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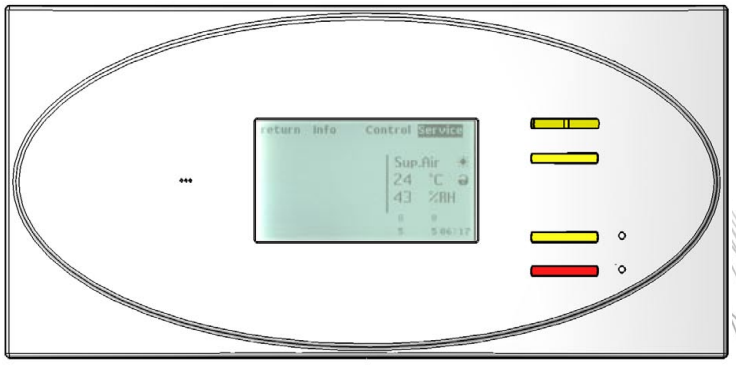
Operating Instructions

InRoom Controller

for DX 21-86
and CW 40-150



Contents

This manual is based on the software versions IOC-V2.23 and AT-V0.90.

1. Presentation of the system

The InRoom Controller offers maximum possible operating safety for industrial applications and a versatile operator interface. There are two interfaces with one controller.

The InRoom Controller works by having each cooling unit possess its own controller while all controllers can be linked together in a bus system.

This way a natural redundancy is obtained that causes the system to function with the least expense.

The second interface can be accessed using a computer. Using the screen of a Laptop or PC provides the best way of visualizing parameter settings. This is the most comfortable way of doing a component-related configuration.

Beyond the basic air conditioning functions, the 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

The heart of the control system is the I/O controller on which up to 4 EAIO/EDIO boards for additional in- and outputs can be installed. The exploitation of the third dimension provides maximum accessibility and an easy board exchange in case of modifications.

The control systems manages four busses:

1. IIC-bus for the communication between the I/O controller and the EAIO/EDIO boards.
2. RS485 IO-bus for the communication among the cooling units.
3. RS485 BMS-bus for the communication with a building management system.
4. RS485 Aux-bus for the communication with optional components capable of bus connection.

For service purposes like software download and control by a remote computer a RS232 interface is located on the I/O controller in the same way as on the InRoom Controller interface.

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

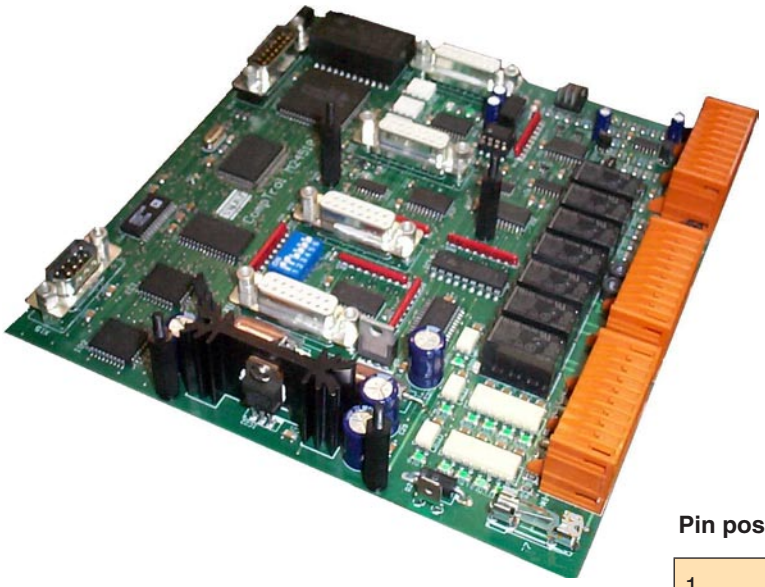
	A-IN	A-OUT	D-IN	D-OUT
IOC-board	5	4	11	7
EAIO-board	4	4	/	/
EDIO-board	/	/	8	6
Maximum equipment				
IOC + 4 EAIO	21	20	11	7
IOC + 4 EDIO	5	4	43	31

	Interfaces
IOC-board	2 x RS485 IO-bus, terminals 4 x IIC-Bus, DB-15 EBUS conn. DB-15 RS232, DB-9
EAIO-board	IIC-Bus, DB-15
EDIO-board	IIC-Bus, DB-15
EBUS-board	I/O board conn. DB-15 RS485 BMS-bus, terminals RS485 Aux.-bus, terminals
Operator interface board	2 x RS485 IO-bus + BMS, terminals 2 x RS232 BMS + service, DB-9

2. Hardware components

2.1 I/O controller

2.1.1 Board design



Technical Data:

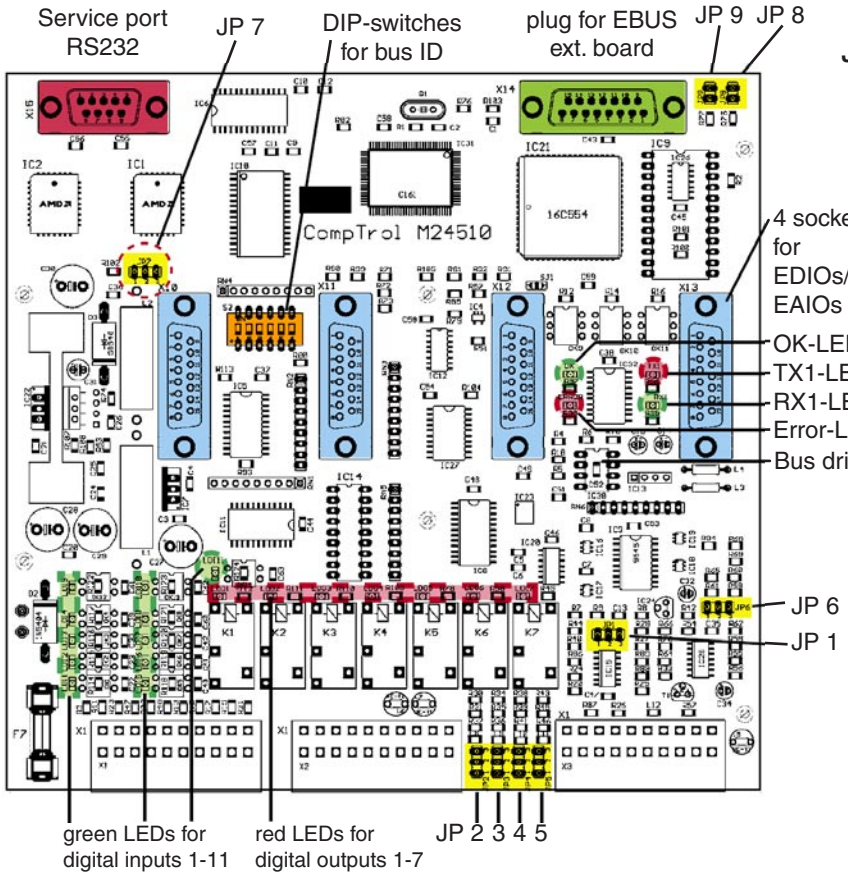
Voltage supply:	24(±15%) VAC
Power consumption:	9.6 VA
Fuse:	2 A time-lag
Operating temp.:	5°C...40°C
Storage temp.:	-30°C...60°C

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 I²C-bus clock.
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

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



Jumper setting depending on sensor types

		Jp n°	Pos.1-2	Pos.2-3
Analogous input	AIN 1	2	4-20mA	0-10V
	AIN 2	3		
	AIN 3	4		
	AIN 4	5		
	AIN 5	6	PT1000	PT100

Jumper for software download

Jp n°	Pos. 1-2	Pos. 2-3
7	operation	download

Termination jumper

Jp n°	Function, when set
1	I/O-bus Port 1 termin. (Pos.1-2)
8	EBUS Port 2 termination
9	EBUS Port 3 termination

Jp 1 has to be set if the I/O controller represents the first or last unit in the I/O bus.

Jp8 and Jp9 have to be set if no EBUS extension board is present. On the contrary, they have to be removed to enable the two extension RS485 busses on a plugged EBUS extension board.

2.1.2 Assignment - I/O controller

The assignment depends on the unit version (DX1, DX2, CW).
DX1 - Single refrigerant circuit. DX2 - Dual refrigerant circuit. CW - Chilled water circuit.
E.g.: PA311D -> DX1, PGCW452U -> DX2, PCW900D -> CW

Pin	Designation	DX1	DX2	CW
1	24VAC	Power supply	Power supply	Power supply
2	GND			
3	GND	Reserved	Reserved	Reserved
4	Din 1	Fan failure	Fan failure	Fan failure
5	Din 2	Compressor failure	Compressor failure 1	Pump failure 1
6	Din 3	Low pressure	Low pressure 1	Chiller failure
7	Din 4	E-reheat failure 1-3	E-reheat failure 1-3	E-reheat failure 1-3
8	Din 5	Filter alarm	Filter alarm	Filter alarm
9	Din 6	Humidifier failure/ ENS 20µS	Humidifier failure/ ENS 20µS	Humidifier failure/ ENS 20µS
10	Din 7	Water detection	Water detection	Water detection
11	Din 8	Ext. alarm 1	Compressor failure 2	Ext. alarm 1
12	Din 9	Ext. alarm 2	Low pressure 2	Ext. alarm 2
13	Din 10	Remote on/off	Remote on/off	Remote on/off
14	Din 11	Fire stat	Fire stat	Fire stat
15	Dout 1 (NO)	Enable fan	Enable fan	Enable fan
16	Dout 1 (COM)			
17	Dout 1 (NC)			
18	Dout 2 (NO)	Compressor	Compressor 1	Pump 2
19	Dout 2 (COM)			
20	Dout 2 (NC)			
21	Dout 3 (NO)	E-reheat 1	E-reheat 1	E-reheat 1
22	Dout 3 (COM)			
23	Dout 3 (NC)			
24	Dout 4 (NO)	E-reheat 2 / Hot gas reheat / HWR*	E-reheat 2 / Hot gas reheat / HWR*	E-reheat 2 or HWR*
25	Dout 4 (COM)			
26	Dout 4 (NC)			
27	Dout 5 (NO)	Dehumidification or Hotgas-bypass	Dehumidification or Hotgas-bypass	On/off Humidifier or ENS
28	Dout 5 (COM)			
29	Dout 5 (NC)			
30	Dout 6 (NO)	Common alarm 1	Common alarm 1	Common alarm 1
31	Dout 6 (COM)			
32	Dout 6 (NC)			
33	Dout 7 (NO)	Louver	Compressor 2	Louver
34	Dout 7 (COM)			
35	Dout 7 (NC)			

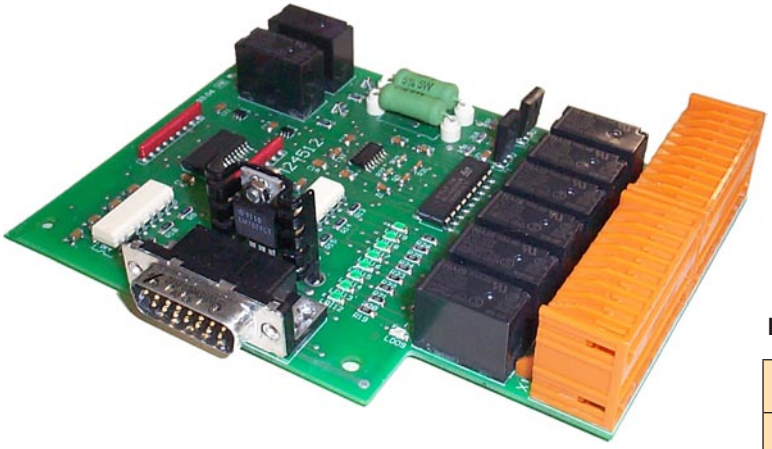
*HWR - hot water reheat

Assignment - I/O controller (continued)

Pin	Designation	DX1	DX2	CW
36	+15V	Active sensor 1	Active sensor 1	Active sensor 1
37	GND			
38	Ain 1	Room/return air temp.	Room/return air temp.	Room/return air temp.
39	Ain 2	Room/return air humidity	Room/return air humidity	Room/return air humidity
40	+15V	Active sensor 2	Active sensor 2	Active sensor 2
41	GND			
42	Ain 3	Supply temperature	Supply temperature	Supply temperature
43	Ain 4	Supply humidity	Supply humidity	Supply humidity
44	+Ub	Passive sensor 3 Water temperature (CW) Pt100 / 1000 3 or 4 conductors	Passive sensor 3 Water temperature (CW) Pt100 / 1000 3 or 4 conductors	Passive sensor 3 Water temperature 1 (CW) Pt100 / 1000 3 or 4 conductors
45	GND			
46	Ain 5			
47	GND			
48	Aout 1	Fan	Fan	Fan 1
49	GND			
50	Aout 2	GE/CW valve/pump 1 or actual temp.	GE/CW valve/pump 1 or actual temp.	CW valve/pump 1 or actual temp.
51	GND			
52	Aout 3	Humidifier/ENS or actual humidity	Humidifier/ENS or actual humidity	Humidifier/ENS or actual humidity
53	GND			
54	Aout 4	G-valve/pump 2	G-valve/pump 2	CW2-valve/pump 2
55	GND			
56	Port 1-H	RS485-I/O-bus	RS485-I/O-bus	RS485-I/O-bus
57	Port 1-L			
58	Port 1-H	RS485-I/O-bus	RS485-I/O-bus	RS485-I/O-bus
59	Port 1-L			
60	+15V	Reserved	Reserved	Reserved
X10	SUB-D 15	Bus 3 I^2C EDIO1 (socket1)	Bus 3 I^2C EDIO1 (socket1)	Bus 3 I^2C EDIO1 (socket1)
X11	SUB-D 15	Bus 3 I^2C EDIO2 (socket2)	Bus 3 I^2C EDIO2 (socket2)	Bus 3 I^2C EDIO2 (socket2)
X12	SUB-D 15	Bus 3 I^2C EAIO1 (socket3)	Bus 3 I^2C EAIO1 (socket3)	Bus 3 I^2C EAIO1 (socket3)
X13	SUB-D 15	Bus 3 I^2C EDIO/EAIO (socket 4)	Bus 3 I^2C EDIO/EAIO (socket 4)	Bus 3 I^2C EDIO/EAIO (socket 4)
X14	SUB-D 15	EBUS exp. (plug)	EBUS exp. (plug)	EBUS exp. (plug)
X15	SUB-D 9	RS232 service port (plug)	RS232 service port (plug)	RS232 service port (plug)

