air and supply air temperature.
For this purpose three return air and three supply air temperature sensors are necessary, which must be provided with the sensor purposes: supply temperature 1, 2, 3 and room temperature 1, 2, 3.

Six further temperature sensors will only be installed on the level of the software, these use the same inputs as the sensors first named and serve to calculate the average return air and supply air temperature, which are used as actual values for the temperature control of the A/C unit.
Depending on the control mode - return air or supply air, with or without limitation - one or both values are required for the temperature control.

The table below illustrates the assignment of analog inputs for a CyberRow ... GES unit:

Analog input	real sensors		virtual sensors	
	Sensor	Sensor purpose	Sensor	Sensor purp.
AIN 1	8	Supply air temp. 1	3	Supply temp.
AIN 2	9	Supply air temp. 2	14	Supply temp.
AIN 3	10	Supply air temp. 3	15	Supply temp.
AIN 4	6	external temp.	–	–
AIN 5	–	–	–	–
AIN 6	2	Room humidity	–	–
AIN 7	11	Room air temp. 1	1	Room temp.
AIN 8	12	Room air temp. 2	16	Room temp.
AIN 9	13	Room air temp. 3	17	Room temp.
AIN 10	5	Water inlet temp. 1	–	–
AIN 11	4	Water outlet temp. 1	–	–
AIN 12	7	Condensation press. 1	–	–

Config/Components/Sensor



Due to different positions of the supply air temp. and return air temp. sensors a deviation from the average of more than 10% (default) can occur for the sensors 1, 3, 14 - 17, which then releases the alarm "Sensor # excess".
To avoid this alarm, the admissible tolerance must be raised or set to 0%. At 0% the alarm is not evaluated.

Fan control

Fan speed is controlled in dependance on the temperature difference between return air and supply air temperature. A return air and a supply air sensor is assigned to each fan. The control parameters which are set for fan 1 are valid, however, for all three fans.

The control range can be subdivided into three sections, which are defined by two adjustable parameters.

The parameter "DTC start" (ΔT_0) ❶ marks the begin of PID control. Below this temperature difference between return air and supply air the fan runs with the speed n_{min}.

If $T_{return\ air} - T_{supply\ air} < \Delta T_0$ then $n_{fan} = n_{min}$

The parameter "DTC range" (ΔT_τ) ❷ sets the range of the PID control. Above the sum of start difference and gradient the fan runs with the speed n_{max}.

If $T_{return\ air} - T_{supply\ air} > \Delta T_0 + \Delta T_\tau$ then $n_{fan} = n_{max}$

In the PID control zone, so if $\Delta T_0 < T_{return\ air} - T_{supply\ air} < \Delta T_0 + \Delta T_\tau$ the fan speed stays in the range between n_{min} and n_{max}.

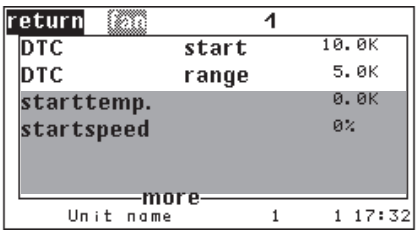
❸ `fan 1 min 30`
❹ `fan 1 nmax 95`

The parameter "DTC type" in the menu "Config/components/air/fan/special/more" must be set on "difference".

Command: `fan 1 dtctype 0`

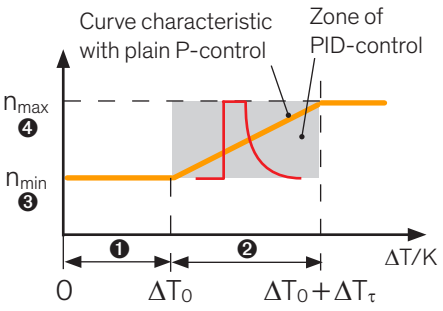
We recommend, not to use the following fan functions with the differential temperature control:
- reduction according to temperature
- reduction according to time
- dehumidification speed
- emergency operation

Operate/Components/Air/Fan

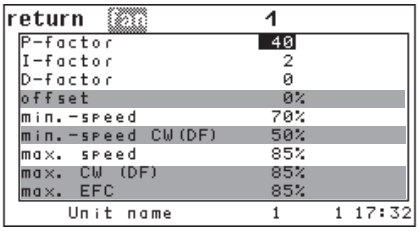


❶ `fan 1 dtcstart 10`
❷ `fan 1 dtcband 5`

Fan speed



Config/Components/Air/Fan/General

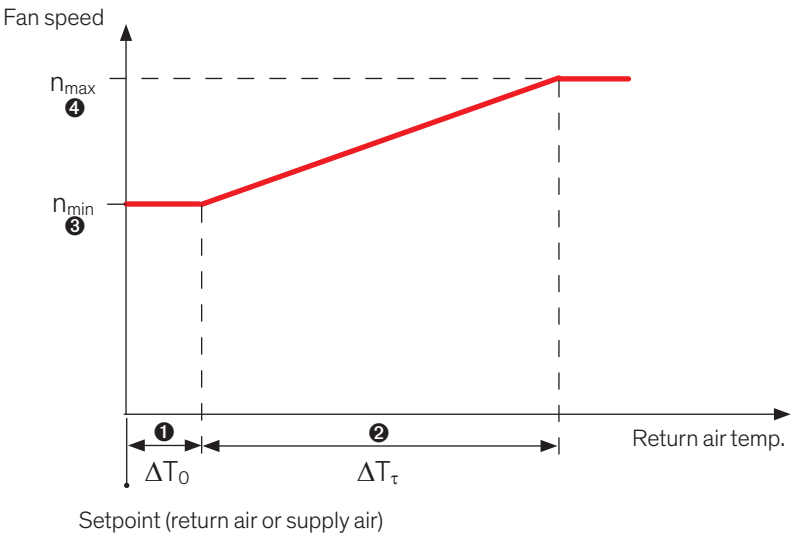


Differential temperature control according to return air

This variant of differential temperature control can be used for A/C units with EC fans (e.g. CyberAir).
With this control the fan speed is proportionally controlled according to the deviation of the return air temperature from the start temperature. Start temperature = setpoint + DTC start. The proportional range is determined by the parameter "DTC range". The PID factors for the fan are not considered. This control can also be used in combination with supply air control, the DTC start parameter should be set bigger then (ca. 7K).

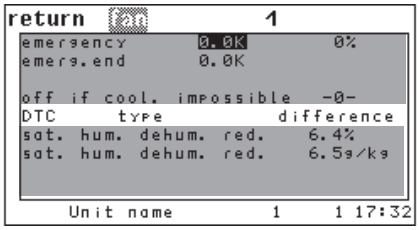
The following settings are necessary:

1. The parameter "DTC type" must be set on "return air" (command: `fan 1 dtctype 1`).
   By typing the command: `fan 1 dtctype 3` you can set a special form of differencial temperature control according to return air. In case of failure of the return air temperature sensor the fan speed is increased to n_{max}.
2. Setting of the parameter "DTC start" (can also be left on "0").
3. Setting of the parameter "DTC range"



Config/components/air/fan/special/more

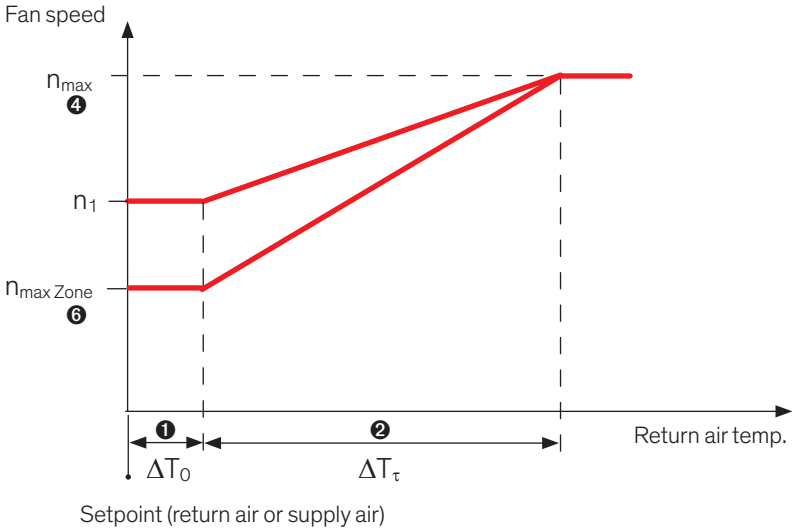
❺



❶ `fan 1 dtcstart 0,2`
❷ `fan 1 dtcband 1`
❸ `fan 1 min 70`
❹ `fan 1 nmax 95`
❺ `fan 1 dtctype 1`

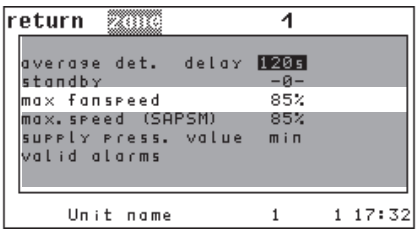
Differential temperature control according to return air with CW standby Management

For A/C units of the versions CW or ACW/GCW with CW cooling priority, which are assigned to a zone in combination with a CW standby management, a control according to the following diagram is possible. The lower fan speed of the proportional range is correspondingly raised in case of failure of an A/C unit.



Config/Zone/more/more

❻



❶ `fan 1 dtcstart 0,2`
❷ `fan 1 dtcband 1`

❹ `fan 1 nmax 95`
❺ `fan 1 dtctype 1`
❻ `zone 1 nmax 60`

$$n_1 = \frac{m \cdot n_{max\ Zone}}{m_1}$$

m : number of units in the zone
m_1 : number of running units in the zone

Example: $m = 7$; $m_1 = 6$

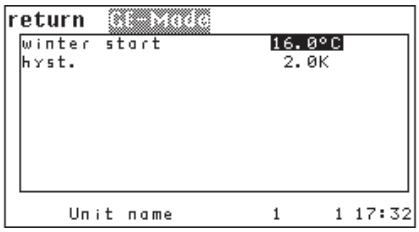
$n_1 = 7 \cdot 60\% / 6$
$n_1 = 70\%$

There are m units in a zone. If all m units are running, the minimum speed of each fan in each unit is $n_{max\ Zone}$. If only m_1 units are in operation (due to the failure of one unit), the minimum speed of each fan is n_1.

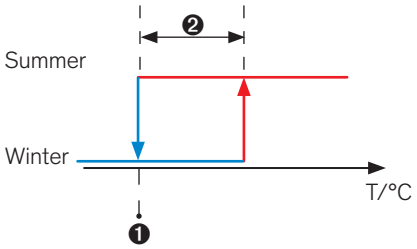
6.8 Summer-/winter operation

Config **Values/GE-mode**

The outside temperature ❶ for the commutation from summer to winter operation is decisive for the drycooler and compressor control. With this hysteresis ❷ the winter operation changes to summer operation.
The winter operation is also switched over to summer operation, if an outside temp. sensor breakdown is detected. An alarm "Outside temperature sensor defective" is not displayed.
If no outside temperature sensor is configured, summer operation is active.

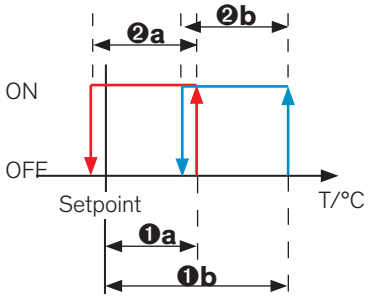


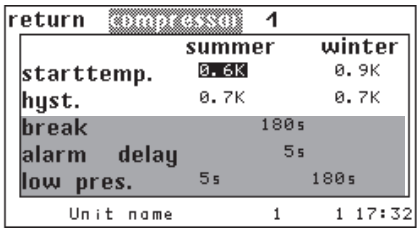
In the main menu winter operation is indicated by the following symbol.



Operate **Components/Cooling**
Compressor

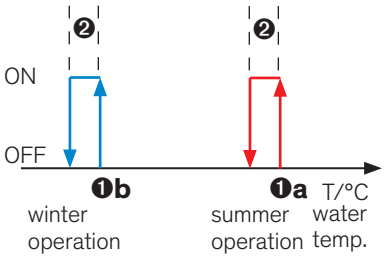
Two different start temperatures ❶a,❶b + hysteresis ❷a,❷b for summer and winter operation can be entered.

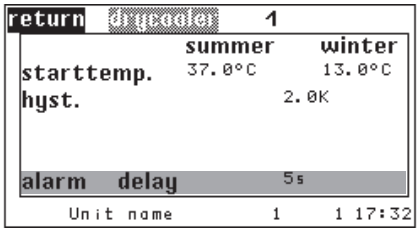




Operate **Components/Cooling**
Drycooler

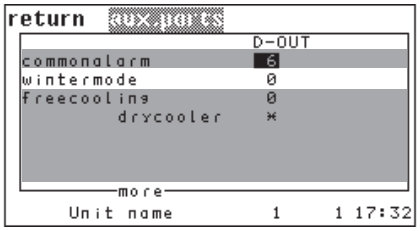
The start temperature for the drycooler is entered as an absolute value for the water temperature.
Two different start temperatures for summer ❶a and winter ❶b operation + hysteresis ❷ can be entered.





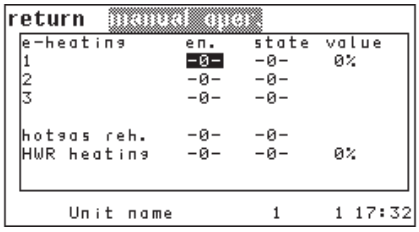
Config **Components**
Aux. Ports/Aux. Ports

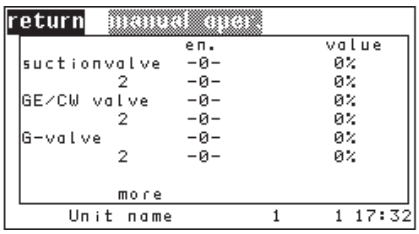
In this menu in the second line you can adjust the digital output for the wintermode. The wintermode signal can be forwarded to a BMS system.



6.9 Manual Operation

Components
Manual operation





When manual operation is used the C7000 control is put out of force.

The manual operation menu consists of two columns of parameters which are decisive for the operation.
In the first column (titled EN.) you enable the manual operation of the listed component by setting the parameter to "1". ❶
The second column (titled STATE) displays the actual state of the component.
After you have enabled the manual operation in the first column, you can switch on/off the component itself. ❷

For proportionally controlled components you can enter a percentage in the second column (titled VALUE) which corresponds to an opening degree for a valve or a capacity for any other component.
Components which exist either with on/off control or with proportional control have both columns (STATE and VALUE). But only the corresponding parameter comes into effect.

Sensors and external alarms can be simulated by the manual operation for the purpose of testing the controller function.

When the manual operation menu is left (e.g. when the menu "components" is reached again), the manual operation of each component is disabled and the controller takes over the control again.

NOTICE

When the fan is switched off, any other component is electrically blocked and can not be started.
If the unit is de-energized, all manual settings are reset.
However, the adjusted proportional values are kept.

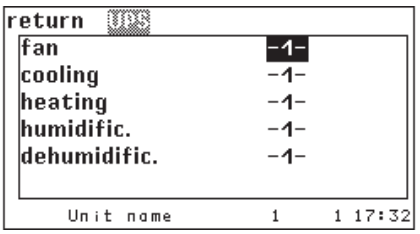
The corresponding commands:

❶ `eheat 1 hand 1`
❷ `eheat 1 handon (1)` ← Instead of 0/1 for "off/on" you can enter a percentage from 0 to 100 if the component is proportionally controlled.

`sensor 1 hand 1`
`sensor 1 handon 25`

6.10 UPS operation

Components
UPS



This window serves to determine the air conditioning functions in case of operation with Uninterrupted Power Supply.
If the controller receives the signal at its digital input for UPS operation, all the functions which are enabled by "1" will be admitted, whereas the functions with a "0" will be disabled.
Note that also the fan speed may be reduced to a pre-adjusted value in case of UPS-operation.

Disabled function	Components blocked
Fan	Fan and all other components except the control
Cooling	Compressor, ICC, HGBP valve, suction valve
Heating	E-reheat, hot gas reheat, hot water reheat
Humidification	Humidifier
Dehumidification	Dehumidifier (dehumidification request is inhibited.)

The GE/CW valve is not affected by UPS operation. That is why cooling by the GE/CW valve is still possible in CW- and GE-units even if the cooling function is disabled.
Take care of selecting the limitation by an absolute GEoff value in GE units.

The corresponding commands:

❶ `ups fan 1`
❷ `ups cool 1`
❸ `ups heat 0`
❹ `ups humi 0`
❺ `ups dehumi 0`

6.11 ACT - Adaptive Cooling Technology

Using the ACT, the temperature setpoint will be provided by the BMS. The connection to the BMS is monitored. In case of a connection error an emergency operation is activated after an adjustable time has elapsed.

There are two operating modes: normal operation and emergency operation.

Normal operation
Normal operation is activated as soon as the C7000IOC receives a temperature setpoint from the BMS and remains active as long as it receives a temperature setpoint within the adjusted time interval (command: act time <1..255>).
The control mode is set by the BMS or can be adjusted at the C7000 controller (command: act control <1..4>). The control mode adjusted in the C7000IOC, which is active at ACT activation, is not taken.
If the C7000IOC receives a temperature setpoint from the BMS, without that the control mode has been set, the temperature is controlled according to the return air temperature.

Emergency operation
If the C7000IOC does not receive any temperature setpoint within the adjusted time interval from the BMS and if the A/C unit is in normal operation, the controller changes into emergency operation.
Emergency operation is active right after switching on the C7000IOC. It will be quit as soon as the C7000IOC receives a temperature setpoint by the BMS.
In emergency operation the air is conditioned according to the control mode and temperature setpoint which are set in the C7000IOC.

Commands:

`option 6 1`	enables ACT function
`act control 1`	sets control mode in normal operation (in the example: control according to room air)
`act time 60`	sets time interval for communication monitoring (in seconds)

6.12 Calculation of the Air Volume Flow

To calculate and display the air volume flow the A/C unit must be equipped with a nozzle and a differential pressure sensor.
The differential pressure sensor must be configured with the sensor purpose "35 - Diff.press. airflow“.

The airflow is calculated using the differential pressure and the k value, a specific nozzle value which is delivered by the manufacturer.

The k value range is 0..65535, with the preadjusted 0, by which the calculation is disabled (nozzle not existent). The actual value is output at the IOC by the commands "avf“ and "is 3“.

The k value can be adjusted in menu Config/Values/Air or by the command:

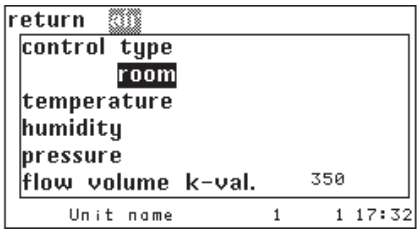
```
avf nozzle 380
```

The airflow is displayed
- at the C7000IOC by "is 1“
- at the C7000AT under "Info/Values/Air“ (only, if k > 0)

The calculated air volume flow can be output by an analog output.
See menu Config/components/aux. ports/A-OUT.
The sensor purpose which must be chosen is "air volume flow" (command: valout # use 37).

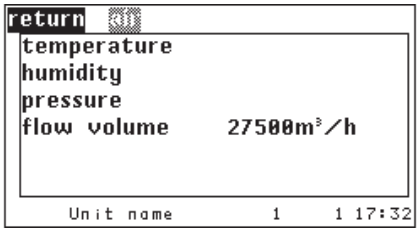
Config

.../Values/Air



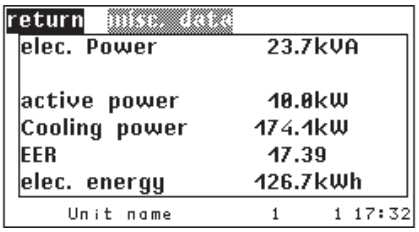
Info

.../Values/Air



6.13 Power indication

Info/Values/Misc. data/more



The electric power, the active power and the electric energy can be displayed by using an electric meter installed at the main power supply.
The following sensor purposes are necessary for electric meters with analog outputs:

48: actual electric power
51: electric active power

The electric meter is connected via Modbus can be configured by the following commands:

`em conf 1`	activation of the electric meter
`em id 247`	setting of the Modbus address (example: 247)

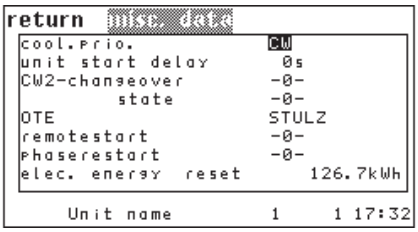
The cooling capacity can be calculated and displayed by using the temperature difference between water inlet and water outlet and the water volume flow.
This is only possible for single circuit CW units.
The EER value is calculated by the quotient of cooling capacity and electric active power.

The density and the heat capacity which are necessary to calculate the cooling capacity are set for water in the default setting. If the A/C unit contains a water/glycol mixture you must adapt the density and heat capacity.

Use the following commands:

`eer heatcapacity 4187`	setting the heat capacity (example: water)
`eer density 1.000`	setting the density (example: water)

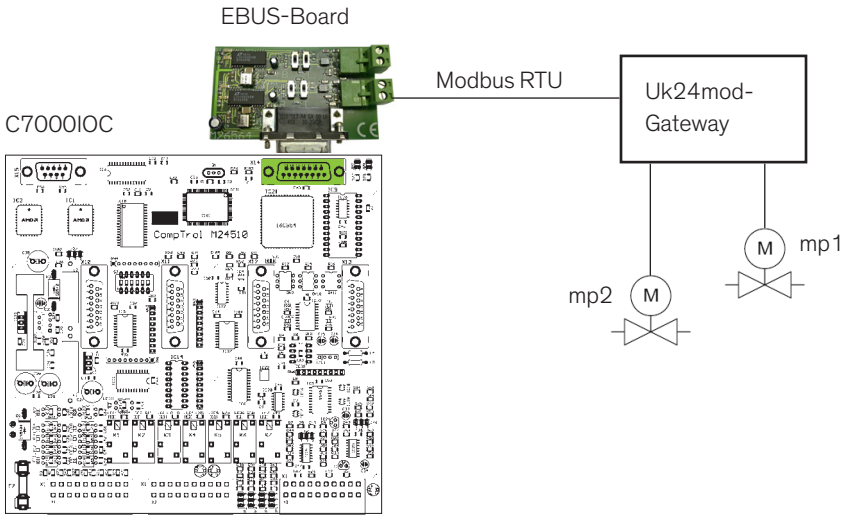
Config/Values/Misc. data



The counter for the electric energy can be deleted.
Handling:

1. select "elec. energy" by the selector key.
2. confirm by the OK key.
3. the cursor is now in the middle column on a case which indicates "return". By the selector key you can choose between the options "reset" and "return".
4. confim selected function by the OK-key.

6.14 Control of a Uk24mod gateway



The Uk24mod gateway is controlled by the C7000IOC using the Modbus RTU protocol.
The Uk24mod gateway can administrate two MP nodes.
The component which is behind an MP node at the time is a pressure-independent water control valve.

The water control valve is controlled by the parameters of the GECW valve.

C7000IOC and Uk24mod gateway are configured at the unit delivery ready for use.
If the configuration is reset to the default settings, the following parameters must be set so that the communication between the C7000IOC and Uk24mod Gateway works:

1. Assignment of gateway 1 to GECW valve 1	`gecwv 1 uk24modmpvalve 1`
2. Configuration of MP1 node	`uk24mod 1 mp1 conf 1`
3. Setting of Modbus ID of the gateway	`uk24mod 1 id 3`

Find out the Modbus ID by the setting of the dip switches on the Uk24mod gateway. 8 dip switches, by which the Modbus ID is set in binary form, are located under the front cover.

The status request for the Uk24mod gateway gives the following display:

```
ioc 01:>uk24mod 1
MP1 configured.........................:1
MP2 configured.........................:0
Modbus bus ID..........................:3
Common alarm...........................:0
Alarmprio..............................:0
Commonalarm not available..............:0
Alarmpriority not available............:0
( 13) MP1 min..........................:0.00 %
( 14) MP1 max..........................:100.00 %
( 33) MP2 min..........................:0.00 %
( 34) MP2 max..........................:100.00 %
Availability...........................:100 %
Alarm availability.....................:0

(  0) Setpoint.........................:0.00 %
(  1) Forced control...................:0 (None)
(  2) Command..........................:0 (None)
(  3) Current drive position...........:0.00 %
(  4) Relative volume flow.............:0.00 %
(  5) Error / disturbance..............:0
(  6) Sensortype.......................:0 (None)
(  7) Currennt sensor value............:0
(  8) Serial number 1st.part...........:1633
(  9) serial number 2nd.part...........:20004
( 10) serial number 4th.part...........:108
( 11) Drive type.......................:5 (controller volume flow VAV/EPIV)
( 12) Time monitoring..................:0 s
( 13) Min..............................:0.00 %
( 14) Max..............................:100.00 %
( 15) Absolute volume flow.............:0
( 16) Nominal volume flow..............:288
```

Commands:

`uk24mod 1 mp1 conf 1`	configuration of MP1 node
`uk24mod 1 mp2 conf 1`	configuration of MP2 node
`uk24mod 1 id 3`	Modbus-ID
`uk24mod 1 commonalarm 1`	release of common alarm
`uk24mod 1 alarmprio 3`	alarm priority
`uk24mod 1 commonalarmna 8`	reachability common alarm
`uk24mod 1 alarmpriona 9`	reachability alarm priority
`uk24mod 1 mp1 min 0.00`	setting of lower limit value
`uk24mod 1 mp1 max 100.00`	setting of upper limit value

The following values are plain display values:
Display of Uk24mod gateway reachability
Display of reachability alarm (when display: 1)

Setpoint by GECW valve

An eventual error of the MP1 node is displayed here.

6.15 Special software option for CyberLab units

The CyberLab function is activated by the following command:

```
option 8 1
```

By activating this special software option the following features come into force:
- the EC compressor (ICC) runs permanently.
- the electric reheat is controlled by PID factors.
  by the following commands you can set the PID factors.

```
eheat 1 pid kp 40
eheat 1 pid ki 2
eheat 1 pid kd 0
```

- for the EC compressor and the electric reheat there is a setpoint spread of 0,1 K if both components are simultaneously in operation.
  With a setpoint of e.g. 24,0°C, the EC compressor runs at 24,1°C and lower at minimum speed, the electric reheat is switched off at 23,9°C and higher.

Dehumidification

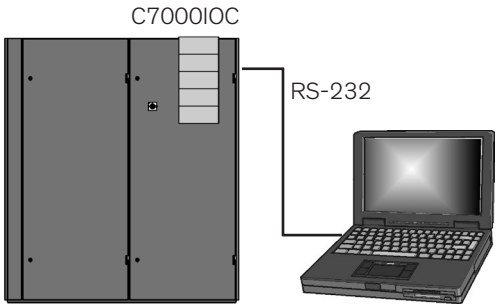
Dehumidification by superheating adaptation:
During dehumidification by superheat adaptation, the evaporation temperature falls beneath the dew point so that a condensation is produced. The temperature control is not influenced by this. With low room loads and as a consequence low compressor power, it can happen that the air is only slightly dehumidified.

Dehumidification with additional compressor speed increase:
To also dehumidify efficiently with low heat loads (compressor power) the compressor speed is increased during dehumidification. To maintain the temperature the air must be reheated. If the electric reheat does not suffice, the hotgas reheat is additionally switched on due to its start value.

7. Bus communication

7.1 System architecture with the C7000IOC

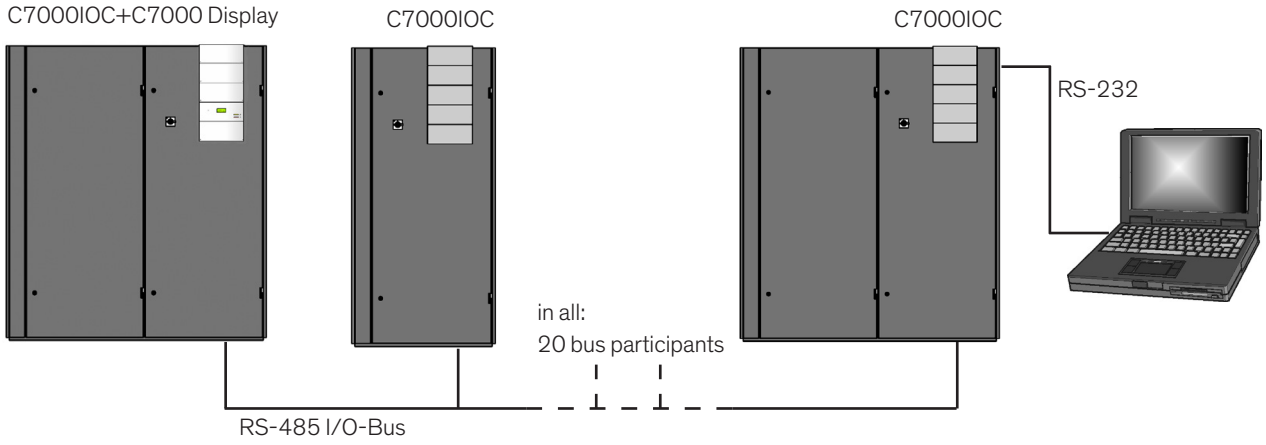
Minimum configuration



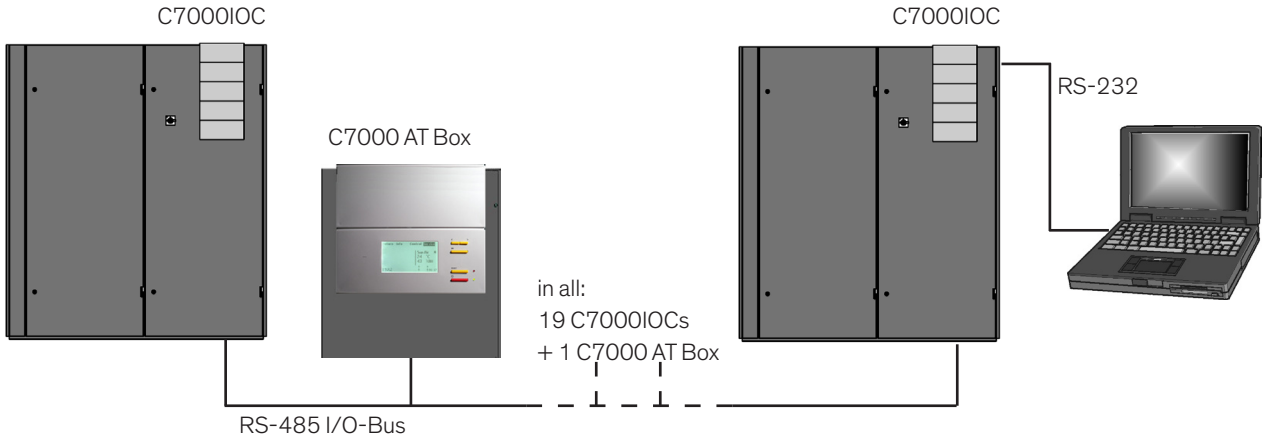
Notebook or PC equipped with a terminal program to communicate with the I/O-controller

The basic configuration of the C7000 consists of a C7000IOC.

Maximum configuration

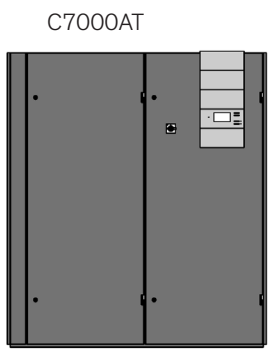


Up to 20 C7000IOCs can be linked in a C7000 I/O bus system. The C7000 AT Box which serves to configure or to operate the A/C units equipped with an C7000IOC also takes part in the RS-485 bus. The C7000Display neither participates in the bus nor occupies a bus position.



7.2 System architecture with the C7000AT

Minimum configuration

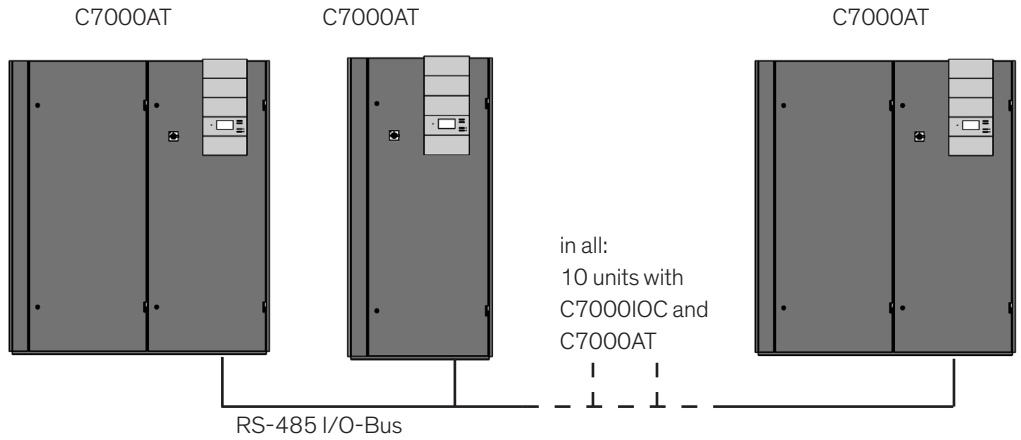


The minimum configuration consists of an A/C unit with a C7000AT and a C7000IOC.

Maximum configuration (concerning n° of A/C units)

The maximum configuration in relation to the number of A/C units consists of 18 A/C units with a C7000IOC and 1 A/C unit with a C7000AT and a C7000IOC which results in 20 bus sharing elements. The C7000Display neither participates in the bus nor occupies a bus position.