2.2 EDIO - Extension board for digital in- and outputs

2.2.1 Board design

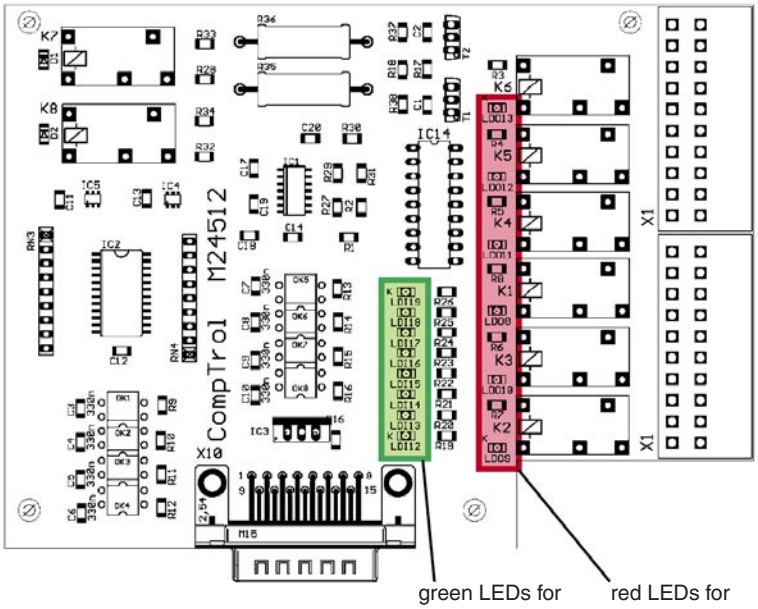


Technical Data:

Power consumption:	10.1 VA
Operating temp.:	5°C...40°C
Storage temp.:	-30°C...60°C

Pin position

1	10	21	30
11	20	31	40



Onboard LEDs

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

ON: Voltage present

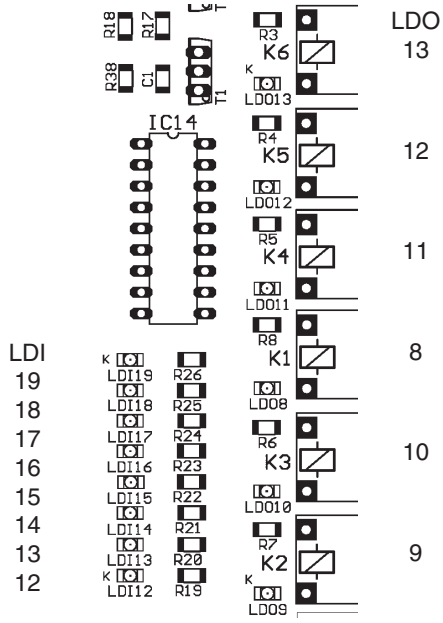
OFF: No voltage (alarm, failure)

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

ON: Relay active

OFF: Relay passive

Enlarged section for onboard LEDs



The EDIO-board is an expansion board for digital inputs and outputs. It can be attached to the I/O controller board at any of the four sockets and will be recognized by the IOC after a self test.

2.2.2 Assignment - EDIO1

The assignment depends on the unit version (DX1, DX2, CW). For more information, see „2.1.2 Assignment - I/O Controller“ on page 7.

Pin	Designation	DX1	DX2	CW
1	Din 12	UPS	UPS	UPS
2	Din 13	Pump 1 failure	Pump 1 failure	Free
3	Din 14	Pump 2 failure	Pump 2 failure	Pump 2 failure
4	Din 15	Drycooler failure	Drycooler failure	Free
5	Din 16	CW disable/DX enable or Ext. alarm 3	CW disable/DX enable or Ext. alarm 1	Ext. alarm 3
6	Din 17	Ext. alarm 4	Ext. alarm 2	Ext. alarm 4
7	Din 18	ENS 5µS	Ext. alarm 3/ENS 5µS	ENS 5µS
8	Din 19	Phase control	Phase control	Phase control
9	Dout 8 (NO)	Pump 1	Pump 1	Free
10	Dout 8 (COM)			
11	Dout 8 (NC)			
12	Dout 9 (NO)	Drycooler 1	Drycooler 1	Free
13	Dout 9 (COM)			
14	Dout 9 (NC)			
15	Dout 10 (NO)	Drycooler 2 or winter operation	Drycooler 2 or winter operation	Winter operation
16	Dout 10 (COM)	Drycooler 2 or winter/summer operation	Drycooler 2 or winter/summer operation	Winter/summer operation
17	Dout 10 (NC)	Drycooler 2 or summer operation	Drycooler 2 or summer operation	summer operation
18	Dout 11 (NO)	Pump 2	Pump 2	Pump 2
19	Dout 11 (COM)			
20	Dout 11 (NC)			
21	Dout 12 (NO)	E-reheat 3	E-reheat 3	E-reheat 3
22	Dout 12 (COM)			
23	Dout 12 (NC)			
24	Dout 13 (NO)	Humidifier on/off /ENS	Louver	Free
25	Dout 13 (COM)			
26	Dout 13 (NC)			
27	PWM1	Electrical expansion valve	Electrical expansion valve	Free
28	GND			
29	PWM2	E-reheat 1 (proportional)	E-reheat 1 (proportional)	E-reheat 1 (proportional)
30	GND			
X10	SUB-D 15	Bus 3 I²C (plug)	Bus 3 I²C (plug)	Bus 3 I²C (plug)

2.2.3 Assignment - EDIO2

The assignment depends on the unit version (DX1, DX2, CW). For more information, see „2.1.2 Assignment - I/O Controller“ on page 7.

Pin	Designation	DX1	DX2	CW
1	Din 20	Free	Ext. alarm 4	Free
2	Din 21	Free	Free	Free
3	Din 22	Pump failure 3	Pump failure 3	Free
4	Din 23	Pump failure 4	Pump failure 4	Free
5	Din 24	Free	Free	Free
6	Din 25	Free	Free	Free
7	Din 26	Free	Free	Free
8	Din 27	Free	Free	Free
9	Dout 14 (NO)	Pump 3	Pump 3	Free
10	Dout 14 (COM)			
11	Dout 14 (NC)			
12	Dout 15 (NO)	Pump 4	Pump 4	Free
13	Dout 15 (COM)			
14	Dout 15 (NC)			
15	Dout 16 (NO)	Free	Humidifier on/off /ENS	Free
16	Dout 16 (COM)			
17	Dout 16 (NC)			
18	Dout 17 (NO)	Drycooler 3	Drycooler 3	Free
19	Dout 17 (COM)			
20	Dout 17 (NC)			
21	Dout 18 (NO)	Drycooler 4	Drycooler 4	Free
22	Dout 18 (COM)			
23	Dout 18 (NC)			
24	Dout 19 (NO)	Free	Free	Free
25	Dout 19 (COM)			
26	Dout 19 (NC)			
27	PWM3	Electrical expansion valve 2	Electrical expansion valve 2	Free
28	GND			
29	PWM4	Free	Free	Free
30	GND			
X10	SUB-D 15	Bus 3 I²C (plug)	Bus 3 I²C (plug)	Bus 3 I²C (plug)

2.3 EAIO - Extension board for analogous in- and outputs

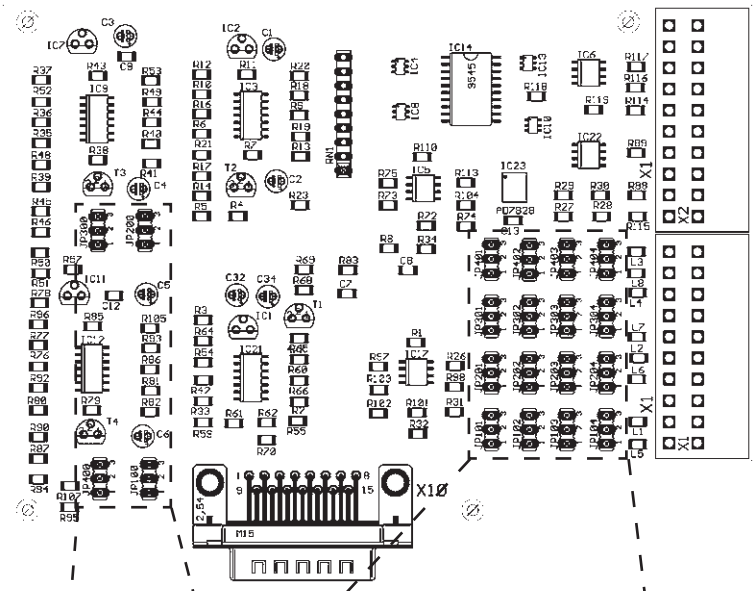
2.3.1 Board design

Technical Data:

Power consumption:	10.1 VA
Operating temp.:	5°C...40°C
Storage temp.:	-30°C...60°C

Pin position

1	10	21	30
11	20	31	40

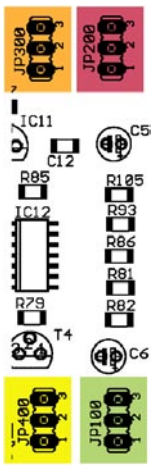


The EAIO-board is an extension board for analogous inputs and outputs. It can be attached to the I/O controller board at any of the four sockets and will be recognized by the IOC due to a self test.
There are several jumpers on board - five for each input - which serve to adapt the board to different sensor types.

How to use the Jumper setting table:
- Choose the analogous input at which you have connected a sensor.
- In the same line you can see the jumpers which relate to this input.
- In the lower part of the table you can read in each column the jumper setting depending on the sensor type you connected.

Example:
You have connected a PT100 at AIN 8. The corresponding jumpers are 301-304, 300. Jumper 301,303,304 must be set on position 2-3, Jumper 300 on 1-2 and Jumper 302 not at all.

Jumper 100-400 (enlarged section)



corresp. input / **Jumper 101-404 (enlarged section)**

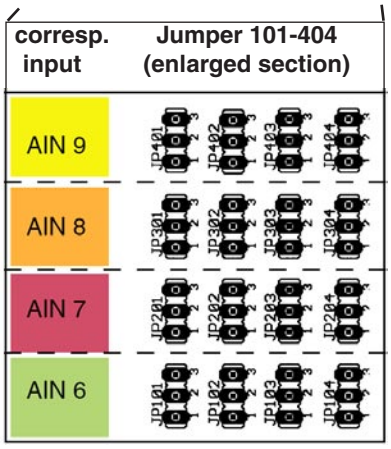


Table: Jumper setting

		Jumper designation				
Analogous input	AIN 6	101	102	103	104	100
	AIN 7	201	202	203	204	200
	AIN 8	301	302	303	304	300
	AIN 9	401	402	403	404	400
Connected sensor type at anal. input	0-10V	1-2	2-3	1-2	1-2	0
	4-20mA	1-2	1-2	1-2	1-2	0
	PT100	2-3	0	2-3	2-3	1-2
	PT1000	2-3	0	2-3	2-3	2-3

2.3.2 Assignment - EAIO

The assignment depends on the unit version (DX1, DX2, CW). For more information, see „2.1.2 Assignment - I/O Controller“ on page 7.

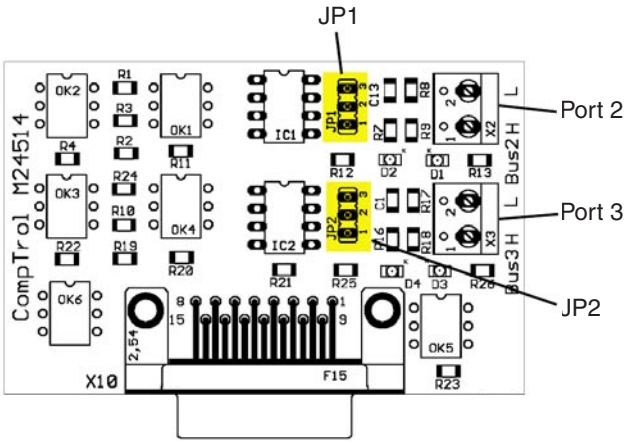
Pin	Designation	DX1	DX2	CW
1	+Ub/Ib	Universal sensor 4 Outside temperature	Universal sensor 4 Outside temperature	Universal sensor 4 Outside temperature
2	Ain 6			
3	GND			
4	GND			
5	+Ub/Ib	Universal sensor 5 Condensation pressure	Universal sensor 5 Condensation pressure 1	Universal sensor 5 Water temp. 2 (CW2)
6	Ain 7			
7	GND			
8	GND			
9	+Ub/Ib	Universal sensor 6 Evaporation pressure	Universal sensor 6 Condensation pressure 2	Universal sensor 6 - free -
10	Ain 8			
11	GND			
12	GND			
13	+Ub/Ib	Universal sensor 7 Water temp. (G)	Universal sensor 7 Water temp. (G) or evaporation pressure 1	Universal sensor 7 - free -
14	Ain 9			
15	GND			
16	GND			
17	Aout 5	Suction valve / compressor1 or actual humidity	Suction valve / compressor1 or actual humidity	Actual humidity
18	GND			
19	Aout 6	Actual temperature	Suction valve / compressor 2/ act. temp.	Actual temperature
20	GND			
21	Aout 7	HWR valve	HWR valve	HWR-valve
22	GND			
23	Aout 8	EEV (with 0-10V) or proportional dehumidification	EEV (with 0-10V) or proportional dehumidification	Proportional dehumidification
24	GND			
X10	SUB-D 15	Bus 3 I^2C (plug)	Bus 3 I^2C (plug)	Bus 3 I^2C (plug)

2.4 EBUS - Extension board for 2x RS485 bus

2.4.1 Board design

Technical Data:

Power consumption:	11.3 VA
Operating temp.:	5°C...40°C
Storage temp.:	-30°C...60°C



2.4.2 Assignment - EBUS

Pin	Designation	Function
1	Port 2-H	RS485 BMS-bus
2	Port 2-L	
1	Port 3-H	RS485 Aux-bus (e.g. EC-motor)
2	Port 3-L	
X10	SUB-D 15	EBUS extension (socket)

Termination jumper

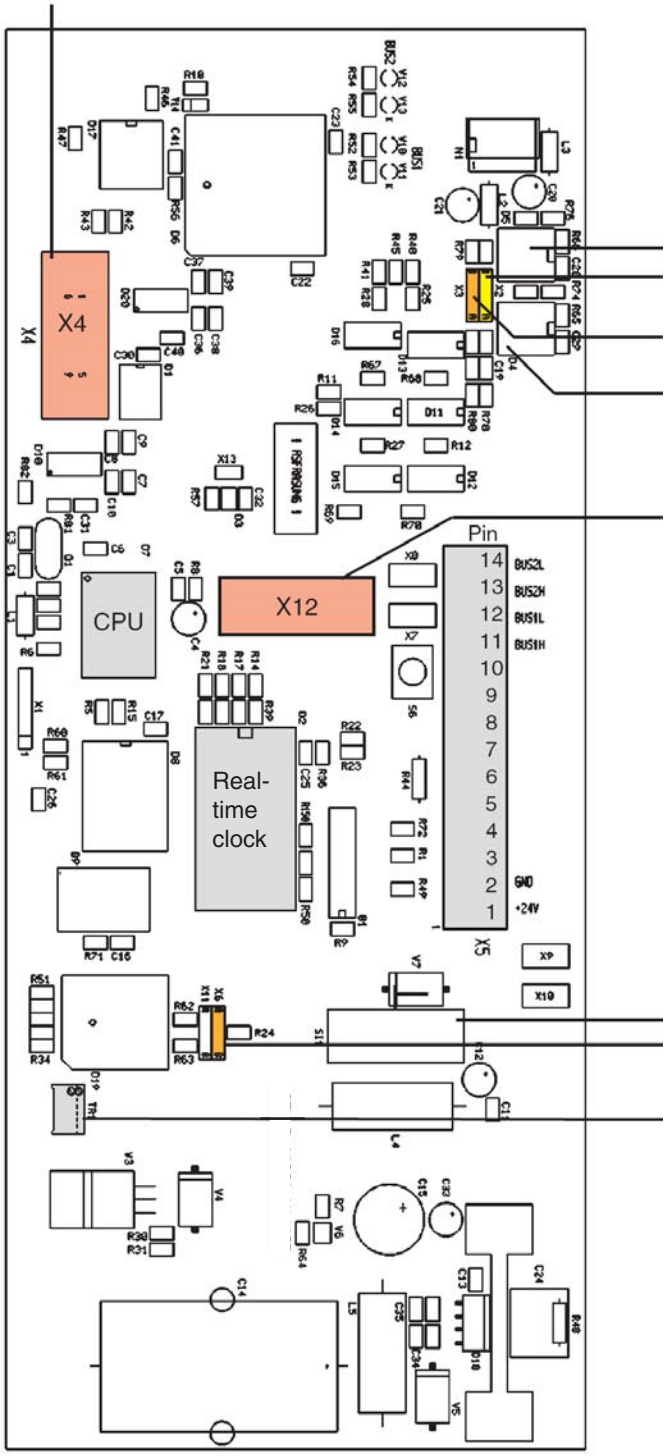
Jp n°	Function in position 1-2
1	EBUS Port 2 termination
2	EBUS Port 3 termination

Jp 1 has to be set, if the cooling unit represents the first or last element in the BMS bus.