Maximum configuration (concerning the operational facilities & the n° of A/C units)



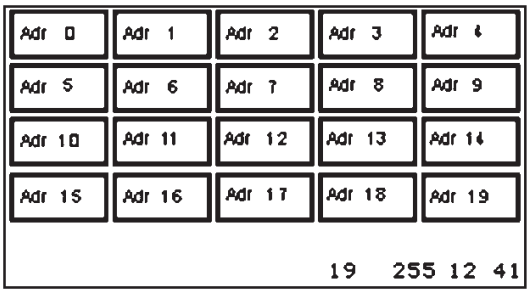
The maximum configuration in relation to the operational facilities and the number of A/C units consists of 10 A/C units with a C7000IOC and a C7000AT which also results in 20 bus sharing elements.

7.3 Bus Layout

7.3.1 General

The IO bus consists of maximum 20 participants. In case of the C7000 system only C7000IOC or C7000AT bus 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 a bus overview (start window) as follows:



7.3.2 Configuration of the IO bus

The configuration of the bus is done automatically during start-up and operation. That means that all connected bus participants log on automatically. The same applies in case of a failure - all bus participants are logged off automatically.

Following preconditions must be fulfilled:

1. Each bus participant has its own bus address which must be unique in the bus system.
2. Bus addresses must range between 0 and 19.
3. All bus participants are connected appropriately with bus cables according to requirements (see next page).
4. The bus has to be terminated at the beginning and at the end.

Each bus participant saves the latest registered configuration during shut-down. Furthermore the bus participant expects the same configuration after its next start-up.
In case new systems have logged on to the bus during the shut-down period, the bus participant detects these systems and records them in the bus configuration without editing a message or an alarm.
In case a system has been disconnected from the bus which was active before shut-down, the bus participant detects this condition and a bus error is triggered in the bus participant after the end of the alarm delay.

The same happens when a bus participant (C7000IOC or C7000AT) is de-energized during operation.

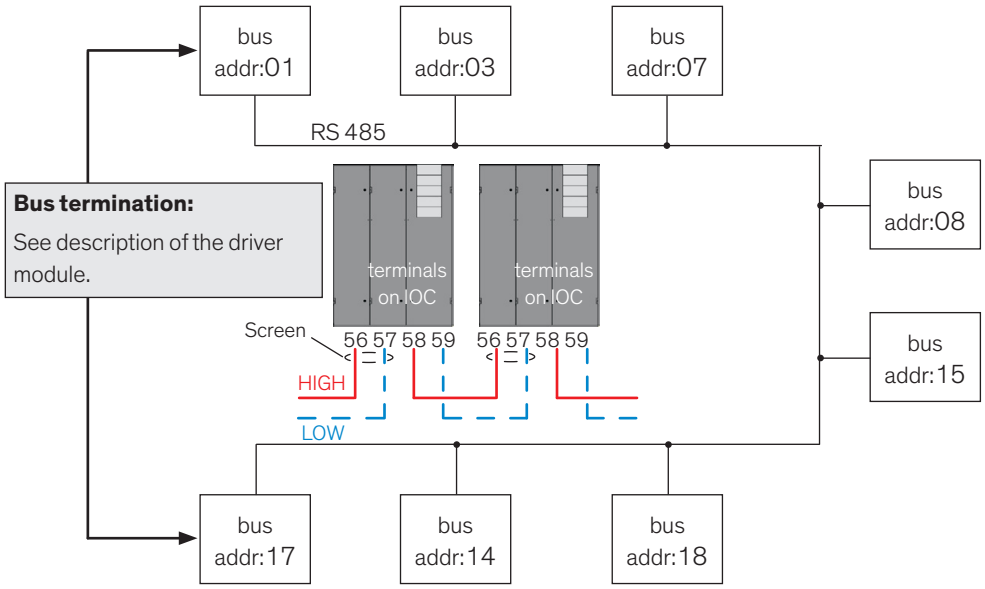
All systems that are connected to the bus detect a bus error automatically. Accordingly this error is displayed on the C7000AT and C7000IOC.

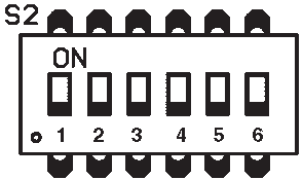
7.3.3 Preparation before Installation

You need a shielded cable with two lines twisted and a cable impedance of 120 Ω (Recommendation Belden 9841), which you have to connect from unit to unit at the terminals 56-59 of each C7000IOC. Connect the screen only at one side of the cable.

In the example below the bus termination of the two units which form the end of the bus (addr. 01 and addr. 17) must be enabled.

The example of a RS485 bus shows an application with 8 bus participants.





Bus addr.	DIP switches 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

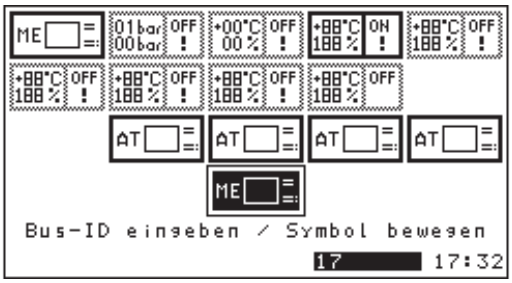
7.3.4 Setting the Bus Address

The bus address is adjusted with the dip-switches on the C7000IOC. The table at the right shows the corresponding adjustment for all possible bus addresses. Please note that the counting begins with 0 and ends with 19. A "1" means dip-switch in "ON"-position.
If you set an address higher than 19, this one is reduced to 19 by the software.
A C7000IOC is delivered with the address 1 as standard, a C7000AT has the address 0 as standard.

On a C7000AT the bus address is adjusted in the **placement view**.

in short:
1. connect units by bus lines
2. set bus terminations (beginning/end)
3. adjust bus-IDs
4. confirm bus configuration

Placement view



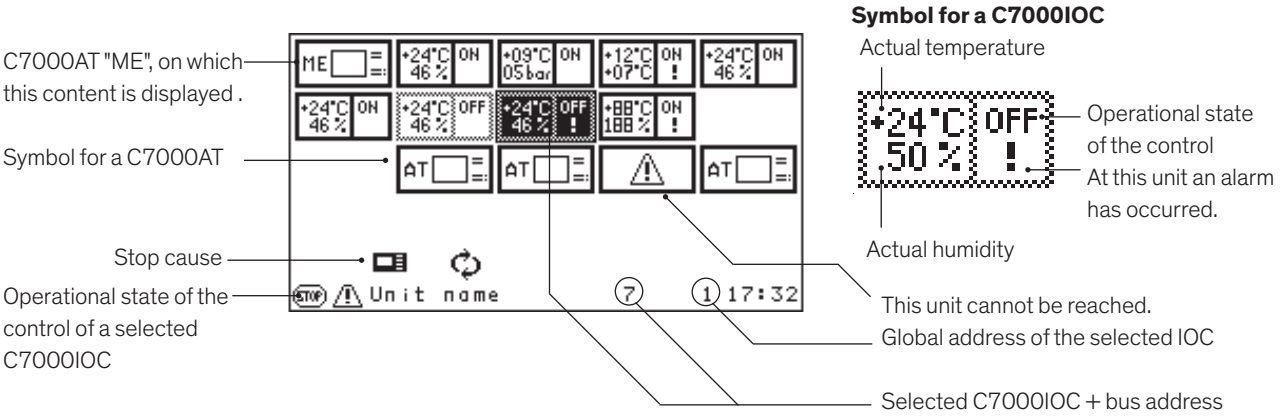
With the selector key you can shift the C7000AT represented by symbol "ME" to a new position and change its bus address this way.

Left display: old position address 0, new position address 17.

To confirm the selection press the OK key.
Now the bus configuration must be confirmed to avoid the display of a bus error, because a bus participant with the address 0 does not exist anymore.
The addresses of all other participants are not affected by this.

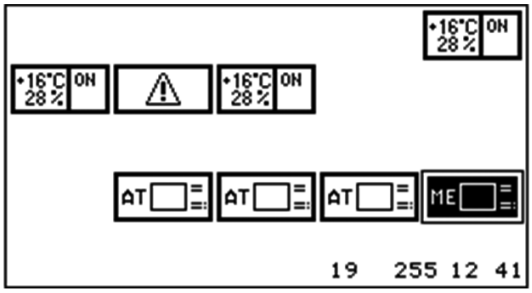
How to get to the placement view and how to confirm the configuration, see chapter 3, page 10.

7.3.5 Bus overview



Example for a de-energized or disconnected (from the bus) IOC with data bus address 6

The AT with the bus address 19 edits the following configuration after the IOC 6 has been switched off :

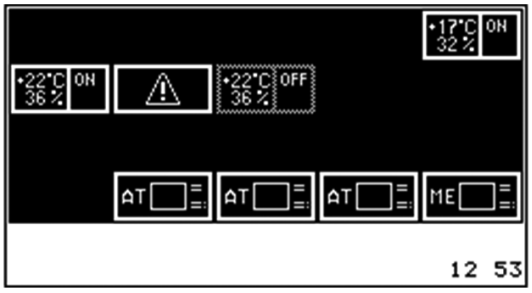



```
ID  glob.adr.    dev.type          reliab.   config.
 0          -    unknown             0%        0
 1          -    unknown             0%        0
 2          -    unknown             0%        0
 3          -    unknown             0%        0
 4          -    IO-Controller     100%        1
 5          -    IO-Controller     100%        1
 6          -    unknown             0%        1    error
 7          -    IO-Controller     100%        1
 8          -    unknown             0%        0
 9          -    unknown             0%        0
10          -    unknown             0%        0
11          -    unknown             0%        0
12          -    unknown             0%        0
13          -    unknown             0%        0
14          -    unknown             0%        0
15          -    unknown             0%        0
16        255    AdvancedTerminal  100%        1
17        255    AdvancedTerminal  100%        1
18        255    AdvancedTerminal  100%        1
19        255    AdvancedTerminal   me         1

ERROR IN THE BUS CONFIGURATION DETECTED.
```

Column "config" displays, which bus addresses are expected as active bus participants.

When the availability of a configured unit is 0%, an error is indicated.

The C7000AT 19 detects, that the IOC 6 has been available in the bus, but can not be reached anymore. When the disconnected unit is switched on again, the bus error is automatically deleted at all bus participants. A bus error can also be deleted by inputting the command "`iobusok`" at a C7000IOC or a C7000AT.



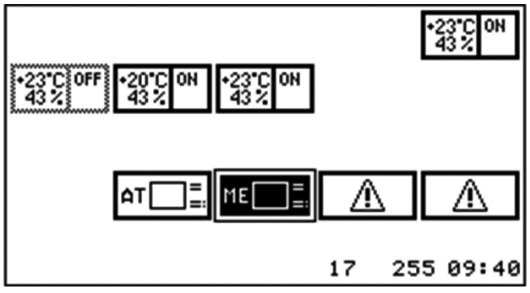
There is another way to delete a bus error on the C7000AT and to transfer so the actual bus configuration.
For this purpose all systems have to be selected simultaneously and afterwards the OK-button has to be pressed.
After entering the password the faulty unit (address 6) is deleted from the bus. The bus error disappears.

7.3.6 Special cases

Disconnecting a bus

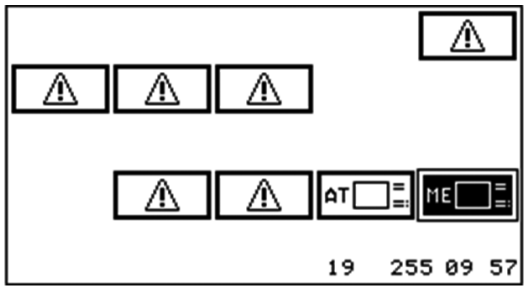
An important aspect concerning the display of the IO bus is that the display is always exclusively dependent on the C7000AT which is in use at the moment.
For example a bus disconnection between the bus participants 4, 5, 6, 7, 16, 17 and the bus participants 18, 19 results in two completely independently running busses.
However the bus participants 4, 5, 6, 7, 16, 17 report the bus participants 18, 19 as faulty and vice versa.

IO bus belonging to the bus participant 17




```
ID  glob.adr.    dev.type          reliab.   config.
 0          -    unknown             0%       0
 1          -    unknown             0%       0
 2          -    unknown             0%       0
 3          -    unknown             0%       0
 4          1    IO-Controller     100%       1
 5          1    IO-Controller     100%       1
 6          1    IO-Controller     100%       1
 7          1    IO-Controller      95%       1
 8          -    unknown             0%       0
 9          -    unknown             0%       0
10          -    unknown             0%       0
11          -    unknown             0%       0
12          -    unknown             0%       0
13          -    unknown             0%       0
14          -    unknown             0%       0
15          -    unknown             0%       0
16        255    AdvancedTerminal    95%       1
17        255    AdvancedTerminal    me%       1
18          -    unknown             0%       1    error
19          -    unknown             0%       1    error

ERROR IN THE BUS CONFIGURATION DETECTED.
```

IO bus belonging to the bus participant 19



ID	glob.adr.	dev.type	reliab.	config.	
0	-	unknown	0%	0	
1	-	unknown	0%	0	
2	-	unknown	0%	0	
3	-	unknown	0%	0	
4	-	unknown	0%	1	error
5	-	unknown	0%	1	error
6	-	unknown	0%	1	error
7	-	unknown	0%	1	error
8	-	unknown	0%	0	
9	-	unknown	0%	0	
10	-	unknown	0%	0	
11	-	unknown	0%	0	
12	-	unknown	0%	0	
13	-	unknown	0%	0	
14	-	unknown	0%	0	
15	-	unknown	0%	0	
16	-	unknown	0%	1	error
17	-	unknown	0%	1	error
18	255	AdvancedTerminal	100%	1	
19	255	AdvancedTerminal	me	1	

ERROR IN THE BUS CONFIGURATION DETECTED.

The bus error has an adjustable alarm delay. Once this delay has expired the bus error is triggered. This delay is separately adjustable for each bus participant.

Address conflict

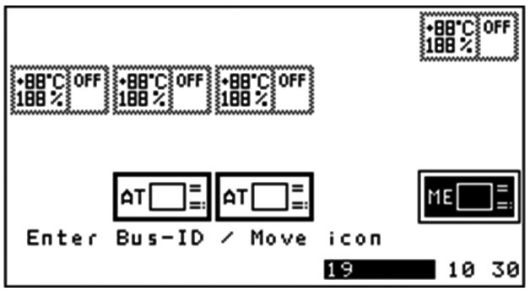
The second failure concerning the bus is a conflict in the address. A conflict in the address occurs when two or more bus participants have the same bus address.
That means that the two bus participants which have the same address send simultaneously data to the bus.
This on the other hand would destroy the data on the bus.
Communications via the bus would be limited.

But this does not happen because bus participants stop the data transfer immediately as soon as they detect that another participant with the same address is sending a data package.
That means that they stop sending and hence do not participate in the communication on the bus anymore.

An address conflict is triggered immediately as soon as a unit has performed a deactivation.

In our example two C7000ATs have the bus address 19.
As soon as the communication on the bus starts, one of them detects that the address 19 has been assigned twice and performs a deactivation. The result is that only one bus participant with the same address is active after a short time.

The user is requested to choose another bus address at the C7000AT which has detected the address conflict. For it the following positioning window is displayed.




```
ID  glob.adr.    dev.type          reliab.    config.
 0         -    unknown              0%         0
 1         -    unknown              0%         0
 2         -    unknown              0%         0
 3         -    unknown              0%         0
 4         1    IO-Controller      100%         1
 5         1    IO-Controller      100%         1
 6         1    IO-Controller      100%         1
 7         1    IO-Controller      100%         1
 8         -    unknown              0%         0
 9         -    unknown              0%         0
10         -    unknown              0%         0
11         -    unknown              0%         0
12         -    unknown              0%         0
13         -    unknown              0%         0
14         -    unknown              0%         0
15         -    unknown              0%         0
16       255    AdvancedTerminal   100%         1
17       255    AdvancedTerminal   100%         1
18         -    unknown              0%         1
19       255    AdvancedTerminal    me          1    conflict

BUS ADDRESS CONFLICT AT ADRESS ‚ME' = 19 DETECTED.
```

If an address conflict exists, this one is indicated for the corresponding bus participant.

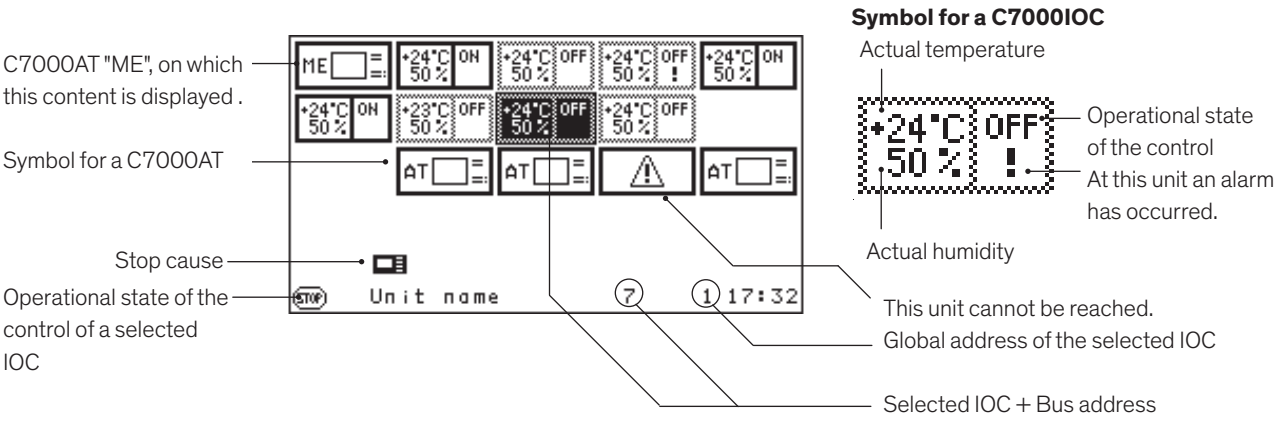
The other C7000AT with the bus address 19 continues operation without any interference.

After the bus address has been assigned properly the address conflict will be solved automatically.
An address conflict can only be displayed at the unit, which causes the address conflict, because it excludes itself immediately from bus communication. If this unit is a C7000AT, this is displayed on the display. An address conflict can only be displayed at unit "ME".
If the unit is a C7000IOC the error LED on the board flashes, the state of the bus configuration can then be requested by using the service port.

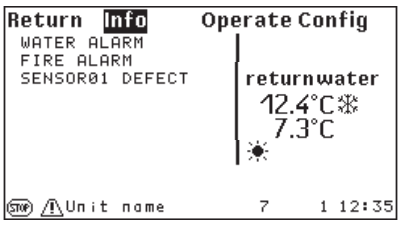
8. Alarm treatment

8.1 Alarm display

In the bus overview window an alarm is indicated by the sign "!". You obtain further information about the alarm, if you select the unit, on which the alarm has occurred (in the example: unit with bus address 03), and press the confirmation key.



You obtain this window if you select the unit with the alarm as described above.



The alarm messages are displayed in the standard window of each unit with C7000IOC.
At the same time the symbol ⚠ in the left bottom indicates that an alarm has occurred.

An alarm tone proves the presence of an alarm.
Attention: The alarm tone can be disabled.

The alarm display in the command level (C7000IOC) is passive. This means that you have to type in the command "state" to see the occurred alarms.

```
„state"

Unit:Running
- Runtime:169 h
- Stoptime:0 h
Cooling: DX active (169 h)

- Compressor 1:1 (<=100.00%)
- Pump 1:1
- Condenser fan 1:86 %

Alarms:
- envelope left C.2
```

8.2 Alarm Reset

C7000AT

Reset the alarms by pressing the RESET-key. Pressing it once mutes the alarm tone. Pressing it again resets all alarms. However, if the alarm cause has not been eliminated, the alarm will appear again.
Alarms can either be reset in the standard window for each single unit or in the bus configuration overview by marking all bus participants for all units.

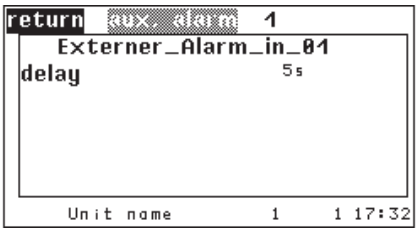
C7000IOC

Reset the alarms for one unit with the command "`alarmreset`" or "`ar`".

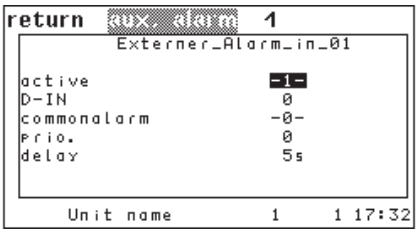
8.3 Configuration of external and unit alarms

Components/Aux. Ports
Aux. Alarm

Operate



Config



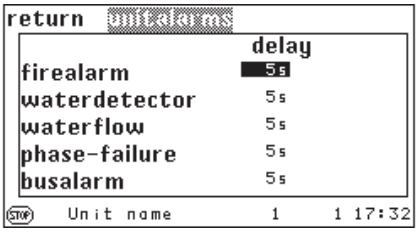
Alarm parameter:
Alarm delay ❻

In the first line you can type in the alarm text which you want to be displayed in case of the alarm. ❶
By setting the parameter "ACTIVE" on 1 you add an external alarm to the configuration. With "0" you disable the ext. alarm. ❷

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

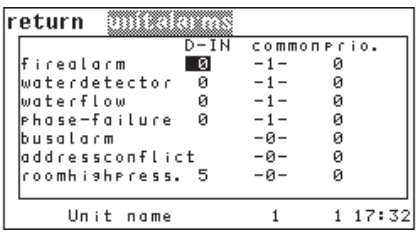
Components/Aux. Ports
Unit alarms

Operate



Concerning the unit alarms, you can adjust the alarm delay for the fire alarm ❺, water alarm ❻, water flow alarm ❼, phase failure ❽ and bus alarm ❾.

Config



In this window you can assign digital inputs to unit alarms (❶-❹)a, determine, whether the corresponding alarm releases a common alarm (❶-❻)b and assign the alarm to a relay (❶-❻)c.

1. Fire ❶, by an external smoke and temperature sensor
2. Water ❷ by an external water detector
3. Water flow failure ❸ by a flow sensor
4. Phase failure ❹ by a phase control module
5. Busalarm ❺,
6. Address conflict ❻, these alarms are detected by the controller and need neither sensor nor digital input.

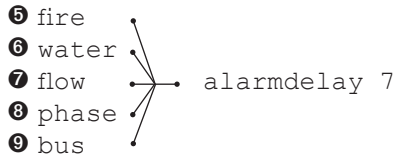
Aux. alarm

Config

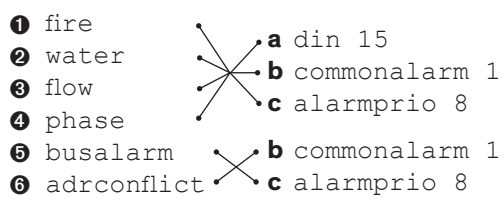
```
❶ exalarmin 1 text xxx123
❷ exalarmin 1 conf 1
❸ exalarmin 1 alarm 11
❹ exalarmin 1 commonalarm 0
❺ exalarmin 1 alarmprio 9
❻ exalarmin 1 alarmdelay 6
```

Unit alarms

Operate



Config



8.4 Alarm texts

Alarm text	Cause	Effect
LOW PRESSURE 1	LP switch/LP limit bigger than actual value, circuit 1	Compressor 1 off
COMP 1 FAILURE/HP	HP switch/HP threshold exceeded, circuit 1, Internal compressor power switch	Compressor 1 off
LOW PRESSURE 2	LP switch/LP limit bigger than actual value, circuit 2	Compressor 2 off
COMP 2 FAILURE/HP	HP switch/HP threshold exceeded, circuit 1, Internal compressor power switch	Compressor 2 off
E-HEAT # FAILURE	Temperature switch/heating MCB	Heating # off
HUMIDIFIER # FAIL	Humidifier MCB	Humidifier # off
AIRFLOW FAILURE #	Airflow differential switch	all components off
FILTER ALARM	Filter differential switch	Fan speed increase according to parameter "Filter offset"
EXTERNAL ALARM #	External alarm signal	no direct effect*
HUMIDIFIER # 5µS	Conductivity >5µS	no direct effect*
HUMIDIFIER # 20µS	Conductivity >20µS	Ultrasonic humidifier off
PUMP # FAILURE	Pump # MCB triggered	Pump # off
DRYCOOLER # FAIL	Drycooler # MCB triggered	Drycooler # off
WATER ALARM	Water detector	Humidifier off
RETURN AIR TEMP TOO HIGH	Return air temp. > limit value	no immediate effect
RETURN AIR HUM TOO HIGH	Return air humidity > limit value	no immediate effect
SUPPLY AIR TEMP TOO HIGH	Supply air temp. > limit value	no immediate effect
SUPPLY AIR HUM TOO HIGH	Supply air humidity > limit value	no immediate effect
WATER TEMP TOO HIGH	Water temp. > limit value	no immediate effect
RETURN AIR TEMP TOO LOW	Return air temp. < limit value	no immediate effect
RETURN AIR HUM TOO LOW	Return air humidity < limit value	no immediate effect
SUPPLY AIR TEMP TOO LOW	Supply air temp. < limit value	no immediate effect
SUPPLY AIR HUM TOO LOW	Supply air humidity < limit value	no immediate effect
WATER TEMP TOO LOW	Water temp. < limit value	no immediate effect
FIRE ALARM	Fire/smoke detector	all components off
PHASE FAILURE	Phase failure, excess voltage, undervoltage, asymmetry, phase sequence	all components off
SENSOR # EXCESS	Tolerance exceeded	faulty sensor # excluded
SENSOR # DEFECT	Measured voltage/current out of defined range	faulty sensor # excluded
HG-HEAT FAILURE	Thermostat at the hotgas reheat triggered.	HG reheat solenoid valve will be closed.
PRESS.SEN.ERR. EEV	Pressure sensor or cable EEV defective	Valve opening remains in actual position.
TEMP.SEN.ERR. EEV	Temp.sensor or cable EEV defective	Valve opening remains in actual position.
STEPPER ERR. EEV	Stepper motor EEV defective	Valve opening remains in actual position.
UNRELIABLE EEV	RS485 bus connection faulty	Valve is closed after 15 seconds. With the option "manual override switch" an OPEN/CLOSE operation is possible.

stands for a number.
* the corresponding alarm can be configured to release a common alarm which can control further equipment by a digital output.
** the alarm text can be configured.

Except the alarm "UNRELIABLE EEV" all alarms must be manually reset on the C7000AT or C7000IOC.

Alarm text	Cause	Effect
BUS ERROR	Controller can not be reached, is switched off	Controller excluded from zone control
ADDRESS CONFLICT	2 bus participants have same bus address	Controller excluded from bus communic.
µPC COMM.LOSS	RS485 bus connection faulty	Compressor is switched off.
DEFECT SENSOR B3	Sensor failure analog input B3 - suction gas temperature	Compressor is switched off.
DEFECT SENSOR B4	Sensor failure analog input B4 - hot gas temperature	Compressor is switched off.
DEFECT SENSOR B5	Sensor failure analog input B5 - condensation pressure	Compressor is switched off.
DEFECT SENSOR B6	Sensor failure analog input B6 - evaporation pressure	Compressor is switched off.
MAX DISCHARGE PRESS.	max. condensation press. exceeded (>43,5 bar)	Compressor is switched off.
MIN. SUCTION PRESS.	min. suction gas press. passed under (<3,3 bar)	Compressor is switched off.
DISCHARGE TEMP	Hot gas temperature too high	Compressor is switched off.
PRESSURE DIFF. LOW	press. difference pc-po lower than limit value (4bar)	Compressor is switched off.
COMP. START FAILED	compressor does not start, defective wiring	Compressor is switched off.
OUTSIDE OF ENVELOPE	compressor exceeds max. time outside the normal operative zone (zone 1)	Compressor is switched off.
SUPERHEAT LOW	Superheat too low - EEV alarm	Compressor is switched off.
MOP ALARM	MOP alarm - EE valve	Compressor is switched off.
SUCTION TEMP LOW	Suction gas temperature too low - EE valve	Compressor is switched off.
EVOTUNES	Evotunes alarm	Compressor is switched off.
EVO REGULATION	EVO control alarms (LOP, MOP, low superheat, low suction gas temperature)	Compressor is switched off.
EVO SYSTEM	EVO system alarms (sensor failure)	Compressor is switched off.
INVERTER	general inverter alarm (further inform. in the menu "Info/..../ICC")*	Compressor is switched off.
INVERTER COMM.LOSS	no communication to the inverter, inverter power failure	Compressor is switched off.

* Further information can be obtained in the menu "Info/components/cooling/ICC/more/more" in menu item "inverter error".

p_C: Condensation pressure
p_o: Suction gas pressure

With all µPC alarms except the one with an orange background an extended alarm management is started, which is described in detail below.

Treatment of µPC alarms

When the µPC detects an alarm, the compressor is switched off by the µPC. The C7000IOC has no effect on this. Most of the alarms are automatically reset by the µPC, this usually takes less than 30 seconds, so that the compressor can be automatically restarted after the compressor pause (180 seconds, pre-configured in the µPC) or after the minimum restart cycle (360 seconds, pre-configured in the µPC).

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

The "Compressor exceeds max time allowed working out of its envelope limits" alarm and the "General inverter alarm" 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 treated by the C7000IOC in a special way.
These alarms are automatically reset by the C7000IOC, but maximally 5 times in 24 hours. However, if the same alarm occurs 6 times within 24 hours, it must be manually reset.

The alarm "min. suction Press." is automatically reset by the C7000IOC, but maximally 4 times in 24 hours. However, if the same alarm occurs 5 times within 24 hours, it must be manually reset.

The C7000IOC resets the alarm 210 seconds after the occurence of the alarm.
All µPC alarms are inhibited for 240 seconds after the occurence by the C7000IOC, i.e. the alarms are not displayed by the "state" command or notified to the C7000AT. Only if they are still active after 240 seconds, an alarm is released.

In the event log, however, the alarm is immediately listed.
An alarm reset caused by the C7000IOC appears as "Automatic alarmreset to µPC".
A manual alarm reset (e.g. via the C7000AT) is displayed as "Alarmreset to µPC".

8.5 Alarm texts in the case of hardware errors

These alarms are edited by the terminal program as following:

```
HARDWARE ERROR Nr. 13 (Ext ID:Set IO-ports)

IIC bus reset!!!
```

The following errors are edited:

```
Nr. 00   Erase sector 6 flash 2 error
Nr. 01   Write in sector 6 flash 2 error
Nr. 02   Erase sector 7 flash 2 error
Nr. 03   Write in sector 7 flash 2 error
Nr. 04   Read of digital input error
Nr. 05   Write of digital output error
Nr. 06   Read of analoge input error
Nr. 07   Write of analoge output error
Nr. 08   Digital extension card error
Nr. 09   Cannot select extension port
Nr. 10   Analoge extension card error
Nr. 11   Analoge extension card: cannot read input
Nr. 12   Analoge extension card: cannot set output
Nr. 13   Ext ID:Set IO-ports
```


9. Troubleshooting

RTC (real time clock)
The RTC installed on the C7000IOC (component IC9) and C7000AT (component D2) has a minimum life expectancy of 10 years at an ambient temperature of 25°C.
This expectancy can be reduced by different influences.

Detecting the malfunction

C7000IOC:
The time on the console and in the event log is wrong (after switching off and on).
Versions older than IOC 4.13 lose their configuration and return to the default setting.

C7000AT:
The time on the display is wrong.

Changing the RTC
The RTC can be purchased as a spare part by the part number M24826.

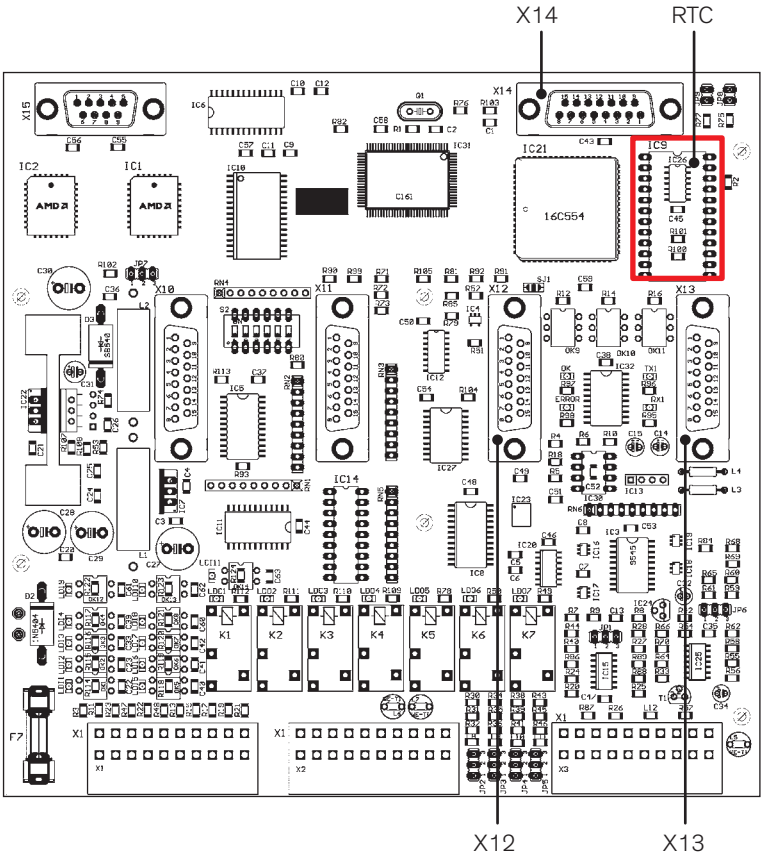
C7000IOC:
From C7000IOC version 4.13 the IOC configuration is no longer stored in the RTC.
Up from this version you can exchange the RTC, without losing the configuration.

- De-energize the A/C unit.

Electrostatically endangered components are located on the C7000IOC.

- Observe the ESD standard.
- Use a wrist grounding strap.