Jp 2 has to be set, if the cooling unit represents the first or last element in an Aux-bus.

2.5 InRoom Controller Board

2.5.1 Board design



Technical Data:

Dimensions:	270 x 110 x 40 mm
Voltage supply:	24(±15%) VAC
Power consumption:	14 VA
Fuse:	2 A time-lag
Operating temp.:	5°C...40°C
Storage temp.:	-30°C...60°C

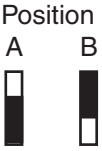
RS485 Driver for the BMS bus

Jumper X2: bus termination for RS 485 I/O-bus
Pos. A: set, Pos. B: not set

Jumper X3: bus termination for RS 485 BMS-bus
Pos. A: set, Pos. B: not set

RS485 Driver for the IO bus

Position



RS232 - BMS port (SUB-D 9)

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

Fuse T1A

Jumper X6: Pos. A: Board in download mode

Contrast adjustment for display

3. Operator interface

3.1 I/O Controller

A keyboard is used to operate the I/O controller by using specified commands that follow an easily understood syntax.
To establish the connection from a PC to the IOC a 9-line cable with SUB-D 9 connectors at both ends (crossed type), which can be obtained as an option, is needed.
A terminal program is also needed. You can download the terminal program "Service" from the APC website **www.apc.com**. Connect the cable at a serial port of your PC and at the service port X15 on the IOC. Start the terminal program.

You can now communicate with the connected I/O controller (ioc), and in return the IOC sends the following prompt to your PC:
"`ioc ##:>`", where ## represents the bus id.

The commands can be classified into three major categories:
1. Bus specific control commands
2. Commands related to cooling unit components
3. Commands concerning the whole cooling unit

1. Bus command	2. Component command	3. Cooling unit command
`invite ##`	`sensor 1`	`equip`
`del ##`	`comp 1`	`is 1`
`iobus`	`suctionv 1`	`state`
`checkbus`	`gecwv`	`ups`
`spreadbusconf`	`gvalve`	`wprg`
	`drycool 1`	`event`
	`pump 1`	`log 1`
	`eheat 1`	`option`
	`gasheat`	`exalarmin 1`
	`pwwheat`	`zone 1`
	`humi 1`	`loaddefault dx1`
	`dehumi`	
	`fan 1`	
	`louver 1`	

The commands on a light-gray (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" such as "comp h".
A command of the second (component command) or third category (Cooling unit command) which is typed in without any parameters displays all the information about its subject (except "loaddefault ###" which is an execution command).

The bus commands except for „`iobus`“ are control commands that are executed after pressing the enter key. The bus commands on a dark-gray (green) background need the bus I.D.s of their respective units in order to execute.

Now the bus commands in detail:

- The `invite` command plus bus I.D. adds a bus participant.

- The `del` command plus bus I.D. excludes the participant from the bus and sends the new I/O-bus configuration to all participants.

- The `iobus` command edits the stored I/O-bus configuration.

- The `checkbus` command checks every I.D. address from 00 to 31 for the presence of a bus participant and updates the stored bus configuration accordingly.

- The `spreadbusconf` command distributes the bus configuration to all participants.

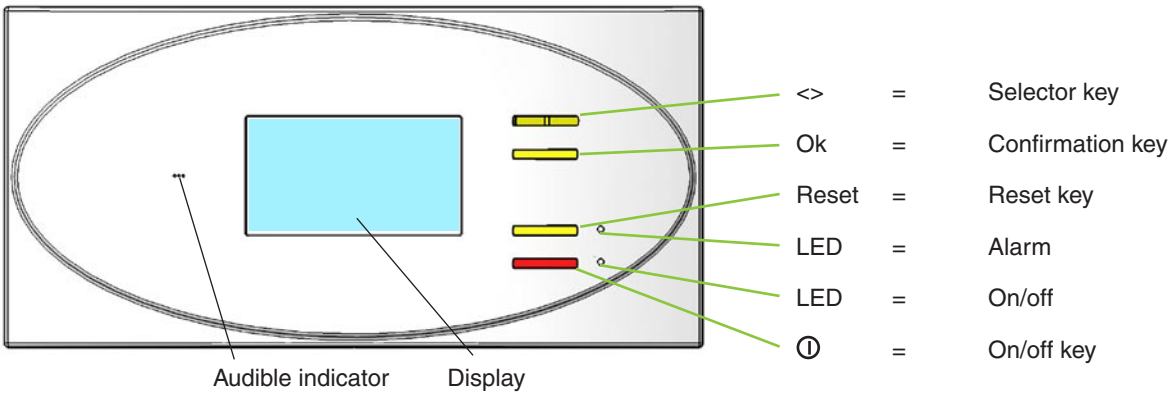
General

The numbering of any digital or analogous in- or output begins with number 1. Despite this the digital/analogous 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 in- and outputs is not possible with the exception of in-/output 0 and the alarm priorities (relays).

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, the configuration for single refrigerant circuit-units DX1 is loaded. Note that no year below 2000 can be entered.

3.2 Operational elements of the InRoom Controller



Selector key	Selects menus and changes parameters.
Confirmation key	Acitvates the functions/parameters selected with the selector key.
Reset key	Press once to silence the alarm tone. Press a second time to clear the alarm message (if the cause has been eliminated).
LED alarm	Lights up in the event of an alarm.
LED on/off	Lights up when the selected IOC is switched on.
On/off key	Turns off the selected cooling unit.
Audible indicator	Issues an alarm tone when an alarm has occurred.
Display	The display shows data, operating conditions and information to guide the operator.

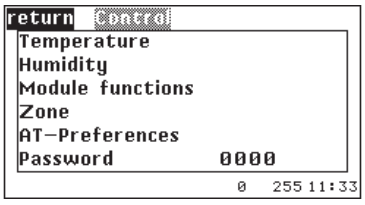
Operation - Navigation through the menus

Use the selector and confirmation keys to navigate in and across the menus. The cursor is represented by the inverse display of field content. This field may contain an expression, a number or a symbol.

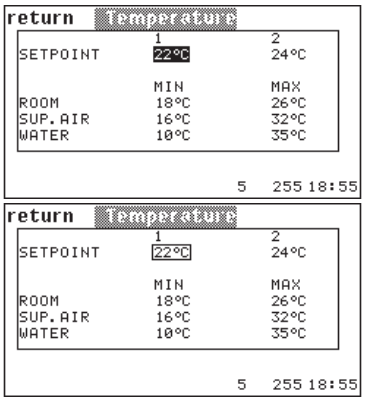
There are two types of menus: Selection menus and parameter menus. In **selection menus** you can choose a menu point using the selector key and the confirmation key to navigate the next submenu. To get back to a higher-level menu there is a "Return" field in the top left corner of every menu.

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 the change mode. Use the selector key to change the parameter value. Pressing the confirmation key finishes the modification and re-displays the inverse cursor.
Select „more“ in some parameter menus using the selector key to display a new window with more information.

Selection menu

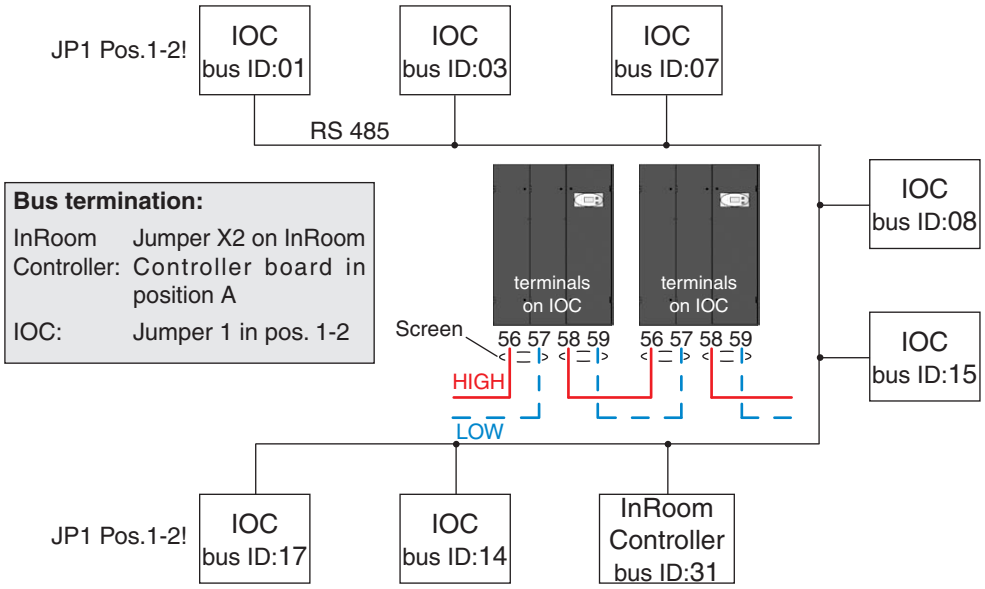


Parameter menu



4. Bus communication

The maximum configuration consists of 16 cooling units with an I/O controller and an InRoom Controller. One of the features of the controller is its facility for bus operation. All that is needed is a shielded cable with two lines twisted in pairs, which are connected from unit to unit at the terminals 56-59 of each I/O controller (IOC). In the example below the bus termination of the two units that form the end of the bus (IOC 01 and IOC 17) must be enabled.
The example of a RS485 bus shows a typical application with 7 IOCs and 1 InRoom Controller.



Bus termination:

InRoom Controller:	Jumper X2 on InRoom Controller board in position A
IOC:	Jumper 1 in pos. 1-2

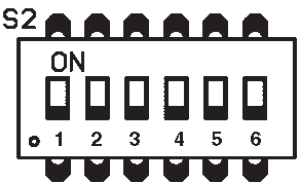
The bus address or bus ID is adjusted with the dip-switches on the IOC. The table at the right shows the corresponding adjustment for all possible bus IDs. The counting begins with 0 and ends with 31. A "1" means a dip-switch is in the ON position.
On an InRoom Controller the bus-ID is adjusted in the global status line (See chapter 5. Controller Start).
An IOC is delivered with the ID 01 as standard, an InRoom Controller has the ID 31 as standard. After having provided all units (IOCs) with a different bus-ID, the units must be declared as participants of the bus, for the bus exists up to now only physically. (See next page).

To control the presence of each bus member, type `iobus` and you will see a list as follows:

```
ID        type        status   availability
00      unknown      passive       000
01   IO-controller    active        255
02      unknown      passive       000
03   IO-controller    active         me
 ⋮
```

In short:
1. Connect units by bus lines
2. Set bus terminations (beginning/end)
3. Adjust bus-IDs
4. Generate bus configuration (declare participants)

Bus ID	DIP-switch				
	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
20	0	0	1	0	1
21	1	0	1	0	1
22	0	1	1	0	1
23	1	1	1	0	1
24	0	0	0	1	1
25	1	0	0	1	1
26	0	1	0	1	1
27	1	1	0	1	1
28	0	0	1	1	1
29	1	0	1	1	1
30	0	1	1	1	1
31	1	1	1	1	1



4.1 Bus with InRoom Controller + IOC

Configuration of the bus participants

1. Configure the address of the bus participants with the DIP-switches or in the global status line at the InRoom Controller.
2. Declare the bus participants; there are 3 ways to do this:
   a. Move DIP-switch 6 from ON to OFF.
   b. Use the selector key to mark all units from an InRoom Controller when the bus with ID 31 is marked. Press the confirmation key OK and enter the Service password.
   c. Connect a laptop to any IOC and enter the command "`invite me`" or "`invite ##`", where ## represents the bus-ID of the IOC to which you are connected. Then use the command `invite` ## with each bus-ID of the connected elements to declare other participants.
3. Check the presence of the bus participants in the overview on the display of the InRoom Controller or by using the command `iobus`.

Deleting bus participants from the bus configuration

1. Delete a bus participant by typing the command `del` ## .

Adding bus participants to the bus configuration

1. Adjust a free bus-ID. If the bus participant, which will be added, is an IOC, adjust the DIP-switches. If the bus participant, which will be added, is an InRoom Controller, adjust the bus-ID in the global status line. (See „Controller start“ on page 21).
2. Declare the bus participant by using the command `invite` ## with the adjusted bus-ID.

Address modification of participants

1. Delete the bus participant from the configuration.
2. IOC: change the dip-switch adjustment correspondingly. InRoom Controller: change the bus-ID in the global status line.
3. Declare the bus participant by the command `invite` ## with the adjusted bus-ID.

4.2 Special cases

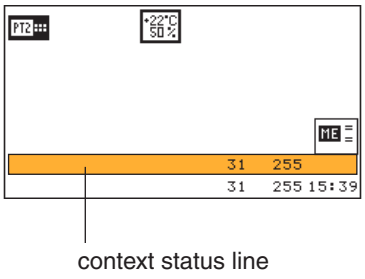
Adding an IOC with invalid bus configuration to a consisting InRoom Controller/IOC-configuration

1. Separate the new unit with invalid configuration from the bus.
2. Delete the IOC with invalid configuration from another IOC (with valid configuration) `del ##`.
3. Adjust a free address with the DIP-switches at the new IOC.
4. Delete the stored bus configuration of the new IOC (either each single address with `del ##` or globally with the command `checkbus`; this command scans the addresses and deletes every unit that is not present).
5. Connect the new unit to the bus.
6. Invite the new IOC by another IOC by typing the "`invite ##`" command.

General Note:
If there is data traffic on the bus, a new unit can only be invited by a valid/active bus member. A bus member is valid/active if the TX1-LED on the IOC board is red.

5. Controller start

After having switched on the power supply of the InRoom Controller the window illustrated at the right will appear. This window displays the maximum number of 32 bus participants (bus ID 0-31).

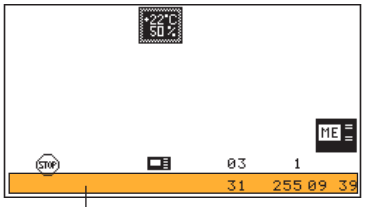


context status line

An I/O controller is displayed by a square frame containing the local temperature and humidity. A gray frame signifies that the unit is in a stop state, and a black frame indicates that the unit is in operation. An IOC symbol without measured values indicates that the IOC is not reachable, either because it is switched off (no voltage) or due to a bus fault. The other symbols contain an abbreviation for the controller type:

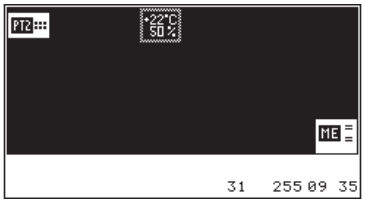
AT - InRoom Controller,
ME - InRoom Controller at which these windows are displayed.

The bus-ID can be deducted from the location in the scheme. Line 1 contains the bus participants 0 - 7 from left to right; line 2, 8-15; line 3, 16-23; line 4, 24-31.

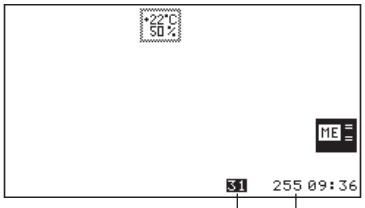


global status line

A space signifies that a unit with a corresponding bus-ID does not exist.
A symbol/unit that is selected displays inversely. In the window on top of the page the InRoom Controller is selected. It appears inversely with white letters on a black background. In the window below, the IOC is selected.
The **context status line** contains the bus-ID and the global address of the selected bus participant.
The **global status line** contains the bus-ID, the global address of the InRoom Controller, and the clock.



Mark the last bus participant position 31 to access the screen illustrated to the right. The entire system can be switched off in this state by using the local on/off key.
All units are switched on and off by pressing the on/off key.
If you press the OK-button when all positions are marked the checkbus function is carried out (after the request and entry of the service master password).

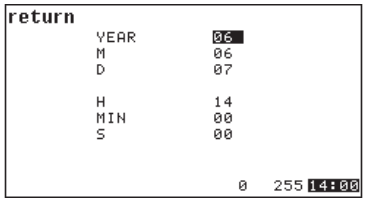


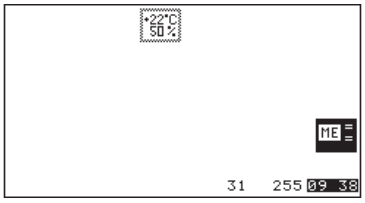
bus-ID
global address

Use the selector key to navigate to the bus-ID of the InRoom Controller which can be adjusted (after the request and entry of the service master password). The global address cannot be adjusted here, for safety reasons.

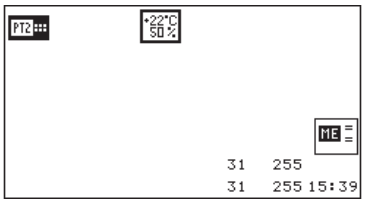
The time can be adjusted by selecting the clock.
The following items can be adjusted in sequence:

- Year
- Month
- Day
- Hour
- Minute
- Second

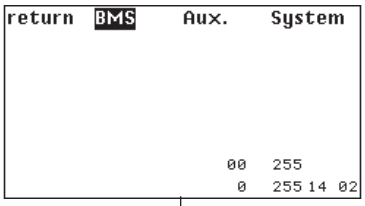


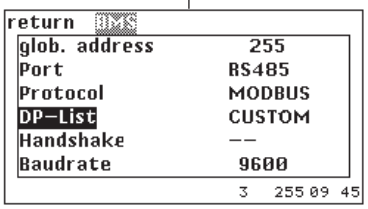


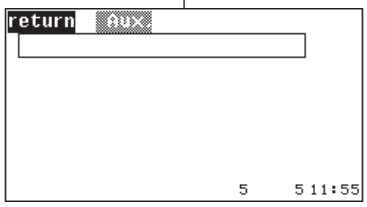
Select the InRoom Controller for further adjustments to receive the following display with the menu structure shown below.

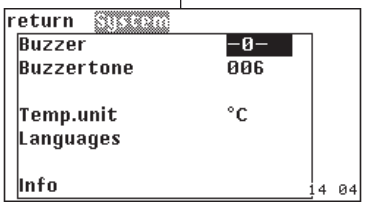


1. In the BMS menu the global address of the InRoom Controller can be adjusted as well as an available interface that can be either RS232 or RS485. The protocol according to the BMS requirement can be adjusted here as well.

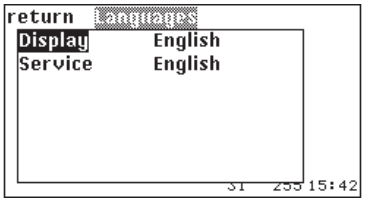


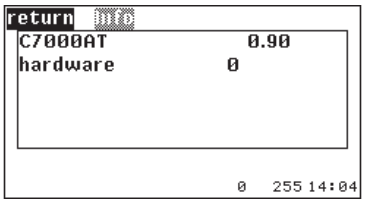




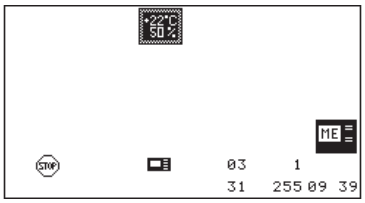


3. In the system menu, the alarm buzzer can be turned on (-1-) or off (-0-) and its pitch can be adjusted by selecting Buzzertone.
Select Temp.unit to display temperature readings in Fahrenheit or Celsius.
Select Languages to change the operator language.
Select Info to display the software version of the InRoom Controller.

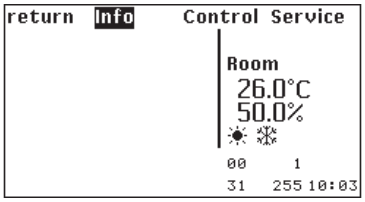




If you select an I/O controller the main menu will display as illustrated to the lower right with the option to choose one of the three submenus "Info", "Control" or "Service".

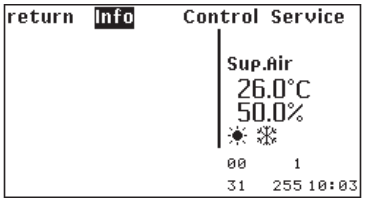


This menu screen displays the control type (Room or Supply air) and the corresponding actual values of the control type.
Below the actual values is a symbol that indicates whether the unit operates during the day or night. Day operation corresponds to operation at the first setpoint temperature. Night operation corresponds to operation at the second setpoint.



Day operation

Night operation



Stop states

The I/O-controller can be stopped by several functions or devices, which are displayed on the InRoom Controller.

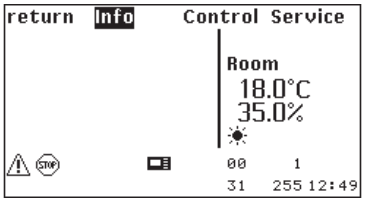
Indicates that the IOC has been stopped.

Stopped by remote On/Off (remote switch connected to digital input 10).

Stopped by PC (by BMS program).

Stopped by internal timer (week program).

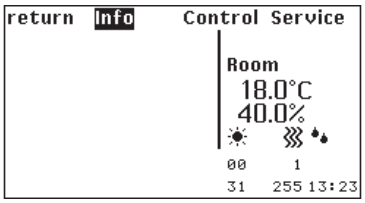
Stopped by the on/off-key at the InRoom Controller or by the command "state stop" using the IOC service port.



Stopped by the sequencing.

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

Heating

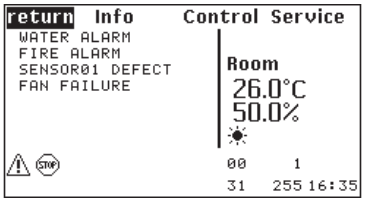
Humidification

Dehumidification

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

Symbols for alarm messages

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

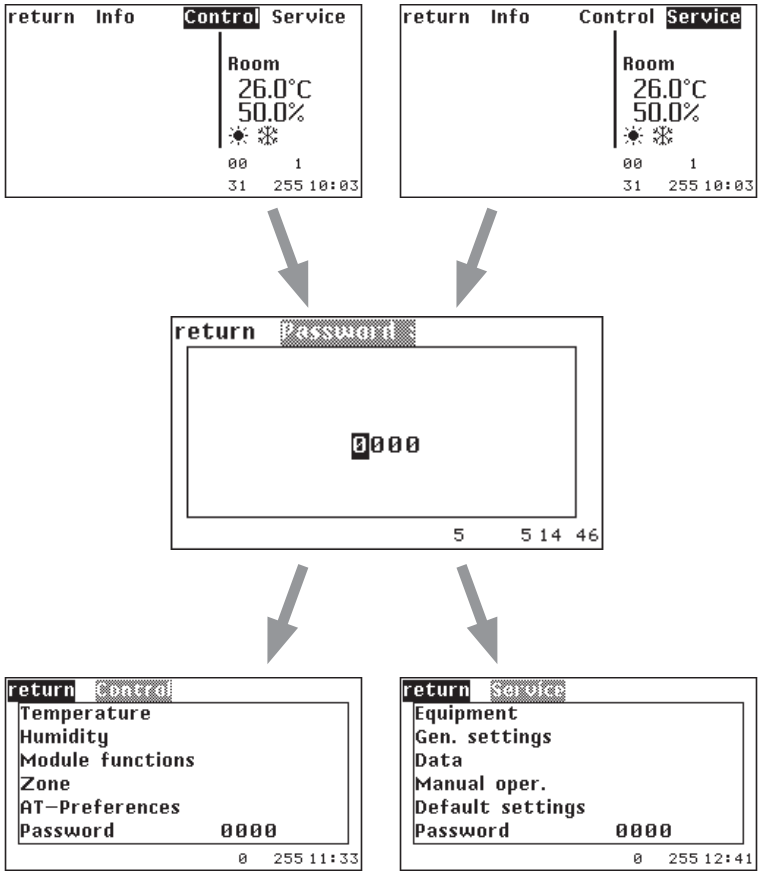


Passwords

To access the Control level and the Service level a password is required.
There are four passwords total, a user-specific password for both the Control- and Service level and a master password for each level.
The default user-specific password is „0000“ for both levels. It can be modified.
The master passwords are for service staff only and give them authorization to adjust the bus-ID and to execute the checkbus function at the InRoom Controller.

Entering the password
Use the selector key to change the digits in the password. After the digit adjustment confirm with the confirmation key and use the selector key to move to the next digit.
When you have reached the last digit in the password, you access the main menu of the Control or Service level by pressing the selector key ">".

There is no limit on password attempts.