- Open the A/C unit. The C7000IOC board is located in the electrical box.
- Remove any existing expansion boards of the IOC board.
- Carefully pry the RTC module with an IC extractor from the socket.
- Insert the new RTC module and observe the polarity (pin1 to pin 1).



IC extractor

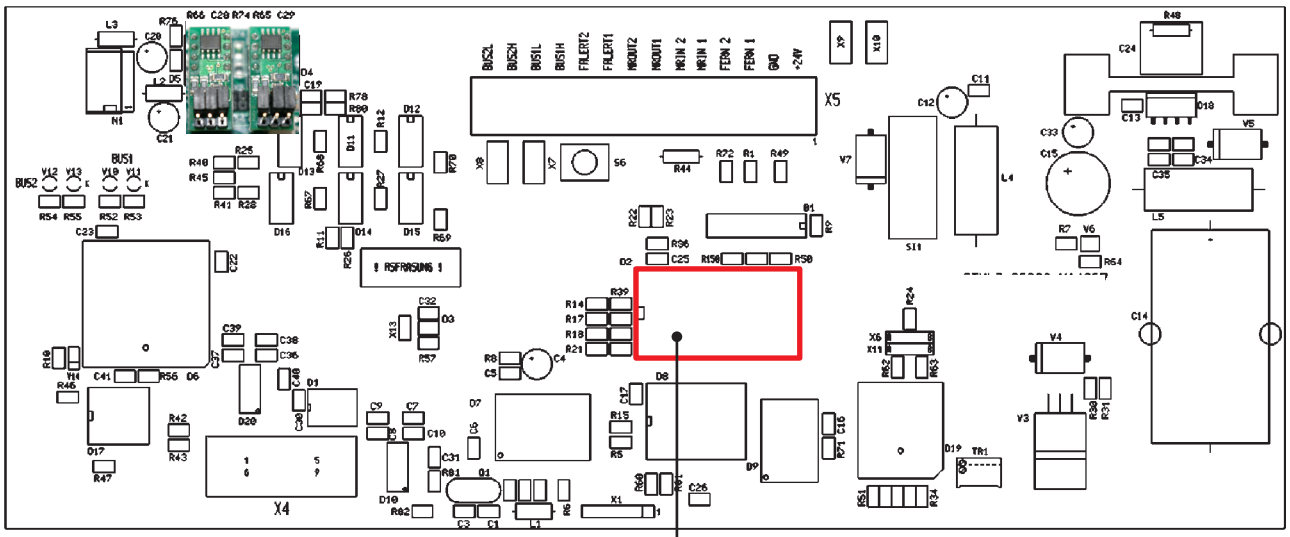
- Insert the dismounted expansion boards on the C7000IOC board.
- Close the A/C unit.
- Switch on the A/C unit.
- Set the correct time and date.

C7000AT:

- De-energize the A/C unit.

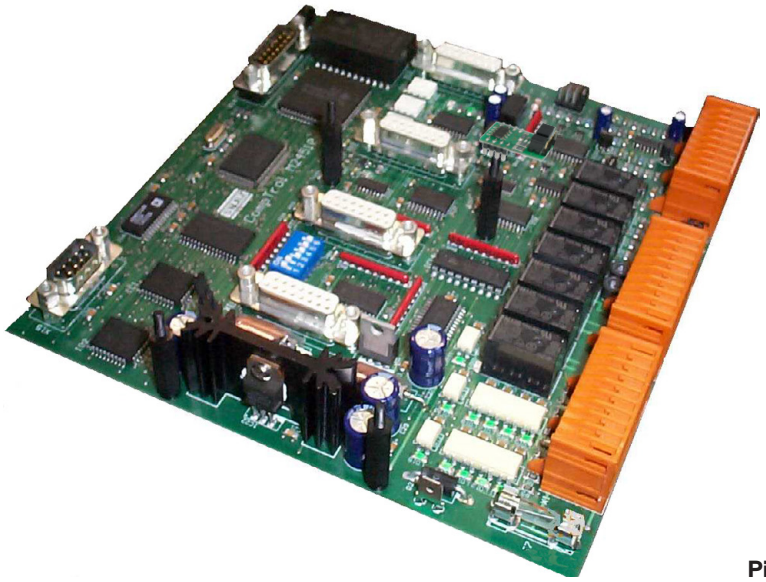
Electrostatically endangered components are located on the C7000AT.
- Observe the ESD standard.
- Use a wrist grounding strap.

- Open the A/C unit. The C7000AT board is located in the door.
- Dismount the transparent acrylic glass pane.
- Carefully pry the RTC module with an IC extractor from the socket.
- Insert the new RTC module and observe the polarity (pin 1 to pin 1).
- Mount the acrylic glass pane onto the board.
- Close the A/C unit.
- Switch on the A/C unit.
- Set the correct time and date.
- Check whether bus address and BMS specific settings are correct.



10. Hardware components

10.1 I/O controller (C7000IOC)



Technical Data:

Voltage supply:	24(±15%) V (AC)
Power consumption:	9,6 VA
Fuse:	2 A time-lag
Operating temperature:	5°C...40°C
Storage temperature:	-30°C...60°C

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

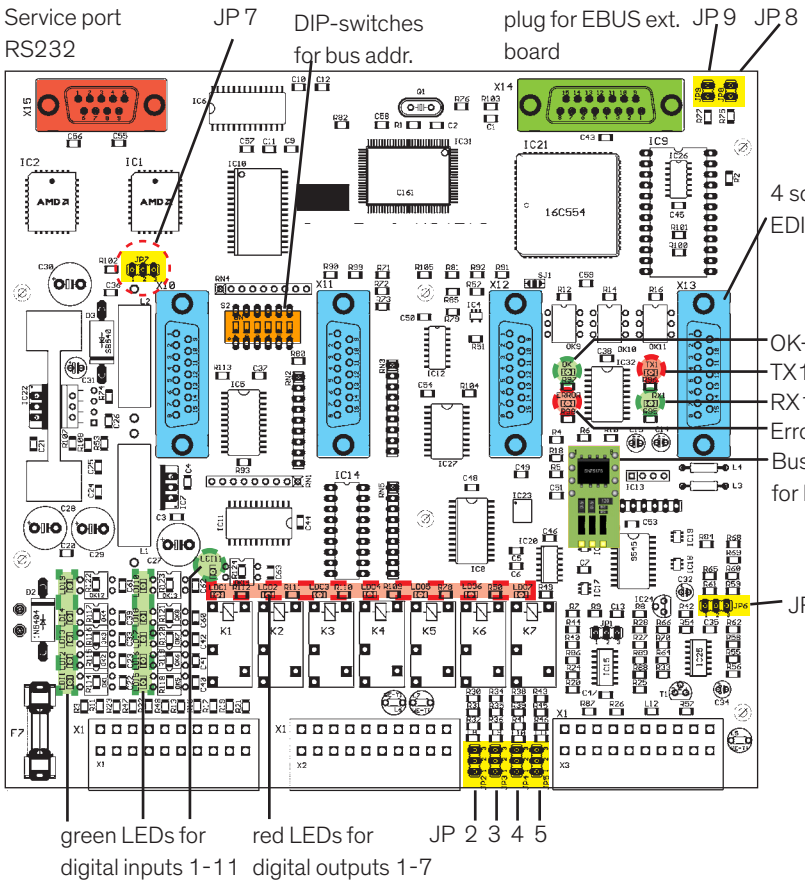
The OK-LED displays the IIC-bus clock. This is the pulse for sensor evaluation too.

The TX1/RX1-LEDs indicate data traffic on the I/O bus (port 1).

The Error-LED lights up at any time, when an alarm has occurred.

Pin position of X1

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



Jumper setting depends on sensor types

		Jp N°	Pos. 1-2	Pos. 2-3
Analog input	AIN 1	2	4-20 mA	0-10 V
	AIN 2	3		
	AIN 3	4		
	AIN 4	5		
	AIN 5	6	can not be used	

Jumper for software download

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

EBUS activation

Jp N°	Function, when set
8	EBUS Port 2 disabled
9	EBUS Port 3 disabled

Jp8 and Jp9 have to be set, if no EBUS extension board is present. On the contrary, it has to be removed to enable the extension RS485 busses on a plugged EBUS extension board.

Assignment - I/O controller

The assignment depends on the unit type.

Pin	Designation
1	24VAC
2	GND
3	GND
4	Din 1
5	Din 2
6	Din 3
7	Din 4
8	Din 5
9	Din 6
10	Din 7
11	Din 8
12	Din 9
13	Din 10
14	Din 11
15	Dout 1 (NO)
16	Dout 1 (COM)
17	Dout 1 (NC)
18	Dout 2 (NO)
19	Dout 2 (COM)
20	Dout 2 (NC)
21	Dout 3 (NO)
22	Dout 3 (COM)
23	Dout 3 (NC)
24	Dout 4 (NO)
25	Dout 4 (COM)
26	Dout 4 (NC)
27	Dout 5 (NO)
28	Dout 5 (COM)
29	Dout 5 (NC)
30	Dout 6 (NO)
31	Dout 6 (COM)
32	Dout 6 (NC)
33	Dout 7 (NO)
34	Dout 7 (COM)
35	Dout 7 (NC)

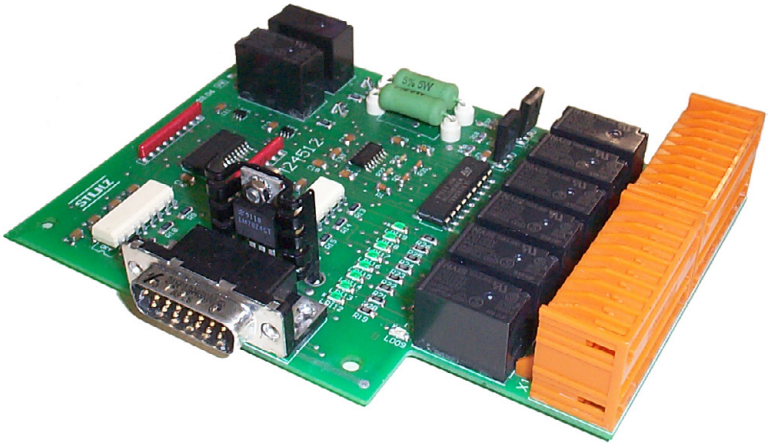
Pin	Designation
36	+15V
37	GND
38	Ain 1
39	Ain 2
40	+15V
41	GND
42	Ain 3
43	Ain 4
44	+Ub
45	GND
46	Ain 5
47	GND
48	Aout 1
49	GND
50	Aout 2
51	GND
52	Aout 3
53	GND
54	Aout 4
55	GND
56	Port 1-H
57	Port 1-L
58	Port 1-H
59	Port 1-L
60	+15V
X10	SUB-D 15
X11	SUB-D 15
X12	SUB-D 15
X13	SUB-D 15
X14	SUB-D 15
X15	SUB-D 9

10.2 EDIO - extension board for digital in- and outputs

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 C7000IOC due to a self test.

Technical Data:

Power consumption:	10,1 VA
Operating temperature:	5°C...40°C
Storage temperature:	-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:

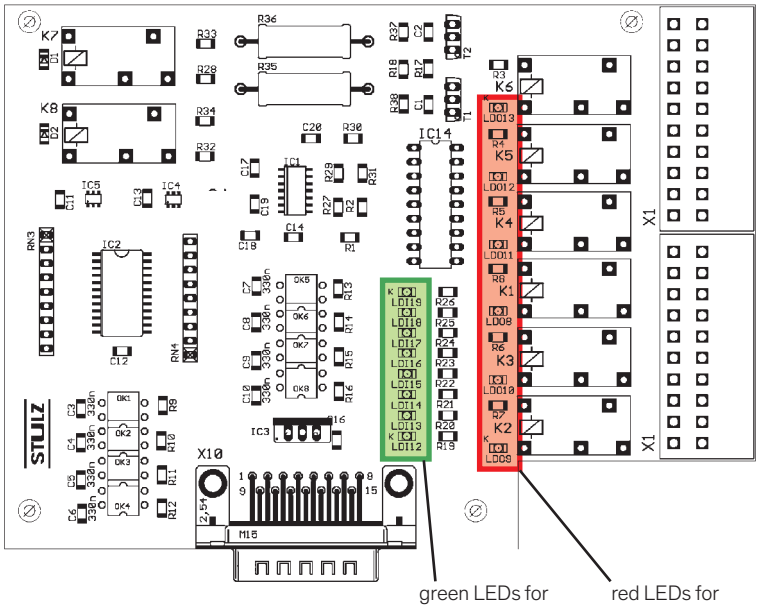
ON: voltage present

OFF: no voltage (alarm, failure)

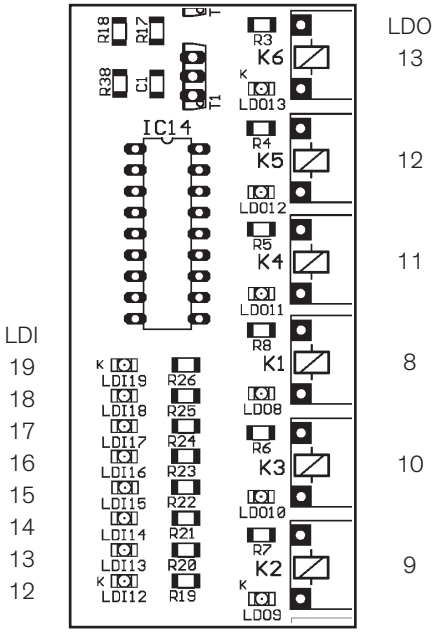
The function of the digital outputs is displayed by red LEDs:

ON: relay active

OFF: relay passive



enlarged section for onboard LEDs



Assignment - EDIO board

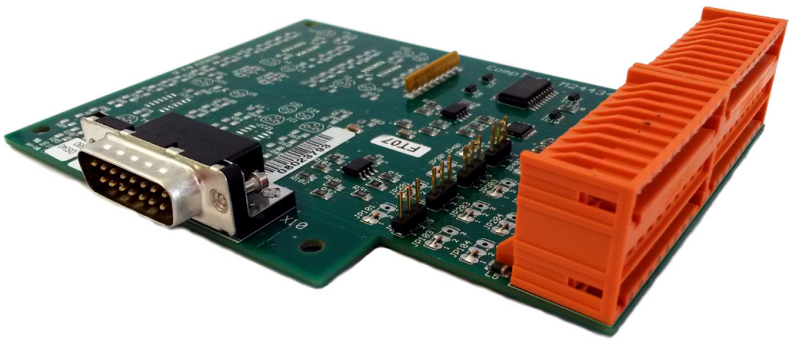
The assignment depends on the unit type.

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

Pins 31 to 40 are not assigned.

10.3 EAIO - extension board for analog in- and outputs

The EAIO is an extension board for analog 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 C7000IOC due to a self test.
There are several jumpers on board - one for each input - which serve to adapt the board to different sensor types.

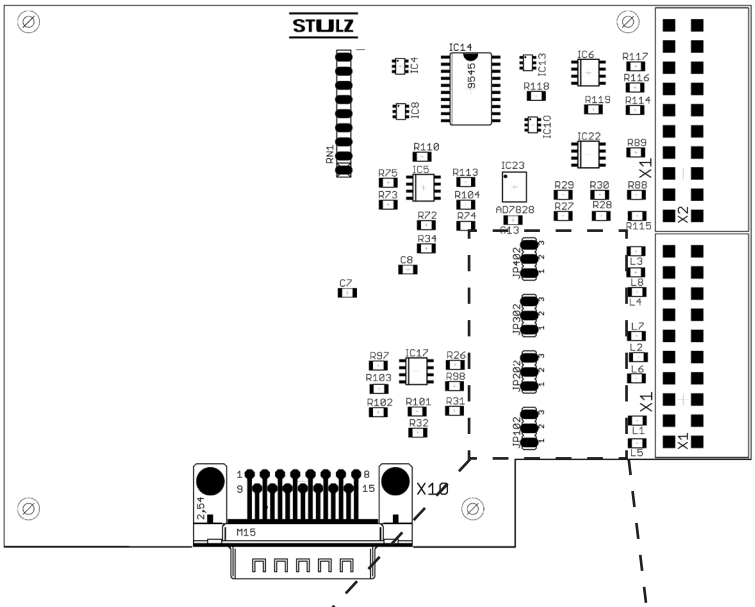


Technical Data:

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

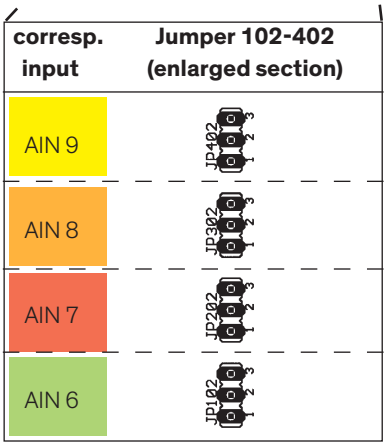
Pin position of X1

1	10	21		30
11	20	31	not assigned	40



How to use the Jumper setting table:
- choose the analog input at which you have connected a sensor.
- in the same line you can see the jumper which relates to this input.
- in the lower part of the table you can read in each column the setting depending on the sensor type you connected.