6. Operation

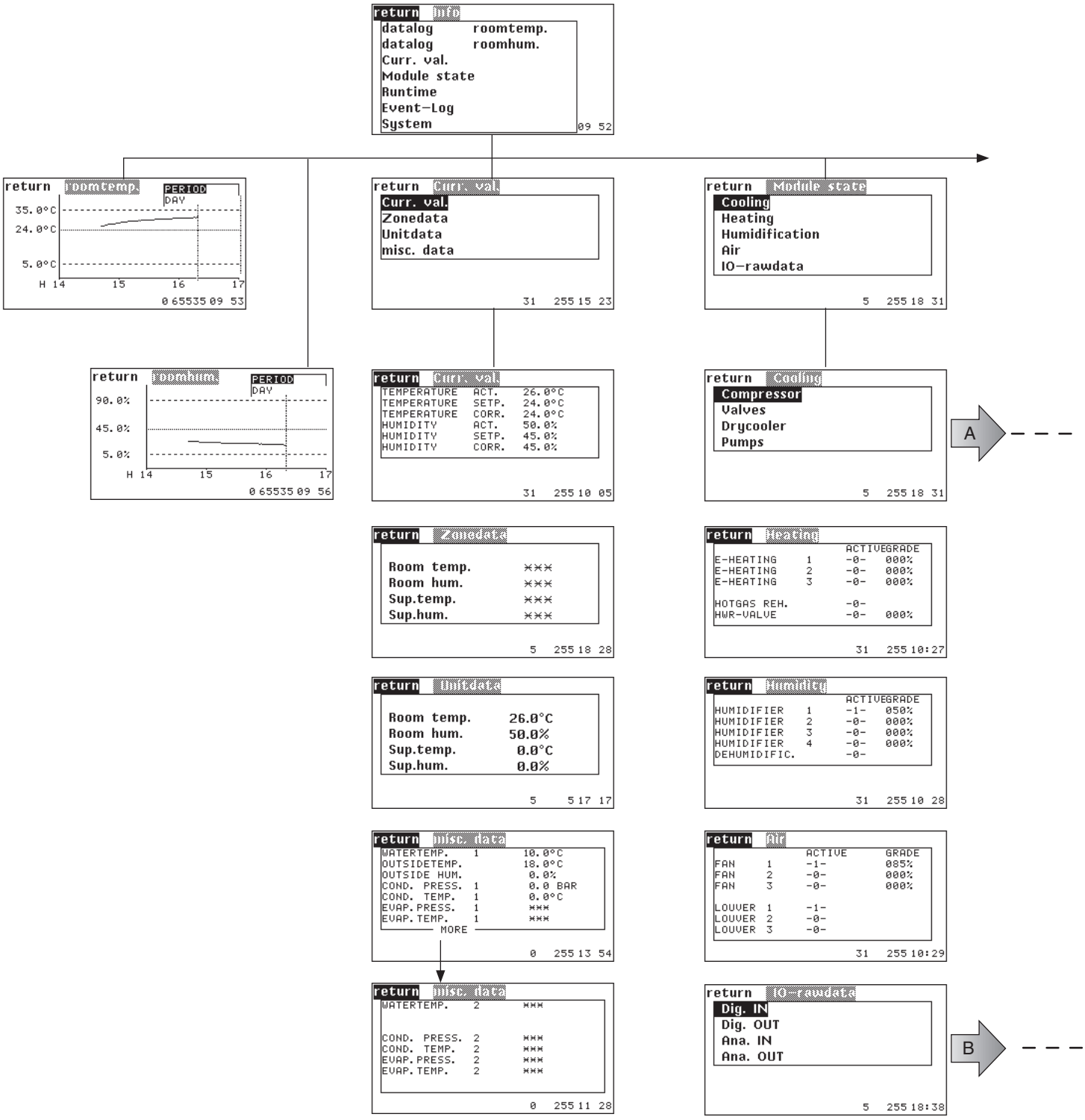
6.1 Info level

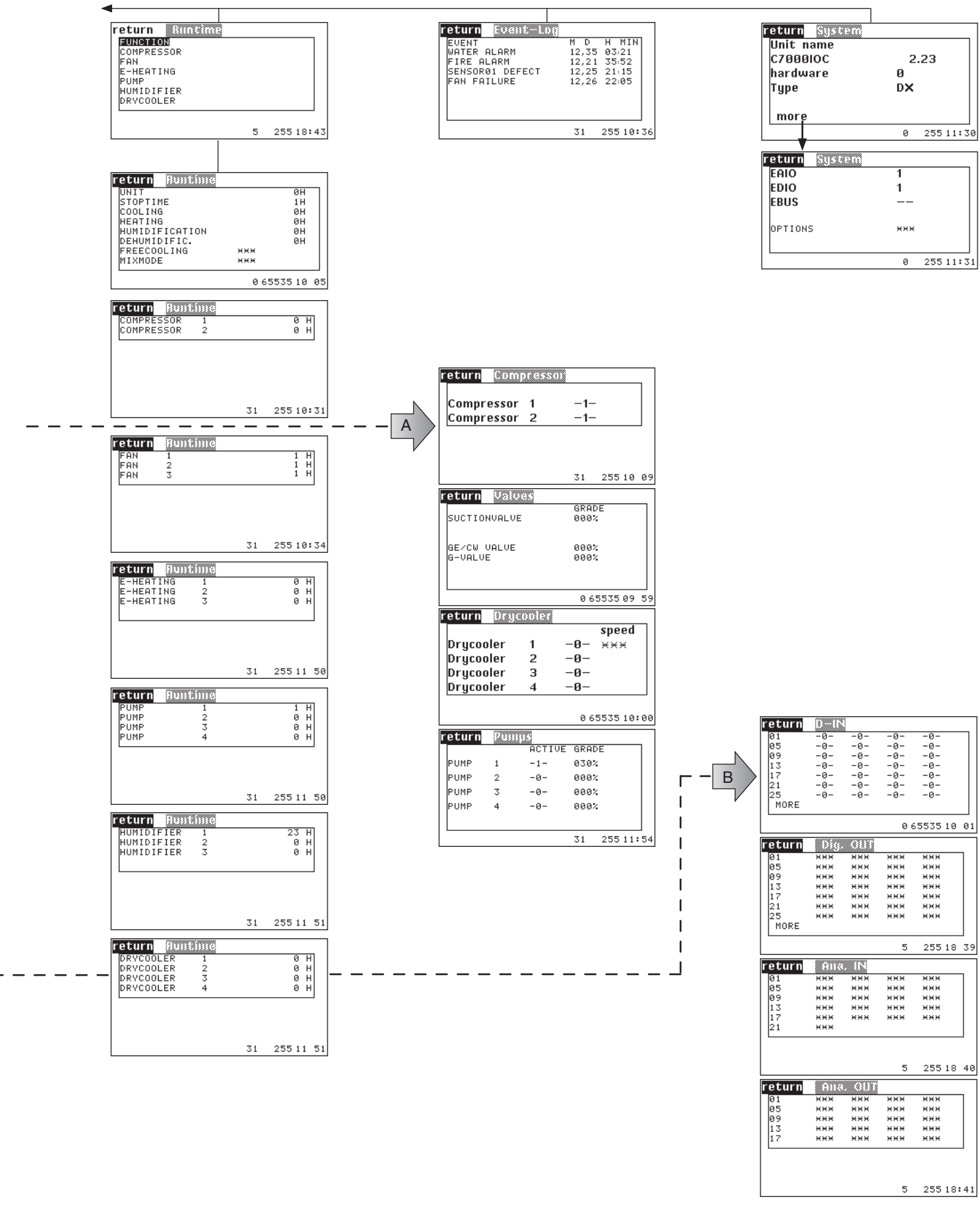
6.1.1 Info commands

Generally each component- or cooling unit-command that 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 their numbers and the extension cards (digital/analogous).
`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 temperature for condensation pressure reduction, gradient for pressure 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 temperature/humidity, CW cooling off.
`wprg` - Shows the programmed timer function for the week.
`events` - Shows all registered events (maximum 200, alarms & unit on/off).
`ups` - Shows the UPS (uninterrupted power supply) configuration.

6.1.2 Info overview

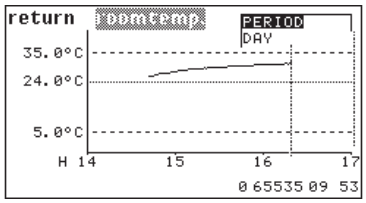



return Runtime
FUNCTION
COMPRESSOR
FAN
E-HEATING
PUMP
HUMIDIFIER
DRYCOOLER
5 255 18:43
return Event-Log
EVENT M D H MIN
WATER ALARM 12,35 03:21
FIRE ALARM 12,21 35:52
SENSOR01 DEFECT 12,25 21:15
FAN FAILURE 12,26 22:05
31 255 10:36
return System
Unit name
C7000IOC 2.23
hardware 0
Type DX
more
0 255 11:30
return System
EAIO 1
EDIO 1
EBUS --
OPTIONS ***
0 255 11:31
return Runtime
UNIT 0H
STOPTIME 1H
COOLING 0H
HEATING 0H
HUMIDIFICATION 0H
DEHUMIDIFIC. 0H
FREECOOLING ***
MIXMODE ***
0 65535 10 05
return Runtime
COMPRESSOR 1 0 H
COMPRESSOR 2 0 H
31 255 10:31
A
return Compressor
Compressor 1 -1-
Compressor 2 -1-
31 255 10 09
return Runtime
FAN 1 1 H
FAN 2 1 H
FAN 3 1 H
31 255 10:34
return Valves
GRADE
SUCTIONVALVE 000%
GE/CW VALVE 000%
G-VALVE 000%
0 65535 09 59
return Runtime
E-HEATING 1 0 H
E-HEATING 2 0 H
E-HEATING 3 0 H
31 255 11 50
return Drycooler
speed
Drycooler 1 -0- ***
Drycooler 2 -0-
Drycooler 3 -0-
Drycooler 4 -0-
0 65535 10:00
return Runtime
PUMP 1 1 H
PUMP 2 0 H
PUMP 3 0 H
PUMP 4 0 H
31 255 11 50
return Pumps
ACTIVE GRADE
PUMP 1 -1- 030%
PUMP 2 -0- 000%
PUMP 3 -0- 000%
PUMP 4 -0- 000%
31 255 11:54
B
return Runtime
HUMIDIFIER 1 23 H
HUMIDIFIER 2 0 H
HUMIDIFIER 3 0 H
31 255 11 51
return D-IN
01 -0- -0- -0- -0-
05 -0- -0- -0- -0-
09 -0- -0- -0- -0-
13 -0- -0- -0- -0-
17 -0- -0- -0- -0-
21 -0- -0- -0- -0-
25 -0- -0- -0- -0-
MORE
0 65535 10 01
return Runtime
DRYCOOLER 1 0 H
DRYCOOLER 2 0 H
DRYCOOLER 3 0 H
DRYCOOLER 4 0 H
31 255 11 51
return Dig. OUT
01 *** *** *** ***
05 *** *** *** ***
09 *** *** *** ***
13 *** *** *** ***
17 *** *** *** ***
21 *** *** *** ***
25 *** *** *** ***
MORE
5 255 18 39
return Ana. IN
01 *** *** *** ***
05 *** *** *** ***
09 *** *** *** ***
13 *** *** *** ***
17 *** *** *** ***
21 ***
5 255 18 40
return Ana. OUT
01 *** *** *** ***
05 *** *** *** ***
09 *** *** *** ***
13 *** *** *** ***
17 *** *** *** ***
5 255 18:41

Display

Data logger

Info



Use the data logger to save measured values or average values (zone data) calculated by the controller and have these values displayed in the shape of a graphical curve so as to show their time course.
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 a horizontal direction; a vertical dashed line marks the actual time.
The range of the measured value within the limit values (if existant for this type of value) is displayed vertically.
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.

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 20 values before the last 20 values (value 21 to 40 going from the actual point of time).

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

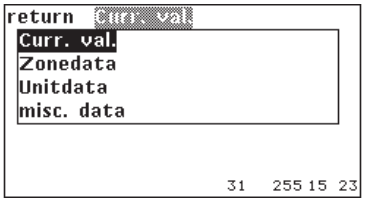
`log 1 15.05.2006` - Edits all values of this day as far as stored.

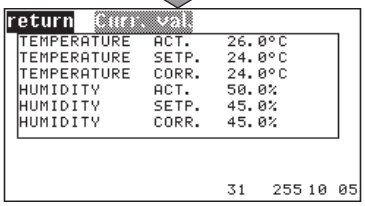
`log 1 1 13` - Edits the values 1 to 13 going from the actual point of time.

`log 1 clear` - Deletes all stored values.

Display

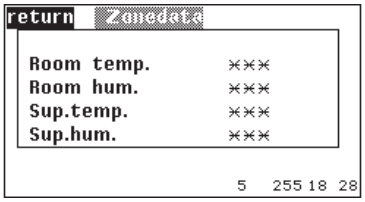
Info



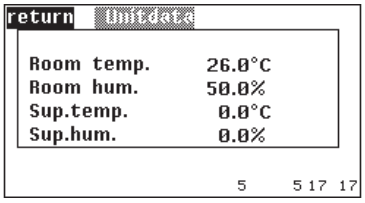


Current values

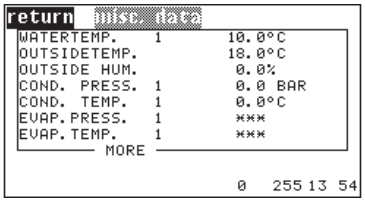
This window shows the actual values of the connected sensors the same as the setpoints adjusted at the controller.
The setpoints shifted by the controller (CORR.) are also displayed. These setpoints are due to the week cycle program (see page 72) or by the sensor limitation control (see page 69). The shifted setpoints are priority setpoints.



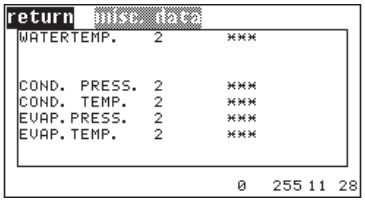
Here you can see the measured values for the zone. These values represent an average value for each parameter, which is calculated from all sensors of the units which are assigned to the same zone.



These are the measured values for the unit.



These are several sensor values of the unit.

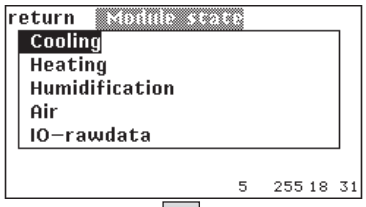


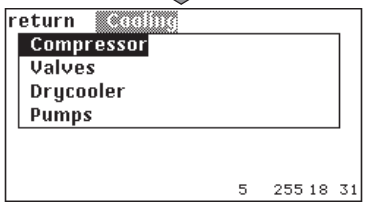
Display

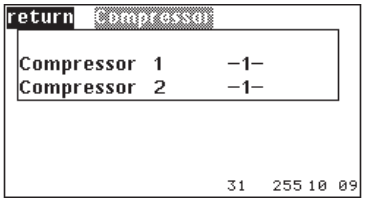
Module state

Info

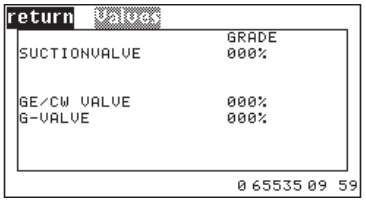
InRoom Controller gives a detailed representation of the operating states of the components.





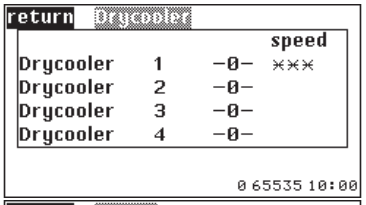


In the following windows you can see the operating state of each component:
-0- means component is off.
-1- means component is on.
xxx means component does not exist.

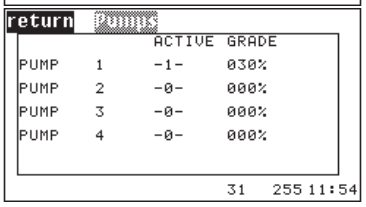


This window displays the opening degree of the valves in a percentage from 0 to 100.

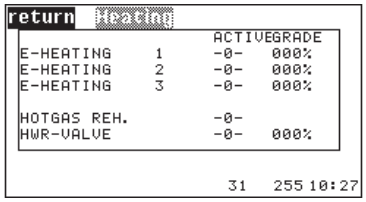
If your cooling unit is equipped with a heater, the operating state is displayed in this window. For proportional heaters the actual capacity is shown from 0-100%.
For the hot water reheat the actual capacity is displayed in the shape of the opening degree of the HWR valve.

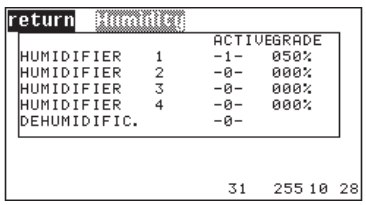


On/off state of the dry coolers

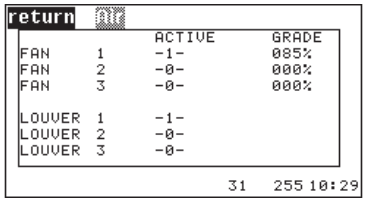


On/off state of the pumps + actual capacity in %, if the pumps are speed controlled.

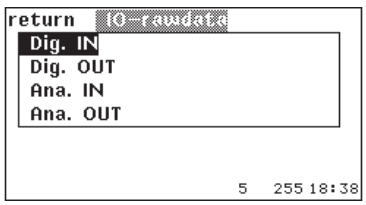


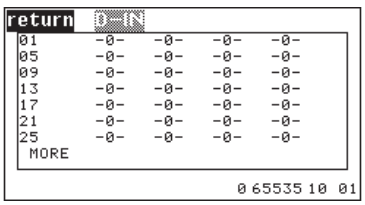


If your cooling unit is equipped with a humidifier, the operating state and the degree of steam production of the humidifier is displayed in this window.
In addition the display indicates whether the dehumidification is switched on or off.



The operating state of the fans with the actual speed from 0-100% is indicated in this window. If your cooling unit is equipped with louvers, -1- indicates that the louver is open.



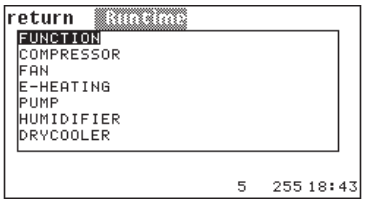


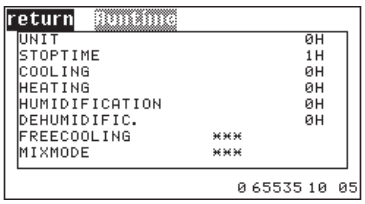
This table shows digital and analog inputs/outputs and displays 0 or 1 for each digital input/output, which could be helpful for diagnosis purposes.
In the first line the inputs from 1 to 4 are displayed, in the second line the inputs from 5 to 8 etc.

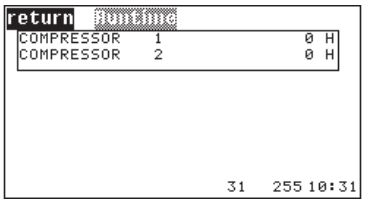
	Display	Signification
D-IN	1	voltage present -> no alarm
D-OUT	1	relay activated -> component in service
A-IN	0-4095	0-20mA, 4-20mA, 0-10V corresp. to sensor type
A-OUT	0-4095	0-10V

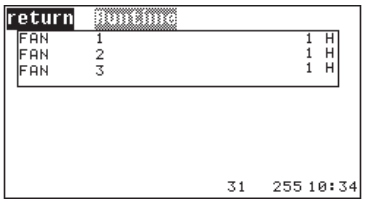
Display

Info







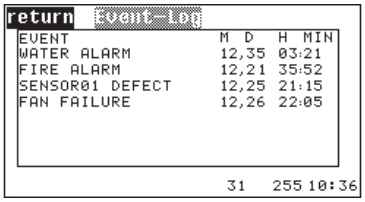


Runtimes

The runtimes of the listed components are shown in hours in the following windows at the bottom of the page.

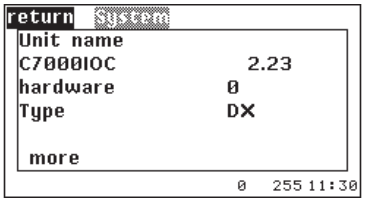
The functional runtimes in detail:
The unit runtime comprises all times when at least one component is operating.
The stoptime is counted when the unit is in local stop or timer stop or remote stop or bms-stop.
The cooling runtime is counted each time that cooling is requested.
The heating runtime is counted each time that heating is requested.
The humidification runtime is the total runtime of all humidifiers.
The dehumidification runtime is counted each time the solenoid valve for cutting a part of the evaporator is activated/closed or the fan speed is reduced for dehumidification reasons (DX-size 1 and all CW-units).

Event-Log

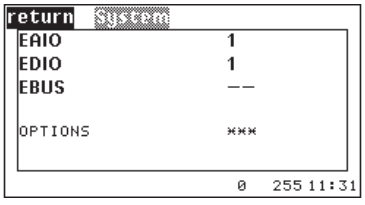


All alarm messages and events of one cooling unit are listed in this window. The messages contain the following information: alarm text, day and time.
When the unit was started and stopped is also displayed.
Up to 200 events can be stored.

System



In this menu the software version, the hardware version and the unit type are displayed.
The field "more" shows that there is another window.



Here the number of connected EAIO-, EDIO- and EBUS-boards is indicated, the same as optional extensions of the software.

6.2 Control level

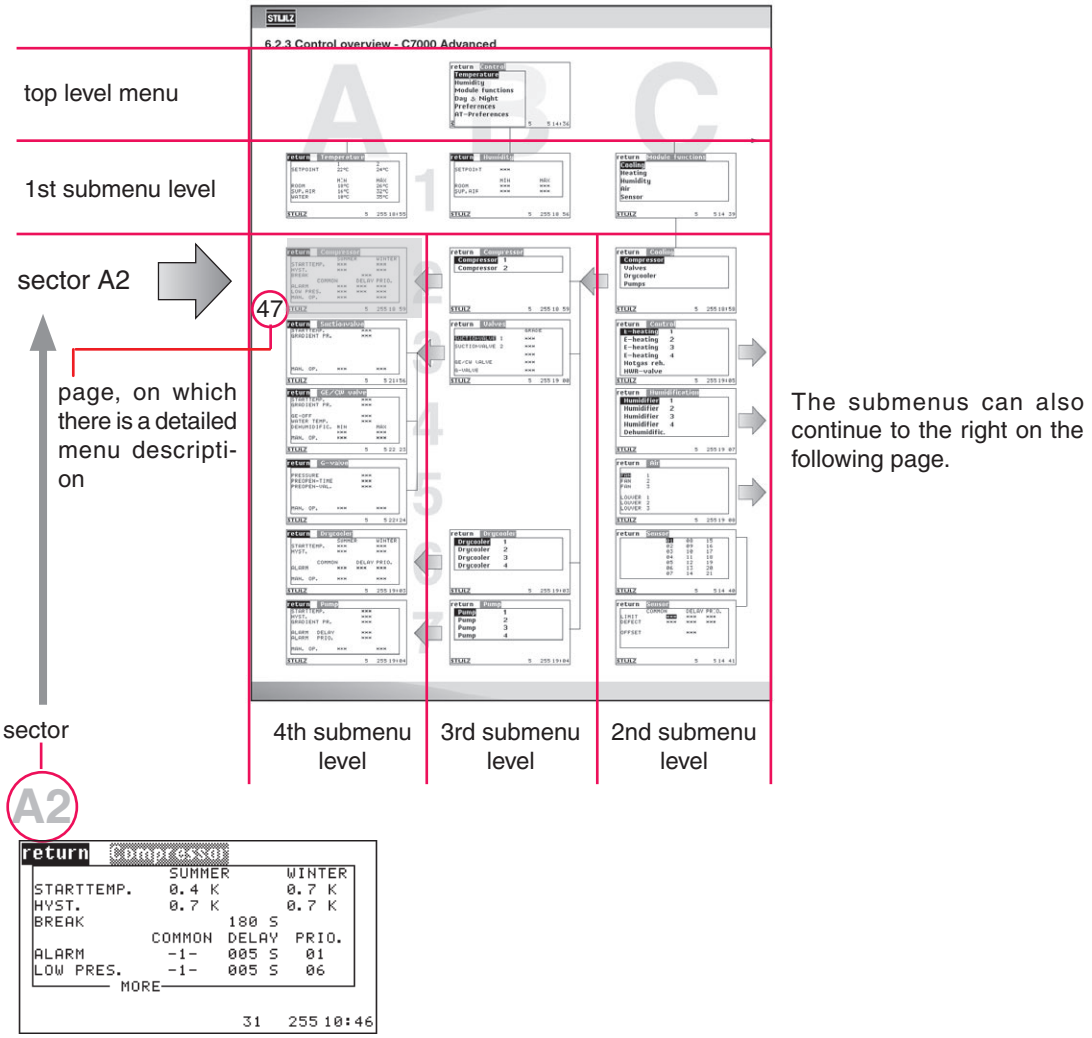
6.2.1 Overview structure

Due to limited space within the manual, it is not possible to display entire menu branches of the two different operator interfaces on one page.

We therefore applicated a city map screen on the Control and Service menu overview, consisting of columns and rows which serve to easily relocate single submenus within the overview.
The columns for the Control menu are named from A to F, the columns for the Service menu from K to V.

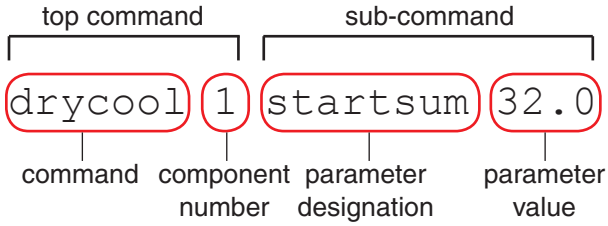
On each page there is one top row without a number, which contains the top level menu and seven rows for the submenus which are named from 1 to 7.

There are up to 4 submenu levels.The first submenu level is horizontally located. All other submenu levels are vertically located. The second submenu level on an arrow indicates the beginning of a new submenu.
On the pages which follow the overview, only the parameter menus are explained, which are normally the menus of the lowest submenu level.



6.2.2 Control commands

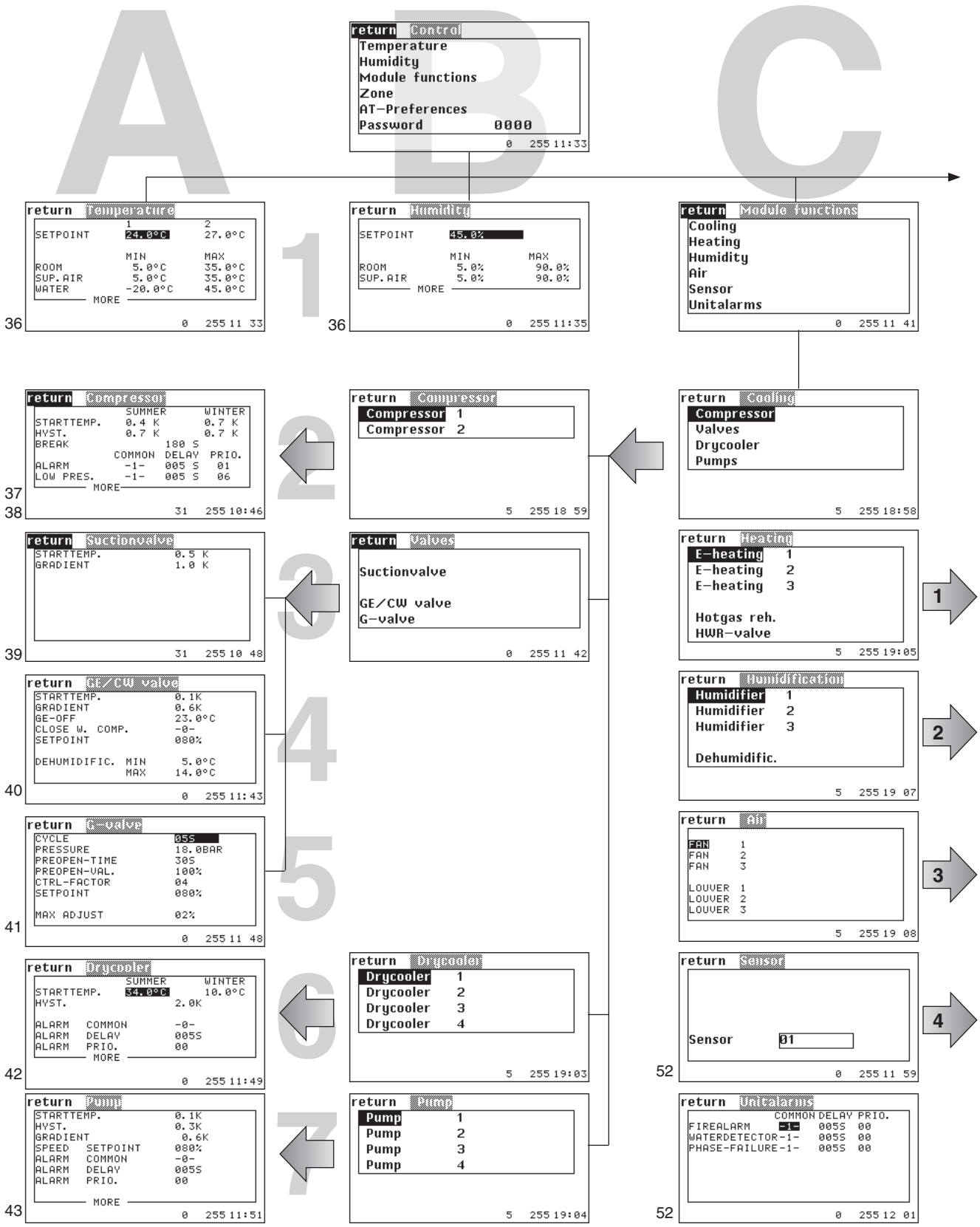
A typical control command is structured as follows:

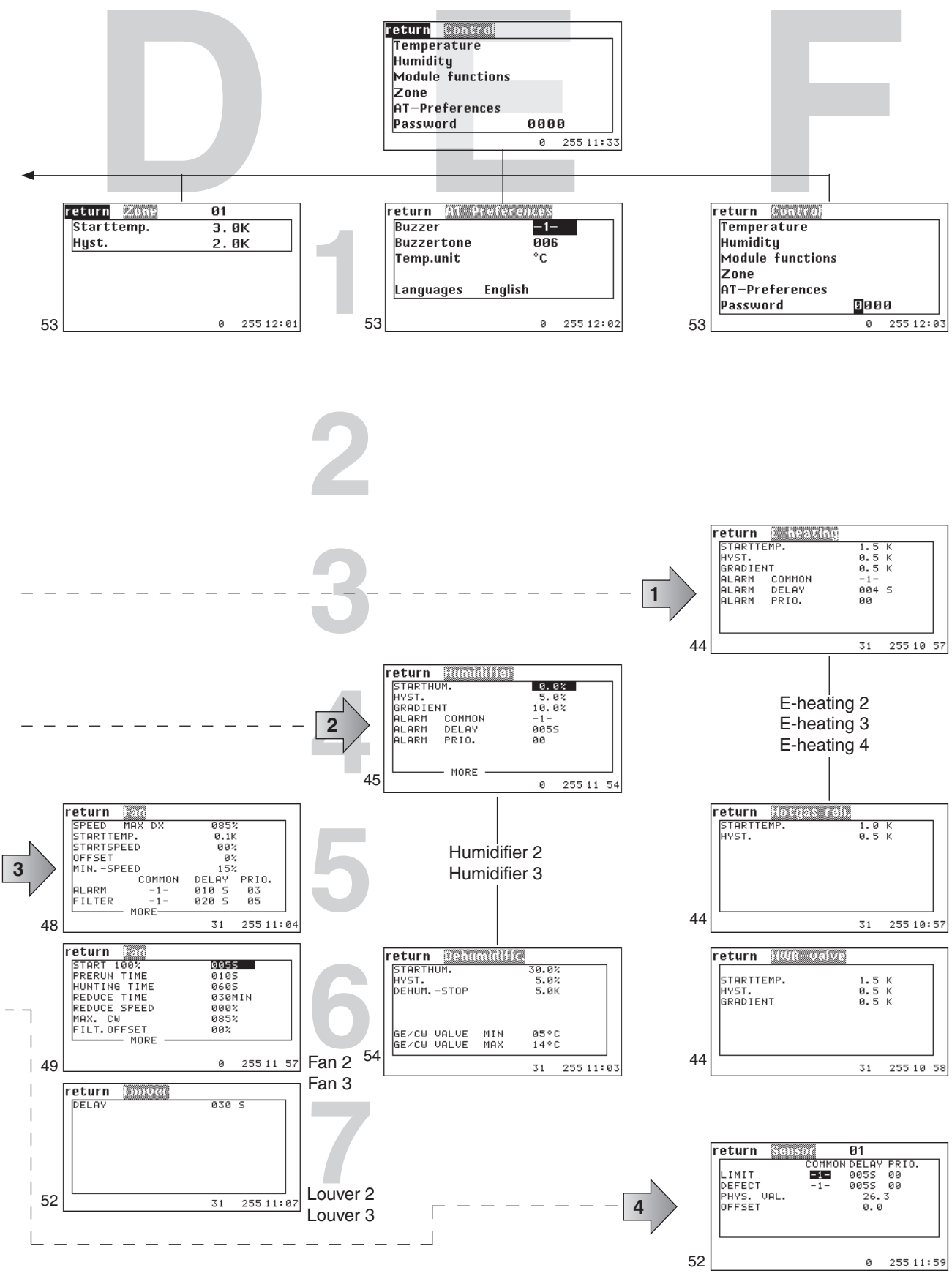


Following a summary of the most frequent sub-commands:

`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 analogous input # to the component (sensor)
`din # / alarm #`	assigns the digital input # to the component related alarm
`aout #`	assigns the component to the analogous output #
`dout #`	assigns the component to the digital output #
`basicalarm 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 #
`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

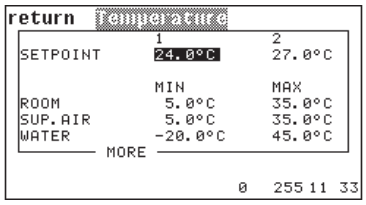
6.2.3 Control overview




D
E
F
1
2
3
4
5
6
7
return Control
Temperature
Humidity
Module functions
Zone
AT-Preferences
Password 0000
0 255 11:33
return Zone 01
Starttemp. 3.0K
Hyst. 2.0K
53
0 255 12:01
return AT-Preferences
Buzzer -1-
Buzzertone 006
Temp.unit °C
Languages English
53
0 255 12:02
return Control
Temperature
Humidity
Module functions
Zone
AT-Preferences
Password 0000
53
0 255 12:03
1
return E-heating
STARTTEMP. 1.5 K
HYST. 0.5 K
GRADIENT 0.5 K
ALARM COMMON -1-
ALARM DELAY 004 S
ALARM PRIO. 00
44
31 255 10 57
E-heating 2
E-heating 3
E-heating 4
2
return Humidifier
STARTHUM. 0.0%
HYST. 5.0%
GRADIENT 10.0%
ALARM COMMON -1-
ALARM DELAY 005S
ALARM PRIO. 00
MORE
45
0 255 11 54
Humidifier 2
Humidifier 3
3
return Fan
SPEED MAX DX 085%
STARTTEMP. 0.1K
STARTSPEED 00%
OFFSET 0%
MIN.-SPEED 15%
COMMON DELAY PRIO.
ALARM -1- 010 S 03
FILTER -1- 020 S 05
MORE
48
31 255 11:04
return Hotgas reh.
STARTTEMP. 1.0 K
HYST. 0.5 K
44
31 255 10:57
return Fan
START 100% 005S
PRERUN TIME 010S
HUNTING TIME 060S
REDUCE TIME 030MIN
REDUCE SPEED 000%
MAX. CW 085%
FILT.OFFSET 00%
MORE
49
0 255 11 57
Fan 2
Fan 3
return Dehumidific.
STARTHUM. 30.0%
HYST. 5.0%
DEHUM.-STOP 5.0K
GE/CW VALVE MIN 05°C
GE/CW VALVE MAX 14°C
54
31 255 11:03
return HWR-valve
STARTTEMP. 1.5 K
HYST. 0.5 K
GRADIENT 0.5 K
44
31 255 10 58
return Louver
DELAY 030 S
52
31 255 11:07
Louver 2
Louver 3
4
return Sensor 01
COMMON DELAY PRIO.
LIMIT -1- 005S 00
DEFECT -1- 005S 00
PHYS. VAL. 26.3
OFFSET 0.0
52
0 255 11:59

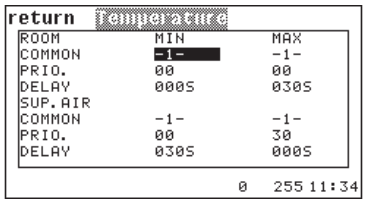
Display

A1 Control



Setpoint & Limit Values

The first two items of the control menu concern the adjustment of setpoints and limit values. The limit values are decisive for the alarms "temp/humidity too high/low".
Two temperature setpoints can be adjusted, setpoint 1 concerns the operation by day, whereas setpoint 2 concerns operation at night according to the week timer (page 72).
The limit values for the room air sensor, the supply air sensor, and the water sensor are displayed. The "MIN" column contains the values for the lower temperature limit and the "MAX" column contains the values for the upper temperature limit.
If the measured value is lower than the minimum room air temperature, the alarm "Room temperature too low" is displayed.

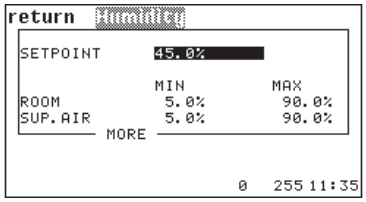


In the following window you can adjust three parameters for the room temperature limit alarms and for the supply air temperature limit alarms each.
1. Whether the corresponding alarm shall release a common alarm (1=yes).
2. The alarm priority, where the corresponding alarm is assigned to an alarm relay with this number (adjusted as alarm priority).
3. The alarm delay in seconds.

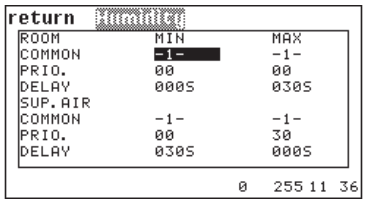
For the water limit alarm the following parameters:
- Common alarm
- Alarm priority
- Alarm delay

can only be adjusted by commands.

B1



You adjust the same parameters for the air humidity. However no difference between day- and night-setpoint is made.



The corresponding commands:

Temperature

```
settemp 24.3
nightsettemp 27.0
```

```
mintemp
maxtemp
        room
        supply
        water
temp 15.0
alarmprio 8
alarmdeleay 4
commonalarm 1
```

Humidity

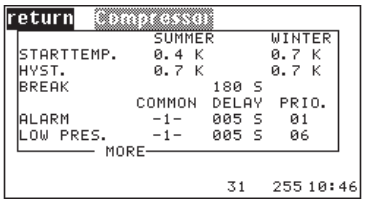
```
sethumi 45.1
```

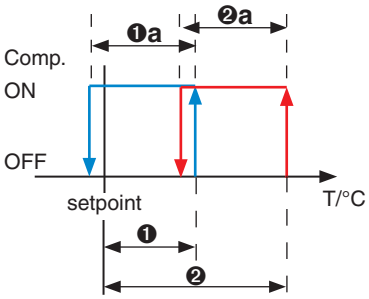
```
minhumi
maxhumi
        room
        supply
humi 3.0
alarmprio 8
alarmdelay 4
commonalarm 1
```

All combinations are possible.

Display

A2 **Control**





Cooling

Compressor (part 1)

The start temperature for the compressor is entered as a positive difference to the setpoint.
Two different start temperatures + hysteresis for summer and winter operation can be entered. (❶,❶a,❷,❷a)
The compressor pause is entered in seconds and serves to increase the service life of the compressor by delaying the restart by the adjusted value. ❸
You can adjust, whether the compressor alarm releases a common alarm (0 = no, 1 = yes) ❹ and, whether the low pressure alarm releases a common alarm. ❹a
The compressor alarm delay can be adjusted the same as the low pressure alarm delay. ❺,❺a
Setting the priorities for the compressor alarm ❻ and the low pressure alarm ❻a means assigning the corresponding alarm to an alarm relay with the adjusted number.

The corresponding commands:

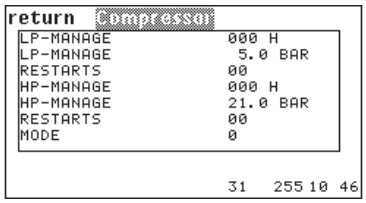
❶ `comp 1 startsum 0.6`
❶a `comp 1 hyssum 0.7`
❷ `comp 1 startwin 1.2`
❷a `comp 1 hyswin 0.7`
❸ `comp 1 pause 180`
❹ `comp 1 commonalarm 1`
❹a `comp 1 commonalarmlp 1`
❺ `comp 1 alarmdelay 5`
❺a `comp 1 alarmdelaylp 5`
❻ `comp 1 alarmprio 1`
❻a `comp 1 alarmpriolp 1`

Times are entered in seconds.

The numbered callouts refer to the corresponding passages in the descriptive text.

Display

A2 **Control**



Cooling

Compressor (part 2)

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 (see page 70).
This way the controller tries to bypass temporary LP alarms.
You can limit the number od compressor restarts in "RESTARTS" ❼**b** within a time space which you can adjust in the first line ❼.
If the maximum number of restarts is reached, the LP alarm is released and the compressor is definitely switched off.
Using the optional LP-sensor you can adjust a threshold ❼**a** which marks the lower limit for the permissible pressure range.

With a HP 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 od compressor restarts in "RESTARTS" ❽**b** within a time space which you can adjust in the fourth line ❽.
If the threshold ❽**a** of the HP is exceeded the adjusted number of times, the HP alarm is released and the measure which you have adjusted in HP mode ❾ is taken.
0: unit off
1: unit continues operation

The corresponding commands:

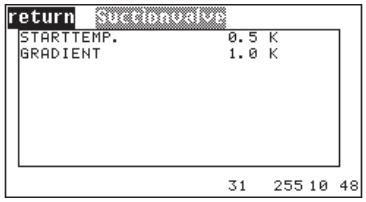
❼ `comp 1 lptime 2`
❼**a** `comp 1 lppress 4.6`
❼**b** `comp 1 lptries 6`
❽ `comp 1 hptime 2`
❽**a** `comp 1 hppress 21`
❽**b** `comp 1 hptries 3`
❾ `comp 1 hpmode 1`

Times are entered in seconds.

The numbered callouts refer to the corresponding passages in the descriptive text.

Display

A3 **Control**



Valves

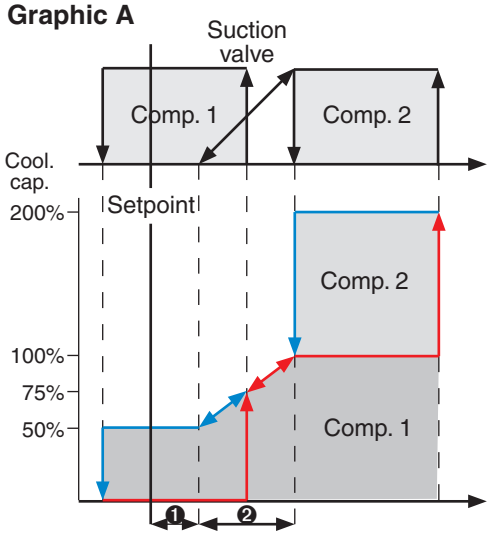
Suction valve

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

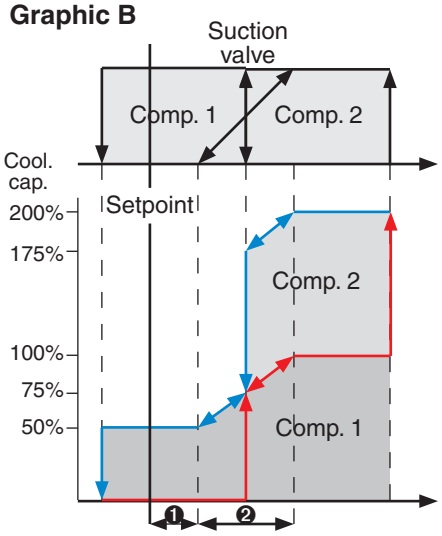
If the cooling unit is equipped with two refrigerant circuits, only the first refrigerant circuit can be equipped with a suction valve.
Depending on how you choose the start points for the compressors you can exploit the proportional control range of the suction valve to a maximum. (See examples.)
The suction valve has a control range of 50% - 100% of the compressor cooling capacity.

The graphics A-C show, for a DX2-unit, how you obtain a double proportional control range by approaching the stop point of the 2nd compressor to the start point of the suction valve.

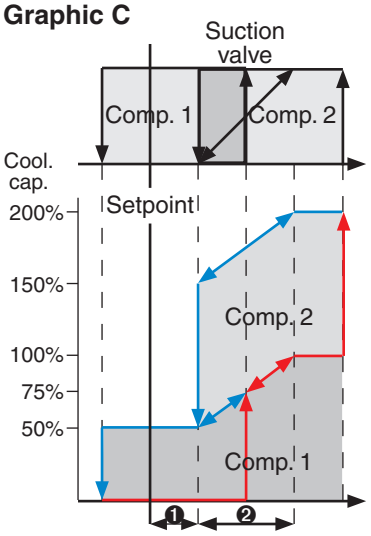
Graphic A



Graphic B



Graphic C



The corresponding commands:

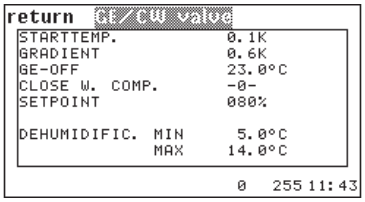
❶ `suctionv 1 start 0.2`
❷ `suctionv 1 grad 0.9`

Times are entered in seconds.

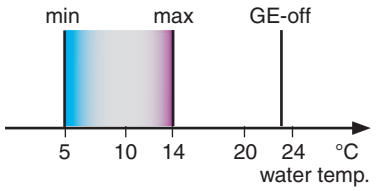
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

A4 **Control**



Dehumidification range



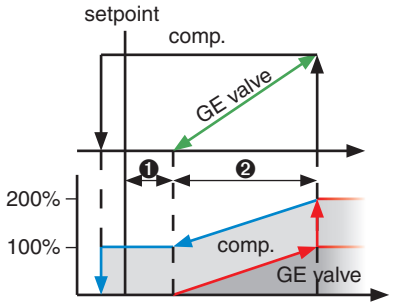
On the InRoom Controller you can adjust the water temperature limits for dehumidification here. However, this is also possible in the dehumidification menu.

Valves

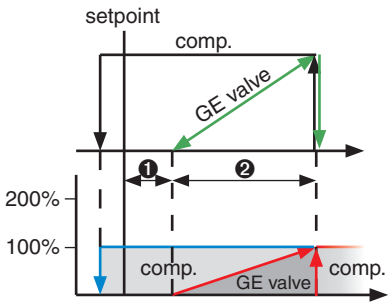
GE-CW valve

The start temperature for the GE/CW valve is entered as a positive difference to the room temperature setpoint. ❶
For the GE/CW valve you can adjust a gradient, which determines the temperature range in which the valve opening increases from 0 to 100%.❷
With the GE-off value 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. ❸
The actual water temperature is shown for a better orientation.
Additionally you can prevent mixed operation of Freecooling and compressor cooling by setting the "Close at comp" value to "1". (see Graphics below). ❹

Graphic A "close at comp = 0"



Graphic B "close at comp = 1"



The corresponding commands:

❶ `gecwv 1 start 0.2`
❷ `gecwv 1 grad 0.9`
❸ `gecwv off 22`
❹ `gecwv compoff 1`

Times are entered in seconds.