Example:
You have connected a 0-10V sensor at AIN 8. The corresponding jumper is 302. Jumper 302 must be set on position 2-3.



Jumper setting

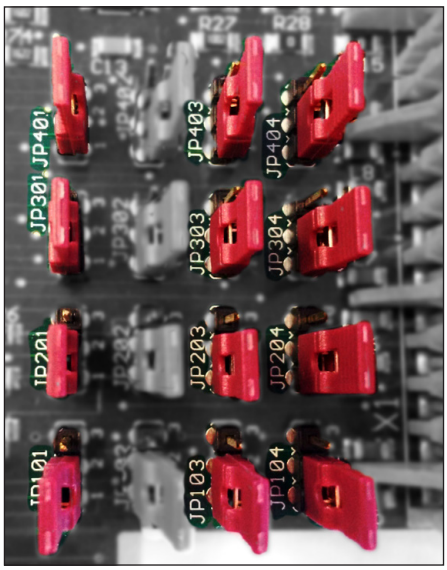
		Jumper
Analog input	AIN 6	102
	AIN 7	202
	AIN 8	302
	AIN 9	402
Sensor type	0-10V	2-3
	4-20mA	1-2

Assignment - EAIO

The assignment depends on the unit type.

Pin	Designation
1	+Ub/Ib
2	Ain 6
3	GND
4	GND
5	+Ub/Ib
6	Ain 7
7	GND
8	GND
9	+Ub/Ib
10	Ain 8
11	GND
12	GND
13	+Ub/Ib
14	Ain 9
15	GND
16	GND
17	Aout 5
18	GND
19	Aout 6
20	GND
21	Aout 7
22	GND
23	Aout 8
24	GND
X10	SUB-D 15

Pins 25 to 40 are not assigned.

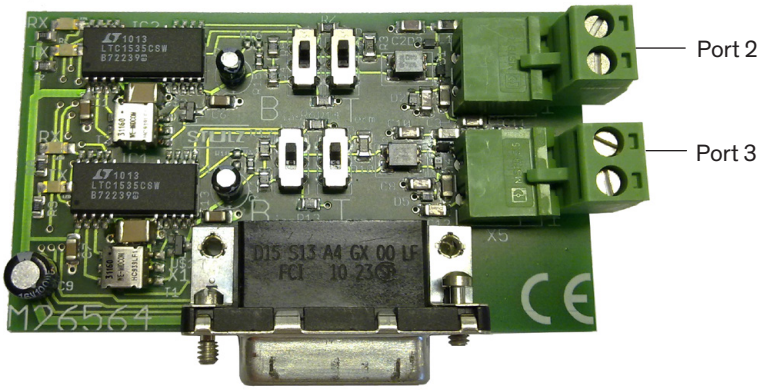


Note:
So that an old EAIO board (M24434) behaves exactly like a new EAIO board (1107475), the jumpers 101, 201, 301, 401, 103, 203, 303, 403, 104, 204, 304 and 404 must be set on position 1-2 additionally (see picture).

The jumpers 102, 202, 302 and 402 must be set as described on the precedent page.

10.4 EBUS-extension board for RS485 bus

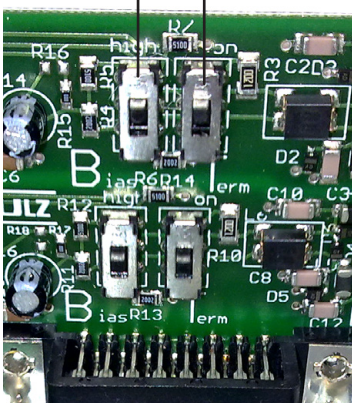
Board design



Technical Data:

Power consumption:	11,3 VA
Operating temperature:	5°C...40°C
Storage temperature:	-30°C...60°C

Switches to adjust 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

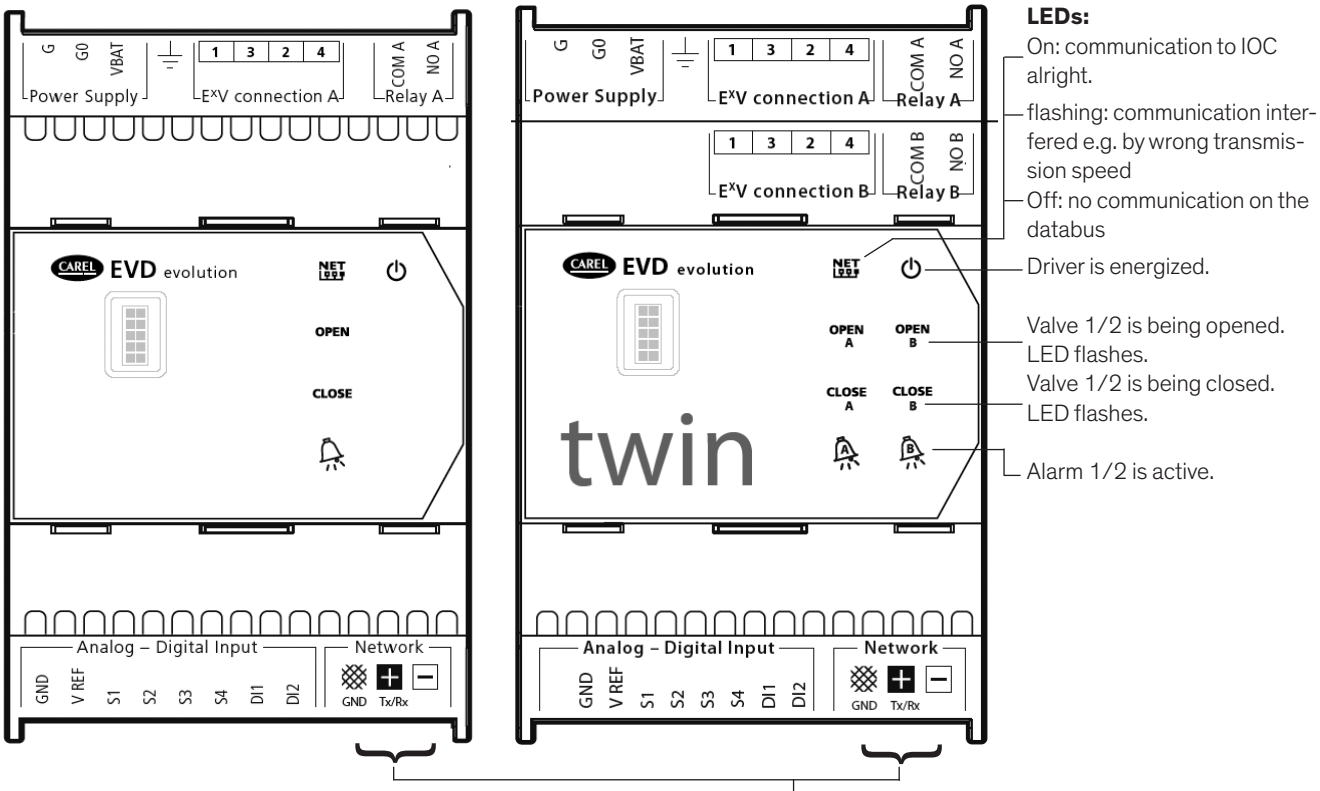
Pin	Designation	Function
1	Port 2-H	RS485 BMS bus
2	Port 2-L	
3	Port 3-H	RS485 component bus
4	Port 3-L	
X10	SUB-D 15	to X14 on IO controller

Note:
Remove jumper 8 on the IOC board to use the EBUS port 2.
Remove jumper 9 on the IOC board to use the EBUS port 3.

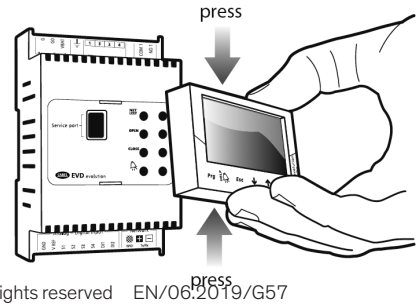
10.5 Driver module for electronic expansion valve EVD

Driver module for one valve

Driver module for the control of two valves



Terminal	Description
G, G0	Power supply 24 VAC
1, 2, 3, 4 A	Stepper motor control, valve 1
1, 2, 3, 4 B	Stepper motor control, valve 2
COM A, NO A	Alarm relay, circuit 1 (not used)
COM B, NO B	Alarm relay, circuit 2 (not used)
GND	Earth for sensor signals
VREF	active sensors supply
S1	Sensor 1, suction gas pressure circuit 1
S2	Sensor 2, suction gas temperature circuit 1
S3	Sensor 3, suction gas pressure circuit 2
S4	Sensor 4, suction gas temperature circuit 2
DI1	Enabling the control of circuit 1 (not used)
DI2	Enabling the control of circuit 2 (not used)
GND - Network	LAN connection (Modbus) to port 3 of the EBUS board for RS485 bus
+ Network	
– Network	



Network connection to port 3 of EBUS board

The following parameters are pre-set for the serial RS485 connection and cannot be changed.

Parameter	Value
Protocol	Modbus
Data bits	8 bit
Stopbits	2
Parity	none
Transmission modality	RTU

The following parameters can be modified:

Network address (pre-set 198)
Command for C7000: `eev 1 id 198`

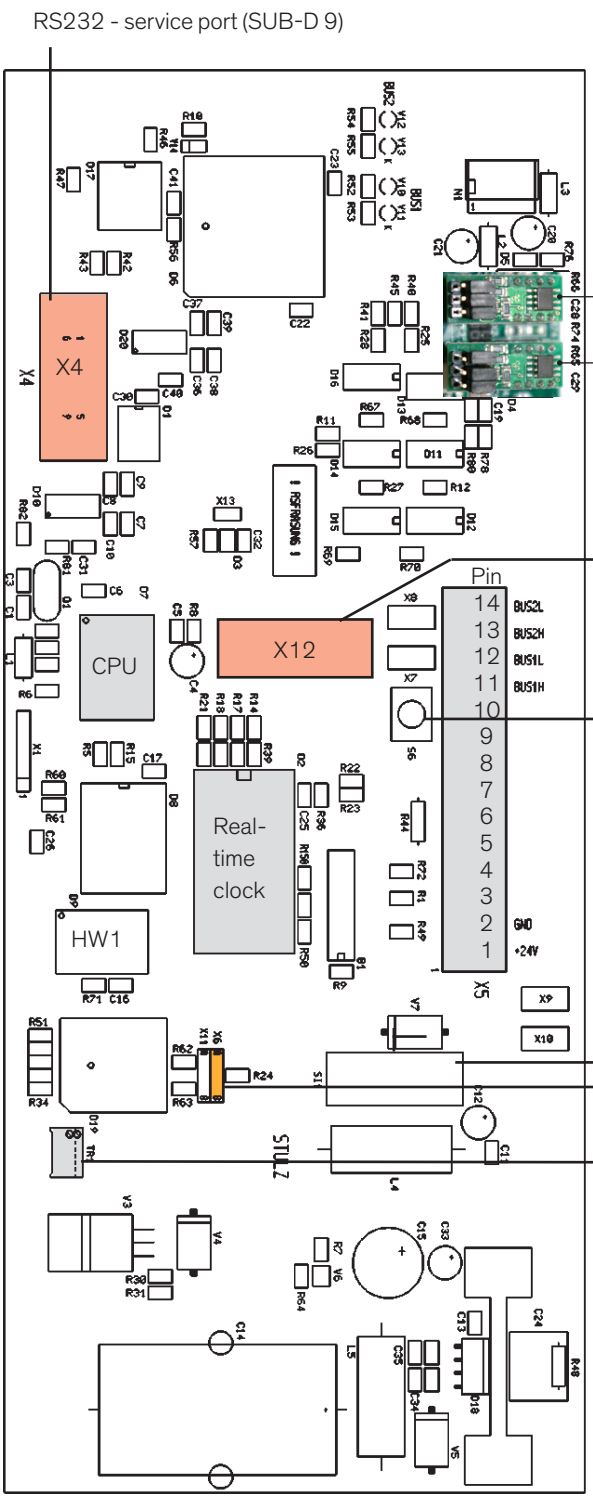
Communcation rate
(pre-set 2=19200 bit/s)
This parameter must be set to 1=9600 bit/s at the start-up.
For this, remove the user interface with the 5 (twin: 8) LEDs and replace it by the user interface with the display.
Then carry out the following steps:

1. press PRG key
2. enter password 0066
3. select "Advanced"
4. scroll down until page 4/4
5. set "Network settings" to 1

10.6 C7000 Advanced - Terminal (C7000AT)

Technical Data:

Dimensions:	270 × 110 × 40 mm
Voltage supply:	24(±15%) VAC
Power consumption:	14 VA
Fuse:	2 A time-lag
Operating temperature:	5°C...40°C
Storage temperature:	-30°C...60°C



Driver module for RS485-2 (BMS-bus)

Driver module for RS485-1 (IO-bus)

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

RS232 - BMS port (SUB-D 9)

Reset button

Fuse T2A

Jumper X6: Pos. A: Board in download mode

Contrast adjustment for display

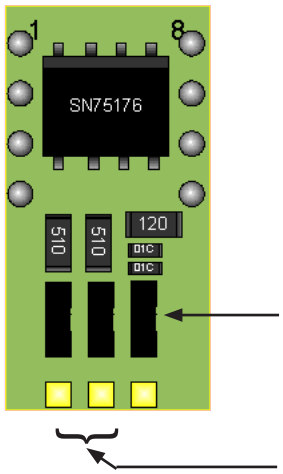
Pin	Designation	Function
14	Port 2-L	RS485 BMS bus
13	Port 2-H	
12	Port 1-L	RS485 I/O bus
11	Port 1-H	
10-3	free terminal	none
2	GND	Power supply
1	+24VAC	

10.6.1 Driver module

The driver module has the following features:

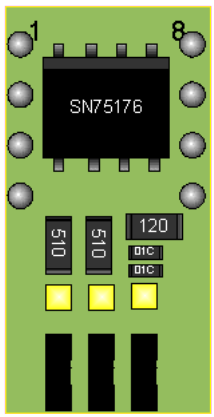
1. a static bus termination (120 Ohm), which can be activated by a jumper.
2. a circuit to set the bias for the bus. By means of two jumpers either a low bias (bus middle) or a high bias (bus end) can be set.
3. protection against electrostatic discharge (ESD) impulses on the data lines

The interference immunity of the bus is increased by the driver module.
As far as the jumper settings are concerned, only the two settings shown below are allowed. The jumpers must be changed blockwise. Other settings result in an unstable bus communication.



Participant at the end of the RS485 bus

This figure shows the jumper position for the participant at the end of the bus.
The rightmost jumper is located in a position where the termination resistor is activated.
The other jumpers are set for a high bias.



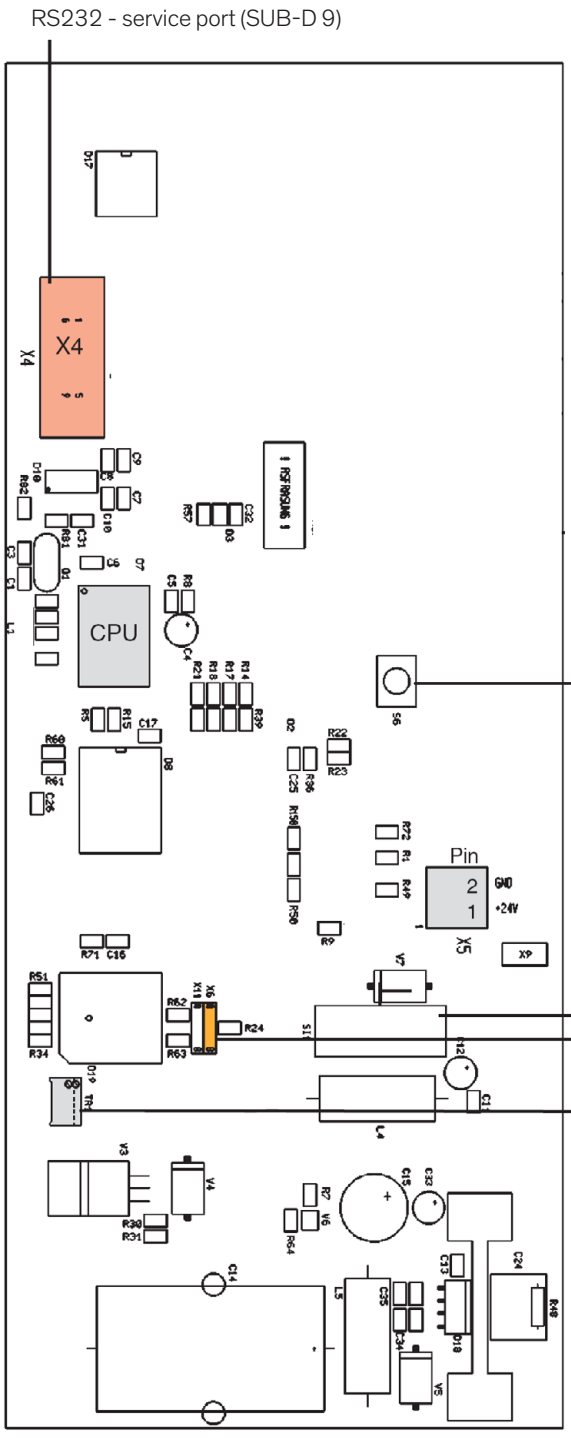
Participant in the middle of the RS485 bus

This figure shows the jumper position for the participant in the middle of the bus.
The rightmost jumper is located in a position where the termination resistor is deactivated.
The other jumpers are set for a low bias.

10.7 C7000 Display

Technical Data:

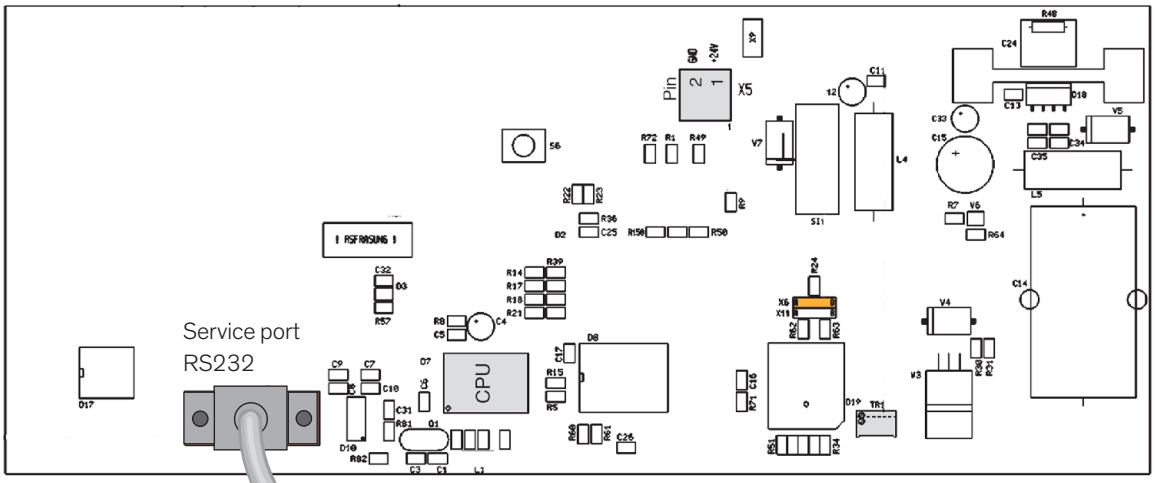
Dimensions:	270 × 110 × 40 mm
Voltage supply:	24(±15%) VAC
Power consumption:	14 VA
Fuse:	2 A time-lag
Operating temperature:	5°C...40°C
Storage temperature:	-30°C...60°C



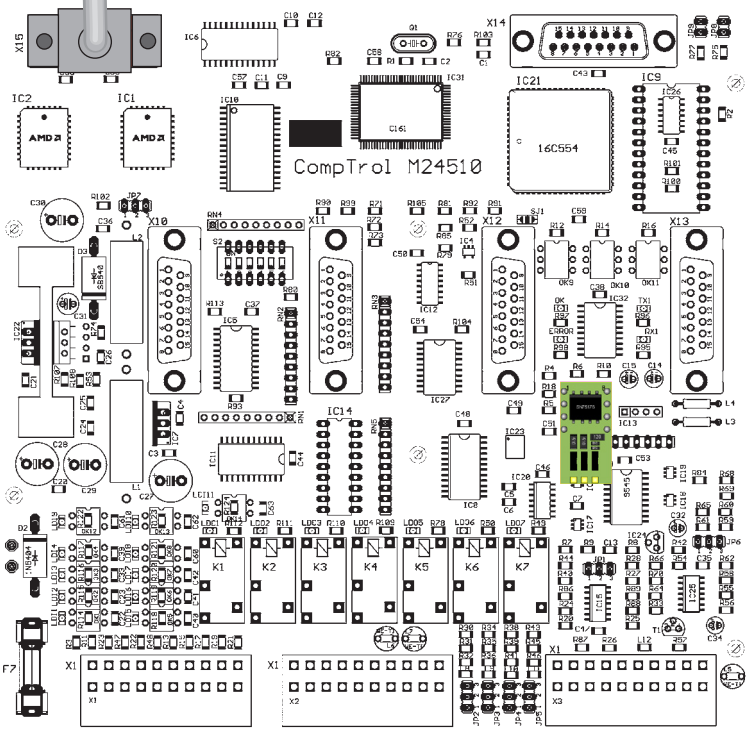
Pin	Designation	Function
2	GND	Power supply
1	+24VAC	

Connection of the C7000 display to the C7000IOC

The C7000 display is connected to the C7000IOC by the RS232 service port. Connecting the C7000 display to a bus is not possible.



C7000 Display



C7000 IOC

Part no.	Designation	Length
M26621	RS232 cable	1200mm
M26620	RS232 cable	1800mm
M26928	RS232 cable	3400mm
M26624	power supply cable	1500mm
M26622	power supply cable	2400mm

11. Default configurations

Unit parameters	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
Setpoint, relative humidity	5 - 90 % r. h.	45% r. h.
Setpoint, specific humidity	0.0 - 20.0 g/kg	8.5 g/kg
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 delay	0 - 65535 s	0 s
Winter start 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 common alarm	0 - 31	6
Output D winter operation	0 - 31	0
Input D remote on/off	0 - 43	0
Output D local stop	0 - 31	0
Input D CW stop	0 - 43	0
Type of control	01. Mai	1
Limiting control - start temperature	0 - 40°C	16°C
Limiting control - start temperature 2	0 - 40°C	0°C
Limiting control - temp. gradient	0 - 20 K	0.5 K
Minimum temperature	0 - 40°C	0°C
Maximum temperature	0 - 40°C	40°C
Limiting control - humidity start	0 - 90 % r.h.	70% r.h.
Limiting control - humidity gradient	0 - 20% r.h.	0.5% r.h.

Unit parameters	Range	Value
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 operation runtime	0 - 2.147.483.647	0 h
Last service - day	1 - 31	1
Last service - month	1 - 12	8
Last service - year	0 - 50	4
Service interval	0 - 24	0
Alarm priority service alarm	0 - 31	0
Common alarm for service alarm	0 - 1	0
UPS - input D	0 - 43	0
UPS - fan admitted	0 - 1	1
UPS - cooling admitted	0 - 1	1
UPS - heating admitted	0 - 1	100%
UPS - humidification admitted	0 - 1	1
UPS - dehumidification admitted	0 - 1	1

* $2^{31} - 1 = 2.147.483.647$

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
Number of defective units	0 - 20	0
Emergency temperature	0 - 40	16°C
Zone fan speed nMax	0 - 100	85%
CW standby management	0 - 1	0
Standby state	0 - 1	0

The parameter "zone" is not a zone parameter but can be adjusted separately for each unit.
Due to his context it is displayed in this table.

Zone parameters	Range	Value
T/H average value determination	0 - 1	1
Pressure average value determ.	0 - 1	1
T/H Average value delay	0 - 255 s	120 s
Average val. determ. w. standby units	0 - 1	0
GE start temperature, air	-100 - 100°C	18°C
GE rel. start temperature, air	0 - 9,9 K	0 K
GE hysteresis, air	0 - 9,9 K	0 K
GE start temperature, water	-100 - 100°C	10°C
GE rel. start temperature, water	0 - 9,9 K	0 K
GE hysteresis, water	0 - 9,9 K	0 K
Fan speed nMax (SAPSM)	0 - 100 %	0 %
Supply air pressure value	0 - 3	1

General alarms

Alarms	Range	Fire	Water	Flow	Phase	Bus alarm	Addr. conflict
Alarm input D	0 - 43	0	0	0	0	-	-
Alarm priority	0 - 31	0	0	0	0	0	0
Common alarm	0 - 1	1	1	1	1	0	0
Alarm delay	0 - 100 s	5 s	5 s	5 s	5 s	5 s	-
Restart	0 - 1				0		

Limit alarms

	Room temperature		Supply air temperature		Water temperature 1 / 2	
	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 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%h.r (0-90)	90%h.r (5-200)	5%h.r (0-90)	90%h.r (5-200)	0.00 Pa (*)	100.00 Pa (*)
Alarm 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)

External alarms

	Range	External alarm 1	External alarm 2	...	External alarm 10
Component configured	0 - 1	0	0	...	0
Input D	0 - 43	0	0	...	0
Alarm priority	0 - 31	0	0	...	0
Common alarm	0 - 1	0	0	...	0
Alarm delay	0 - 250 s	5 s	5 s	...	5 s
Alarm text	20 characters	Externer_Alarm_in_01	Externer_Alarm_in_02	...	Externer_Alarm_in_10

Week programm

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

Components

Compressor

	Range	Compressor 1	Compressor 2
Component configured	0 - 1	0	0
Compressor type	1 - 2	1	1
Summer start temperature	0 - 9,9 K	0,4 K	0,6 K
Summer hysteresis	0 - 9,0 K	0,7 K	0,7 K
Winter start temperature	0 - 9,9 K	0,7 K	0,9 K
Winter hysteresis	0 - 9,0 K	0,7 K	0,7 K
Quick start	0 - 1	0	0
Start delay by FC	0 - 600 s	0 s	0 s
ASTP threshold	0 - 10,0 bar	0,0 bar	0,0 bar
ASTP hysteresis	0 - 10,0 bar	0,0 bar	0,0 bar
Output D	0 - 31	2	7
Start disable, input D	0 - 31	0	0
LP management time	0 - 100 h	0 h	0 h
LP management pressure	0 - 10 bar	5 bar	5 bar
LP management restart	0 - 10	0	0
HP management time	0 - 100	0 h	0 h
HP management pressure	0 - 35 bar	21 bar	21 bar
HP management restart	0 - 10	0	0
HP management mode	0 - 1	0	0
Pause	10 - 1000 s	180 s	180 s
Minimum runtime	0 - 1000 s	180 s	180 s
Runtime	0 - 2.147.483.647 h	0 h	0 h

Low pressure alarm	Range	Circuit 1	Circuit 2
Alarm input D	0 - 43	0	0
Alarm priority	0 - 31	0	0
Common alarm	0 - 1	1	1
Alarm delay	0 - 100 s	5 s	5 s

High pressure alarm	Range	Circuit 1	Circuit 2
Alarm input D	0 - 43	0	0
Alarm priority	0 - 31	0	0
Common alarm	0 - 1	1	1
Alarm delay	0 - 100 s	5 s	5 s

ICC - Integrated cooling circuit

	Range	ICC
Component configured	0 - 1	0
Global address	1 - 247	1
Start temperature	0,0 - 9,9	0,4
Hysteresis	0,0 - 9,9	0,8
Min runitme after start	0 - 1000 s	240 s
Min runitme after dehumidification	0 - 1000 s	240 s
P factor	0 - 100	10
I factor	0 - 100	40
D factor	0 - 100	0
Minimum power	17,0 - 40,0 %	17,0 %
Maximum power	50,0 - 100,0 %	100,0 %
Minimum pressure (threshold)	0 - 40,0 bar	0 bar
EEV value	0 - 100,0 %	0 %
EEV time	0 - 60 s	0 s
Alarm priority reachability	0 - 31	0
Common alarm reachability	0 - 1	0
Alarm priority ICC	0 - 31	0
Common alarm ICC	0 - 1	0
Alarm priority LP	0 - 31	0
Common alarm LP	0 - 1	0
Runtime	0 - 2.147.483.647 h	0 h

Valves in the refrigerant circuit

Electronical expansion valve

	Range	EEV 1	EEV 2
Component configured	0 - 1	0	0
Controller type	0 - 1	0	0
Valve type	1 - 5	2	2
Refrigerant	0 - 7	4	4
Pressure sensor	0 - 3	0	0
MOP temperature	-40 - 40°C	0°C	0°C
Start opening	10 - 100%	50%	50%
Pre-open time	1 - 30 s	5 s	5 s
Alarm priority pressure sensor	0 - 31	0	0
Common alarm pressure sensor	0 - 1	0	0
Alarm priority temperature sensor	0 - 31	0	0
Common alarm temperature sensor	0 - 1	0	0
Alarm priority motor	0 - 31	0	0
Common alarm motor	0 - 1	0	0
Superheating SP normal	5 - 30°C	7°C	7°C
Superheating SP dehumidification	5 - 30°C	12°C	12°C

Hotgas bypass valve

	Range	HGBP valve 1	HGBP valve 2
Component configured	0 - 1	0	0
Output A	0 - 20	0	0
P-factor	0 - 100	20	20
I-factor	0 - 100	20	20
D-factor	0 - 100	20	20
Control cycle	1 - 10 s	2 s	2 s
Pre-open time	0 - 120 s	15 s	15 s
Pre-opening	0 - 100%	50%	50%
Minimum opening	0 - 100%	0%	0%
Maximum opening	0 - 100%	20%	100%

Suction valve

	Range	Suction valve 1	Suction valve 2
Start	0 - 9,9 K	0 K	0,4 K
Gradient	0,5 - 9,9 K	0,5 K	0,5 K
Minimum opening	0 - 100 %	20	20
Component configured	0 - 1	0	0
Output A	0 - 20	5	6

Valves in hydraulic circuit

GE/CW valves

	CW control
Input D	0 (0 - 43)
Output D	0 (0 - 31)
Valve close at compr.	0 (0 - 1)
Valve operating mode	0 (0 - 1 - 2)
Setpoint	70% (0 - 100)
Value at switching	0% (0 - 100)
Mixmode max. value	100% (0 - 100)
100% pre-opening	0 s (0 - 255)

	Range	GE/CW-Valve 1	GE/CW-Valve 2
Component configured	0 - 1	0	0
Output A	0 - 20	2	4
Uk24mod	0 - 8	0	0
Start temperature	-9,9 - 9,9 K	-0,3 K	0,5 K
GE-off	0 - 100 °C	23°C	23°C
GE-off relative	0 - 9,9 K	0,0 K	0,0 K
Valve close at setpoint	0 - 1	0	0
Heating	0 - 1	0	0
Output inversion	0 - 1	0	0
Control start	0 - 9,9 V	2,0	2,0
P-factor	0 - 100	30	30
I-factor	0 - 100	1	1
D-factor	0 - 100	0	0

G valves

	Range	G-Valve 1	G-Valve 2
Component configured	0 - 1	0	0
Output A	0 - 20	4	0
Pre-open time	0 - 255 s	30 s	30 s
Pre-opening	0 - 100 %	100%	100%
Opening setpoint	0 - 100 %	70%	70%
Minimum opening	0 - 100 %	25%	25%
Opening in standby	0 - 100 %	0%	0%
Min. opening start temp.	-20 - 50°C	0°C	0°C
Min. opening gradient	0,0 - 10,0	0,0	0,0
Control start	0 - 9,9 V	2,0 V	2,0 V
P-factor	0 - 100	40	40
I-factor	0 - 100	60	60
D-factor	0 - 100	0	0
Max. alternation	1 - 30	2%	2%

Drycooler

	Range	Drycooler 1	Drycooler 2	Drycooler 3	Drycooler 4
Winter start	5 - 35°C	10°C	11°C	12°C	13°C
Summer start	10 - 50°C	34°C	35°C	36°C	37°C
Stop hysteresis	1 - 9,9 K	2 K	2 K	2 K	2 K
Component configured	0 -1	0	0	0	0
Output D	0 - 31	9	10	17	18
Output A	0 - 20	6	not available		
Alarm input D	0 - 43	15	0	0	0
Alarm priority	0 - 31	0	0	0	0
Common alarm	0 - 1	0	0	0	0
Alarm delay	0 - 100	5 s	5 s	5 s	5 s
Preliminary speed	50 - 100%	100%	0% fix	0% fix	0% fix
Control cycle	1 - 100 s	1 s	0 s fix	0 s fix	0 s fix
Max. alternation	1 - 30%	2%	0% fix	0% fix	0% fix
Control factor	1 - 100	40	0 fix	0 fix	0 fix
Runtime	0 - 2.147.483.647	0 h	0 h	0 h	0 h

Pumps

	Range	Pump 1	Pump 2	Pump 3	Pump 4
Type	3 - 4	4 (PS)	4 (PS)	3 (Glycol)	3 (Glycol)
Start	0 - 9,9 K	(0,1 K)	(0,1 K)	0,1 K	0,1 K
Stop hysteresis	0 - 9,9 K	(0,3 K)	(0,3 K)	0,6 K	0,6 K
Component configured	0 - 1	0	0	0	0
Partner pump	0 - 4	0	0	0	0
Partner unit	0 - 19	0	0	0	0
Speed setpoint	0 - 100%	0%	0%	(70%)	(70%)
Minimum speed	0 - 100%	0%	0%	(0%)	(0%)
Output D	0 - 31	1	2	8	11
Output A	0 - 20	2	4	5	8
Alarm input D	0 - 43	2	3	13	14
Alarm priority	0 - 31	0	0	0	0
Common alarm	0 - 1	1	1	0	0
Alarm delay	0 - 100 s	5 s	5 s	5 s	5 s
Pre-open time	0 - 120 s	10 s	10 s	(10 s)	(10 s)
Preliminary speed	0 - 100	100%	100%	(100%)	(100%)
Delay (over-run time)	0 - 120 s	0 s	0 s	(0 s)	(0 s)
Control factor	1 - 100	30	30	(40)	(40)
I-factor	0 - 100	1	1	(0)	(0)
D-factor	0 - 100	0	0	(0)	(0)
Runtime	0 - 2.147.483.647	0 h	0 h	0 h	0 h

The values in brackets can be changed, but do not have any effect on the control.

Reheats

	Range	electr. reheat 1	electr. reheat 2	electr. reheat. 3
Type	1 - 2	1	1 fix	1 fix
Start	0 - 9.9 K	1.5 K	2 K	2.5 K
Stop hysteresis	0 - 9.9 K	0.5 K	0.5 K	0.5 K
Gradient	0.3 - 9.9 K	0.5 K	0.5 K	0.5 K
Component configured	0 - 1	0	0	0
Output D	0 - 31	3	4	12
Alarm input D	0 - 43	4	4	4
Alarm priority	0 - 31	0	0	0
Common alarm	0 - 1	1	1	1
Alarm delay	0 - 2550 s	4 s	4 s	4 s
Runtime	0 - 2.147.483.647	0 h	0 h	0 h

	Range	Hot water reh.
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
Component configured	0 - 1	0
Output D	0 - 31	4
Output A	0 - 20	7

	Range	Hot gas reheat
Start	0 - 9.9	1.0 K
Stop hysteresis	0 - 9.9	0.5 K
Component configured	0 - 1	0
Output D	0 - 31	4
Alarm input D	0 - 43	0
Alarm priority	0 - 31	0
Common alarm	0 - 1	0
Alarm delay	0 - 2550 s	1 s

Humidifiers

	Range	Humidifier 1	Humidifier 2	Humidifier 3
Type	1 - 2	2	2	2
Start, relative humidity	0 - 20 %r.h.	0 %r.h.	0 %r.h.	0 %r.h.
Hysteresis, relative humidity	0 - 20 %r.h.	5 %r.h.	5 %r.h.	5 %r.h.
Gradient, relative humidity	0,5 - 20	10	10	10
Start, specific humidity	0 - 20 g/kg	0 g/kg	0 g/kg	0 g/kg
Hysteresis, specific humidity	0 - 20 g/kg	1 g/kg	1 g/kg	1 g/kg
Proportional band, specific hum.	0.1 - 20 g/kg	2 g/kg	2 g/kg	2 g/kg
Component configured	0 - 1	0	0	0
Conductivity meter conf.	0 - 1	0	0	0
Output D	0 - 31	13	0	0
Output A	0 - 20	3	6	7
Alarm input D	0 - 43	6	6	6
Alarm priority	0 - 31	0	0	0
Common alarm	0 - 1	1	1	1
Alarm delay	0 - 2550 s	5 s	5 s	5 s
Alarm input D 5µS	0 - 43	0	0	0
Alarm priority 5µS	0 - 31	0	0	0
Common alarm 5µS	0 - 1	0	0	0
Alarm delay 5µS	0 - 2550 s	300 s	300 s	300 s
Alarm input D 20µS	0 - 43	6	6	6
Alarm priority 20µS	0 - 31	0	0	0
Common alarm 20µS	0 - 1	1	1	1
Alarm delay 20µS	0 - 2550 s	300 s	300 s	300 s
Runtime	0 - 2.147.483.647	0 h	0 h	0 h

Dehumidifier

	Range	Dehumidifier
Start, relative humidity	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
Dehumidif. valve conf.	0 - 1	0
Bypass valve conf.	0 - 1	0
Output D	0 - 31	5
Min water temperature	-20 - 50°C	5°C
Max water temperature	0 - 100°C	14°C
Type, humidity control	0 - 2	0

Fans

	Range	Fan 1	Fan 2	Fan 3
Type	1 - 2	2	2	2
Maximum speed	30 - 100 %	85%	85%	85%
Maximum speed CW(DF)	30 - 100 %	85%	85%	85%
Maximum speed EFC	30 - 100 %	85%	85%	85%
Offset	-10,1	0%	0%	0%
Pre-start	0 - 100 s	10 s	10 s	10 s
Overrun	0 - 250 s	60 s	60 s	60 s
Start temperature	0 - 9,9 K	0 K	0 K	0 K
Start speed	0 - 100%	0%	0%	0%
100% start time	0 - 100 s	5 s	5 s	5 s
Reduction time	1 - 120 min	30 min	30 min	30 min
Reduction speed	0 - 100 %	0%	0%	0%
Dehumidific. reduction	0 - 100 %	0%	0%	0%
Dehumidification time	0 - 30 min	0 min	0 min	0 min
UPS reduction	0 - 20 %	0%	0%	0%
Filter offset	0 - 10 %	0%	0%	0%
Minimum speed	0 - 100 %	70%	70%	70%
Minimum speed CW(DF)	0 - 100 %	50%	50%	50%
Output D	0 - 31	1	8	9
Output A	0 - 20	1	0	0
Alarm input D	0 - 43	1	13	15
Alarm priority	0 - 31	0	0	0
Common alarm	0 - 1	1	1	1
Alarm delay	0 - 100 s	10 s	10 s	10 s
Filter alarm input D	0 - 43	5	5	5
Filter max. pressure loss	0 - 1000 Pa	0 Pa	0 Pa	0 Pa
Filter alarm priority	0 - 31	0	0	0
Filter common alarm	0 - 1	1	1	1
Filter alarm delay	0 - 100 s	20 s	20 s	20 s
Emergency start	0 - 9,9 K	0 K	0 K	0 K
End temperature	0 - 9,9 K	0 K	0 K	0 K
Emergency speed	0 - 100 %	0%	0%	0%
Control cycle	1 - 10 s	5 s	5 s	5 s
Max. alternation	1 - 30 %	2%	2%	2%
Control factor	1 - 100	40	40	40
Component configured	0 - 1	1	0	0
Difference start	0 - 25 K	10 K	10 K	10 K
Difference gradient	0 - 25 K	0 K	0 K	0 K
P-factor	0 - 100	40	40	40
I-factor	0 - 100	2	2	2
D-factor	0 - 100	0	0	0
Stop if cooling impossible	0 - 1	0	0	0
DTC type	0 - 3	0	0	0
proportional deh., rel. humidity	0 - 100 %	0%	0%	0%
proportional deh., spec. hum.	0 - 100 g/kg	0 g/kg	0 g/kg	0 g/kg
Runtime	0 - 2.147.483.647	0 h	0 h	0 h

Sensors

	Range	Sensor 1	Sensor 2	Sensor 3	Sensor 4
Purpose	1 - 51	1	2	3	4
Analog input	1 - 4, 6 - 21	100%	200%	300%	4
Type	1 - 5	100%	100%	100%	1
Component configured	0 - 1	100%	100%	0%	0
Min. measure value	-150	0°C (-50 - 100)	0%r.h (0 - 100)	0°C (-50 - 100)	0%r.h (0 - 100)
Max. measure value	-150	50°C (-50 - 100)	100%r.h (0 - 100)	50°C (-50 - 100)	100%r.h (0 - 100)
Min. output value	0 - 20	4 mA (0 - 20)	4 mA (0 - 20)	4 mA (0 - 20)	4 mA (0 - 20)
Max. output value	0 - 20	20 mA (0 - 20)	20 mA (0 - 20)	20 mA (0 - 20)	20 mA (0 - 20)
Max. difference	0 - 100	10%	10%	10%	10%
Limit - alarm priority	0 - 31	0	0	0	0
Limit - common alarm	0 - 1	1	1	1	1
Limit - alarm delay	0 - 100	5 s	5 s	5 s	5 s
Failure - alarm priority	0 - 31	0%	0%	0%	0
Failure -common alarm	0 - 1	1	1	1	1
Failure - alarm delay	0 - 100	5 s	5 s	5 s	5 s
Offset	-50.0 - 50.0	0°C	0% r.h.	0°C	0% r.h.

	Range	Sensor 5	Sensor 6	Sensor 7	Sensor 8
Purpose	1 - 51	5	6	9	14
Analog input	1 - 4, 6 - 21	500%	600%	700%	8
Type	1 - 5	100%	200%	100%	1
Component configured	0 - 1	0%	0%	0%	0
Min. measure value	-150	-50°C (-50 - 100)	-20°C (-50 - 100)	0 bar (0 - 35)	0 bar (0 - 35)
Max. measure value	-150	50°C (-50 - 100)	40°C (-50 - 100)	30 bar (0 - 35)	30 bar (0 - 35)
Min. output value	0 - 20	4 mA (0 - 20)	0 V (0 - 20)	4 mA (0 - 20)	4 mA (0 - 20)
Max. output value	0 - 20	20 mA (0 - 20)	10 V (0 - 20)	20 mA (0 - 20)	20 mA (0 - 20)
Max. difference	0 - 100	10%	10%	10%	10%
Limit - alarm priority	0 - 31	0	0	0	0
Limit - common alarm	0 - 1	1	1	1	1
Limit - alarm delay	0 - 100	5 s	5 s	5 s	5 s
Failure - alarm priority	0 - 31	0%	0%	0%	0
Failure -common alarm	0 - 1	1	1	1	1
Failure - alarm delay	0 - 100	5 s	5 s	5 s	5 s
Offset	-50.0 - 50.0	0°C	0°C	0 bar	0 bar

Sensors (continued)

	Range	Sensor 9	Sensor 10	Sensor 11	Sensor 12 - 21
Purpose	1 - 51	17	18	21	0
Analog input	1 - 4, 6 - 21	8	10	1	0
Type	1 - 5	2	2	1	0
Component configured	0 - 1	0	0	0	0
Min. measure value	-50 - 100	10°C	0 %h.r.	0 bar	0
Max. measure value	-50 - 100	30°C	100 %h.r.	10 bar	0
Min. output value	0 - 20	0 V	0 V	4 mA	0
Max. output value	0 - 20	10 V	10 V	20 mA	0
Max. difference	0 - 100%	0%	0%	10 %	0 %
Limit - alarm priority	0 - 31	0	0	0	0
Limit - common alarm	0 - 1	0	0	1	1
Limit - alarm delay	0 - 100 s	0 s	0 s	5 s	5 s
Failure - alarm priority	0 - 31	0	0	0	0
Failure -common alarm	0 - 1	0	0	1	1
Failure - alarm delay	0 - 100	0 s	0 s	5 s	5 s
Offset	-50.0 - 50.0	0°C	0 %h.r.	0 bar	0

Louver

	Range	Louver 1	Louver 2	Louver 3
Pre-start	0 - 180	90 s	90 s	90 s
Output D	0 - 31	700%	0%	0%
Component configured	0 - 1	0%	0%	0%

Value output

	Range	Value output 1	...	Value output 4
Component configured	0 - 1	0	...	0
Purpose	1 - 51	1	...	1
Min. limit value	-50 - 100	0°C	...	0°C
Max. limit value	-50 - 100	50°C	...	50°C
Output A	0 - 20	0	...	0

Electric meter

	Range	Electric meter
Modbus address	1 - 247	1
Component configured	0 - 1	0

Calculation of cooling capacity (EER)

	Range	EER
Heat capacity	1 - 10000	4187
Density	0 - 10	1.000

ACT control

	Range	ACT
Control mode	1 - 4	1
Time	1 - 255 s	120

ECO-Cool Control

	Range	ECO-Cool
Function configured	0 - 1	0
Start outside temperature	–100 - +100°C	18°C
Hysteresis	0 - 9,9 K	0 K
Difference start	0 - 9,9 K	3 K
Emergency hysteresis	0 - 9,9 K	3 K
Anti freeze	–50 - +50 °C	5 °C
Delay	0 - 255 Min.	10 Min.
Outside moisture min.	0 - 25.5 g/kg	0.0 g/kg
Outside moisture hyst.	0 - 9.9 g/kg	0.0 g/kg

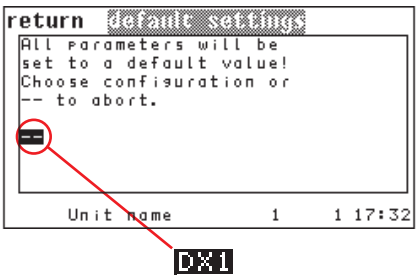
ECO-Cool louver

	Range	ECO-Cool
Output A	0 - 20	0
Start temperature	-9.9 - 9.9 K	0.1 K
Gradient	0.1 - 9.9 K	0.6 K

Data logger

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

11.1 Preconfigurations



Several default configurations for different unit cooling systems are stored in the C7000IOC.

Unit type	A/G	GE	ACW/GCW	CW
1 circuit	dx1	ge11	agcw1	cw
2 circuits	dx2	ge12	agcw2	cw2

C7000 command:

`loaddefault dx1`

The table contains the parameters for the C7000IOC command.

The following table displays the differences in relation to the default settings when a pre-configuration is selected.

	DX1	DX2	CW	CW2	AGCW1	AGCW2	GE11	GE12
Compressor 1 configured	1	1	-	-	1	1	1	1
Compressor 2 configured	-	1	-	-	-	1	-	1
Sensor 5 configured	-	-	-	-	1	1	1	1
Sensor 6 configured	-	-	-	-	-	-	1	1
Sensor 7 configured	-	-	-	-	-	-	1	1
Sensor 8 configured	-	-	-	-	-	-	-	1
GE/CW valve configured	-	-	1	1	1	1	1	1
G valve configured	-	-	-	-	-	-	1	1
Dehumidification reduction	-	-	20%	20%	20%	20%	20%	20%
Input D GE/CW valve	-	-	-	3	-	-	-	-
Cooling priority	-	-	-	-	1	1	-	-

Notes:

- For all unit versions except CW and CW2 of the series CyberAir 2/3 the electronic expansion valve must be configured.

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For general inquiries about our products and services, our hotline is available at +49 40 5585-5000. Our service hours are weekdays from 7 am – 4 pm.

Or directly contact our representative in your area:

STULZ COMPANY HEADQUARTERS

STULZ GmbH
Holsteiner Chaussee 283
22457 Hamburg
Tel. +49 40 5585-0
Fax +49 40 5585-352
products@stulz.de

STULZ SUBSIDIARIES

AUSTRALIA
STULZ Australia Pty. Ltd.
Tel. +61 (2) 96 74 47 00
Fax +61 (2) 96 74 67 22
sales@stulz.com.au

BELGIUM
STULZ Belgium BVBA
Tel. +32 (470) 29 20 20
info@stulz.be

BRAZIL
STULZ Brasil
Ar Condicionado Ltda.
Tel. +55 11 4163 4989
Fax +55 11 2389 6620
comercial@stulzbrasil.com.br

CHINA
STULZ Air Technology and Services Shanghai Co., Ltd.
Tel. +86 (21) 3360 7133
Fax +86 (21) 3360 7138
info@stulz.cn

FRANCE
STULZ France S. A. R. L.
Tel. +33(1)34804770
Fax +33(1)34804779
info@stulz.fr

ITALY
STULZ S.p.A.
Tel. +39(045)6331600
Fax +39(045) 6331635
info@stulz.it

INDIA
STULZ-CHSPL (India) Pvt. Ltd.
Tel. +91 (22) 56 66 94 46
Fax +91 (22) 56 66 94 48
info@stulz.in

INDONESIA
PT STULZ AIR TECHNOLOGY INDONESIA
Tel. +62 21 2221 3982
Fax +62 21 2221 3984
info@stulz.id

MEXICO
STULZ México S.A. de C.V.
Tel. +52(55)52928596
Fax +52(55)52540257
ventas@stulz.com.mx

NETHERLANDS
STULZ GROEP B. V.
Tel. +31 (20) 54 51 111
Fax +31 (20) 64 58 764
stulz@stulz.nl

NEW ZEALAND
STULZ New Zealand Ltd.
Tel. +64 (9) 360 32 32
Fax +64 (9) 360 21 80
sales@stulz.co.nz

POLAND
STULZ Polska SP. Z O.O.
Tel. +48 (22) 883 30 80
Fax +48 (22) 824 26 78
info@stulz.pl

SINGAPORE
STULZ Singapore Pte Ltd.
Tel. +65 6749 2738
Fax +65 6749 2750
andrew.peh@stulz.sg

SPAIN
STULZ España S. A.
Tel. +34(91)5178320
Fax +34(91)5178321
info@stulz.es

SOUTH AFRICA
STULZ South Africa Pty. Ltd.
Tel. +27 (0) 11 397 2363
Fax +27 (0) 11 397 3945
aftersales@stulz.co.za

SWEDEN
STULZ SWERIGE AB
Tel. +46 8 12157550
info@stulzsverige.se

UK
STULZ U. K. Ltd.
Tel. +44 (1372) 74 96 66
Fax +44 (1372) 73 94 44
sales@stulz.co.uk

USA
STULZ AIR TECHNOLOGY SYSTEMS (SATS) , INC.
Tel. +1 (301) 620 20 33
Fax +1 (301) 662 54 87
info@stulz-ats.com