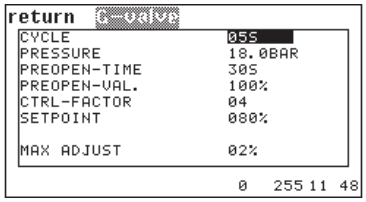
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

Valves

G-valve

A5 **Control**



The pressure setpoint is entered in the 2nd line and relates to the refrigerant condensation pressure in the condenser. ❶

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. ❷
The pre-open value is the G-valve opening which should be obtained during the pre-start time. ❸
To avoid a constant discrepancy from the set value there are three parameters, which imitate the behavior of an integral control.
The control factor ❹ is the decisive value, by which the extent of the control correction is adjusted in the way of calculating the actuating variable after the lapse of an adjustable control cycle ❺ (0-10 sec) according to the following formula:

$S_{new} = S_{old} - f \bullet (\text{set value} - \text{actual value})$

S: actuating variable - in this case, valve opening
f: control factor
Set value: condensation pressure

To avoid a drastical change you can adjust a maximum control correction ❻ (0 - ±10%). This control correction relates to the old actuating variable in each cycle.

The corresponding commands:

❶ `gvalve press 18.4`
❷ `gvalve pretime 15`
❸ `gvalve preopen 40`
❹ `gvalve fact 2`
❺ `gvalve concyc 5`
❻ `gvalve maxc 5`

Times are entered in seconds.

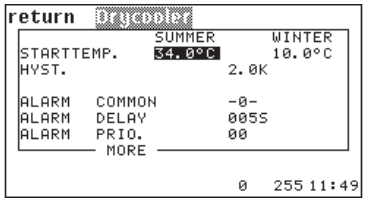
The numbered callouts refer to the corresponding passages in the descriptive text.

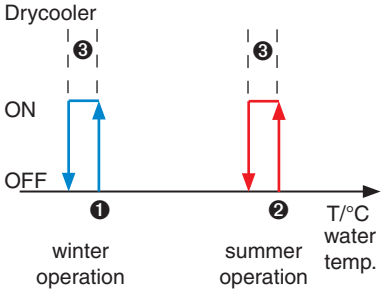
Display

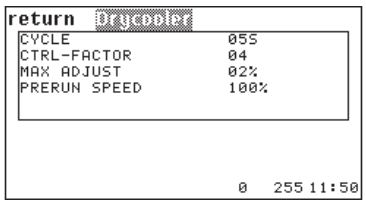
Cooling

Drycooler

A6 **Control**







The start temperature for the drycooler is entered as an absolute value for the water temperature.
Two different start temperatures for summer and winter operation + hysteresis can be entered. ❶,❷,❸

Note:
The summer/winter operation depends on the setting in the menu Service/General settings/control/parameters. (see page 70)

You can determine, whether the drycooler alarm shall generate a common alarm (0 = no, 1 = yes). ❹
The drycooler alarm delay can be adjusted. ❺
Setting the priority for the drycooler alarm ❻ means assigning the alarm to an alarm relay with the adjusted number.

The parameters:
- control factor ❼
- control cycle ❽
- max. control correction ❾
- pre-speed ❿

are only necessary for the GEp-control, which is explained in a separate manual.

The corresponding commands:

❶ `drycool 1 startwin 15.0`
❷ `drycool 1 startsum 32.0`
❸ `drycool 1 hys 3.0`
❹ `drycool 1 commonalarm 1`
❺ `drycool 1 alarmdelay 3`
❻ `drycool 1 alarmprio 3`
❼ `drycool 1 fact 3`
❽ `drycool 1 concyc 10`
❾ `drycool 1 maxc 4`
❿ `drycool 1 prespeed 100`

Times are entered in seconds.

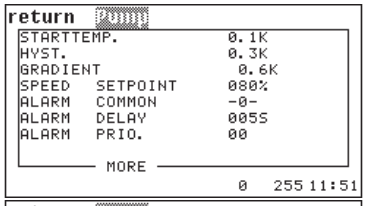
The numbered callouts refer to the corresponding passages in the descriptive text.

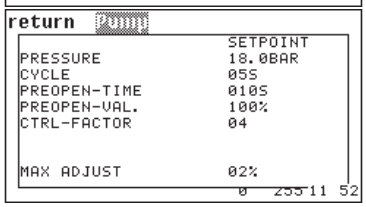
Display

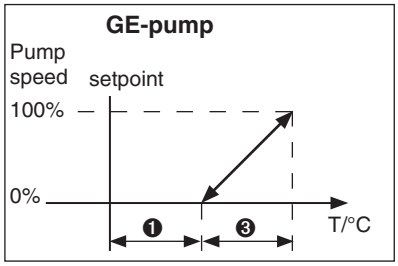
Cooling

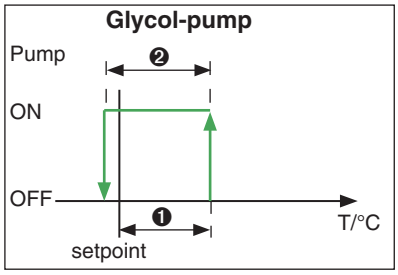
Pump

A7 **Control**









Depending on which pump type you have configured, different parameters are decisive. (See table 1).
The start temperature for the pump is entered as a positive difference to the room temperature setpoint. ❶
The corresponding hysteresis for the pump stop is only valid for pumps with on/off-control such as the glycol pump.❷
For speed controlled pumps you can adjust a gradient, which determines the range in which the pump speed increases from 0 to 100%.❸
You can determine, whether the pump alarm releases a common alarm (0 = no, 1 = yes). ❹
The pump alarm delay can be adjusted in seconds. ❺
Setting the priority for the pump alarm ❻ means assigning the corresponding alarm to an alarm relay with the adjusted number.
The pressure setpoint is entered in the 1st line and relates to the refrigerant condensation pressure in the condenser. ❼
The pump pre-start serves to pre-cool the heat absorbing medium. When compressor operation is requested, the G-pump starts and the compressor start is delayed by the pump pre-start time. ❽
The pre-speed is the G-pump speed which should be obtained during the pre-start time. ❾

Table 1

Pump type	G (1)	GE (2)	Glycol (3)
Start temp.		❶	❶
Hysteresis			❷
Gradient		❸	
Press. setpoint	❼		
Pre-start	❽		
Pre-speed	❾		

The control factor ❿**a** is the decisive value, by which the extent of the control correction is adjusted in the way of calculating the actuating variable after the lapse of an adjustable control cycle ❿**b** (0-10 sec) according to the following formula:

$S_{new} = S_{old} - f \bullet$ (set value - actual value)

S: actuating variable - in this case pump speed
f: control factor
Set value: condensation pressure

To avoid a drastical change you can adjust a maximum control correction ❿**c** (0 - ±10%). This control correction relates to the old actuating variable in each cycle.

The corresponding commands:

❶ `pump 1 start 0.1`
❷ `pump 1 hys 0.7`
❸ `pump 1 grad 0.6`
❹ `pump 1 commonalarm 0`
❺ `pump 1 alarmdelay 6`
❻ `pump 1 alarmprio 3`

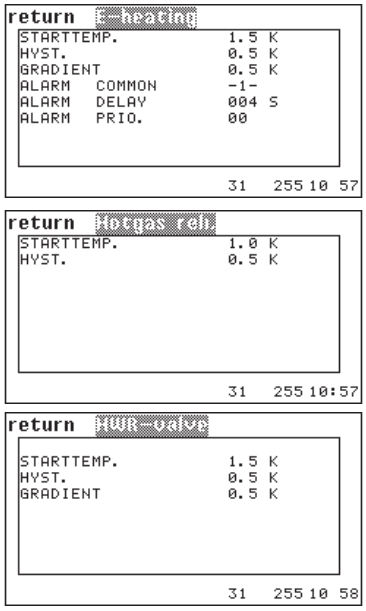
❼ `pump 1 press 18.4`
❼**a** `pump 1 speed 96`
❽ `pump 1 pretime 5`
❾ `pump 1 prespeed 60`
❿**a** `pump 1 fact 2`
❿**b** `pump 1 concyc 5`
❿**c** `pump 1 maxc 5`

Times are entered in seconds.

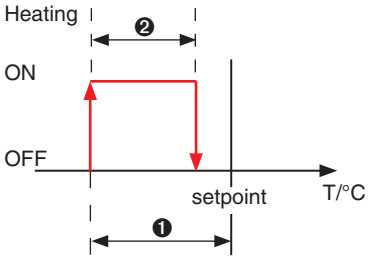
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

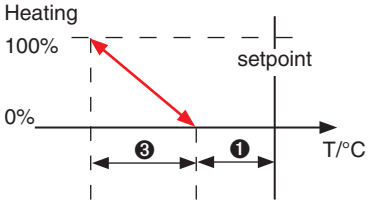
F3 F5 F6 **Control**



On/Off-control



Proportional



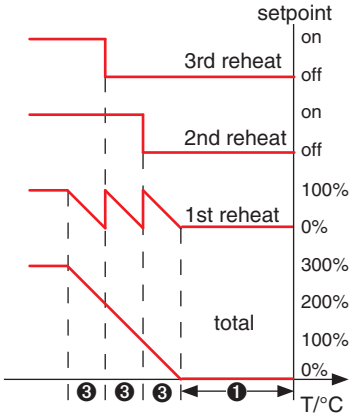
Heating

E-heating/Hotgas reheat/Hot water reheat

Depending on which heating type you have configured, different parameters are decisive.
The start temperature for every heating type 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
You can determine, whether the e-heating alarm releases a common alarm (0= no, 1 = yes). ❹
The e-heating alarm delay can be adjusted in seconds. ❺
Setting the priority for the heating alarm ❻ means assigning the corresponding alarm to an alarm relay with the adjusted number.
Only the first heating can be proportional. If this is the case and if there are several heatings (up to 4), 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 four individual heatings act as one proportional heating. (See illustration 1).

Illustration 1

Added heat capacities



The corresponding commands:

❶ `eheat 1 start 0.2`
❷ `eheat 1 hys 0.7`
❸ `eheat 1 grad 0.9`
❹ `eheat 1 commonalarm 1`
❺ `eheat 1 alarmdelay 3`
❻ `eheat 1 alarmprio 3`

❶ `gasheat 1 start 1.3`
❷ `gasheat 1 hys 0,6`

❶ `pwwheat 1 start 1.3`
❷ `pwwheat 1 hys 0.6`
❸ `pwwheat 1 grad 0.5`

Times are entered in seconds.

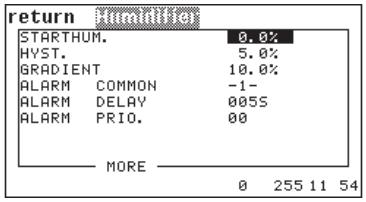
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

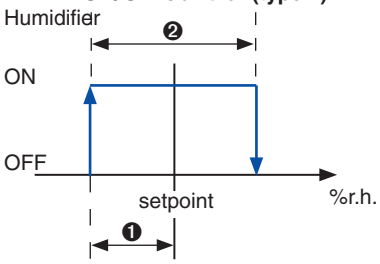
Humidification

Humidifier

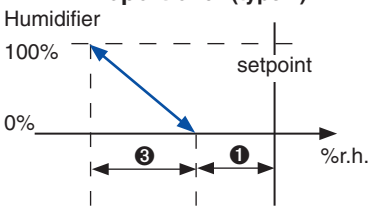
E4 **Control**

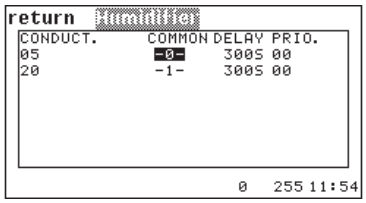


On/Off-control (type 1)



Proportional (type 2)





Depending on which humidifier type you have, different parameters are decisive.
The start humidity for every humidifier is entered as a negative difference to the room humidity setpoint. ❶
The hysteresis for the humidifier stop is only valid for humidifiers with on/off-control.❷
For proportional humidifiers you can adjust a gradient, which determines the humidity range in which the humidifying capacity increases from 0 to 100%.❸
You can determine, whether the humidifier alarm releases a common alarm (0 = no, 1 = yes). ❹
The humidifier alarm delay can be adjusted in seconds. ❺
Setting the priority for the humidifier alarm ❻ means assigning the corresponding alarm to an alarm relay with the adjusted number.

In the following window you can adjust the three parameters: common alarm **❹a ❹b**, alarm delay **❺a ❺b** and alarm priority **❻a ❻b** for the conductivity alarm at 5µS and at 20µS.
These alarma 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`
❷ `humi 1 hys 9.0`
❸ `humi 1 grad 10.0`
❹ `humi 1 commonalarm 1`
❺ `humi 1 alarmdelay 6`
❻ `humi 1 alarmprio 5`

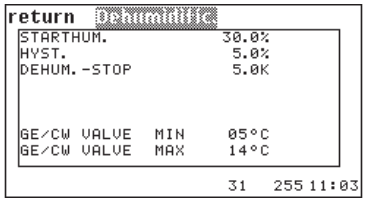
❹a `humi 1 commonalarm5 1`
❺a `humi 1 alarmdelay5 6`
❻a `humi 1 alarmprio5 5`
❹b `humi 1 commonalarm20 1`
❺b `humi 1 alarmdelay20 6`
❻b `humi 1 alarmprio20 5`

Times are entered in seconds.

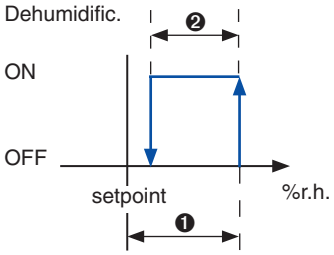
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

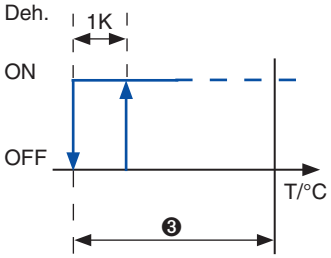
E6 **Control**



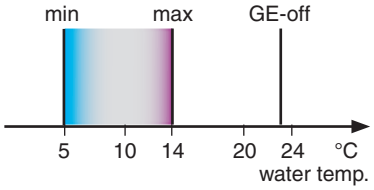
On/Off-control



Dehumidif. -Stop



Dehumidification range



Humidification

Dehumidification (Part 1)

The start humidity for dehumidification is entered as a positive difference to the room humidity setpoint. ❶
The hysteresis for the dehumidification stop is entered in the 2nd line.❷

To avoid a feedback circle of dehumidification and cooling, you can adjust a stop temperature, which is entered as a negative difference to the air temperature setpoint. ❸
With a fixed hysteresis of 1 Kelvin the dehumidification is switched on again, when the room temperature rises.

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

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

The corresponding commands:

❶ `dehumi start 7.0`
❷ `dehumi hys 7.0`
❸ `dehumi stop 2.0`
❹ `dehumi min 4`
❺ `dehumi max 10`

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

Dehumidification (Part 2)

There two ways of achieving dehumidification:
1. By reducing the fan speed, this is the only way of dehumidification for CW-units.

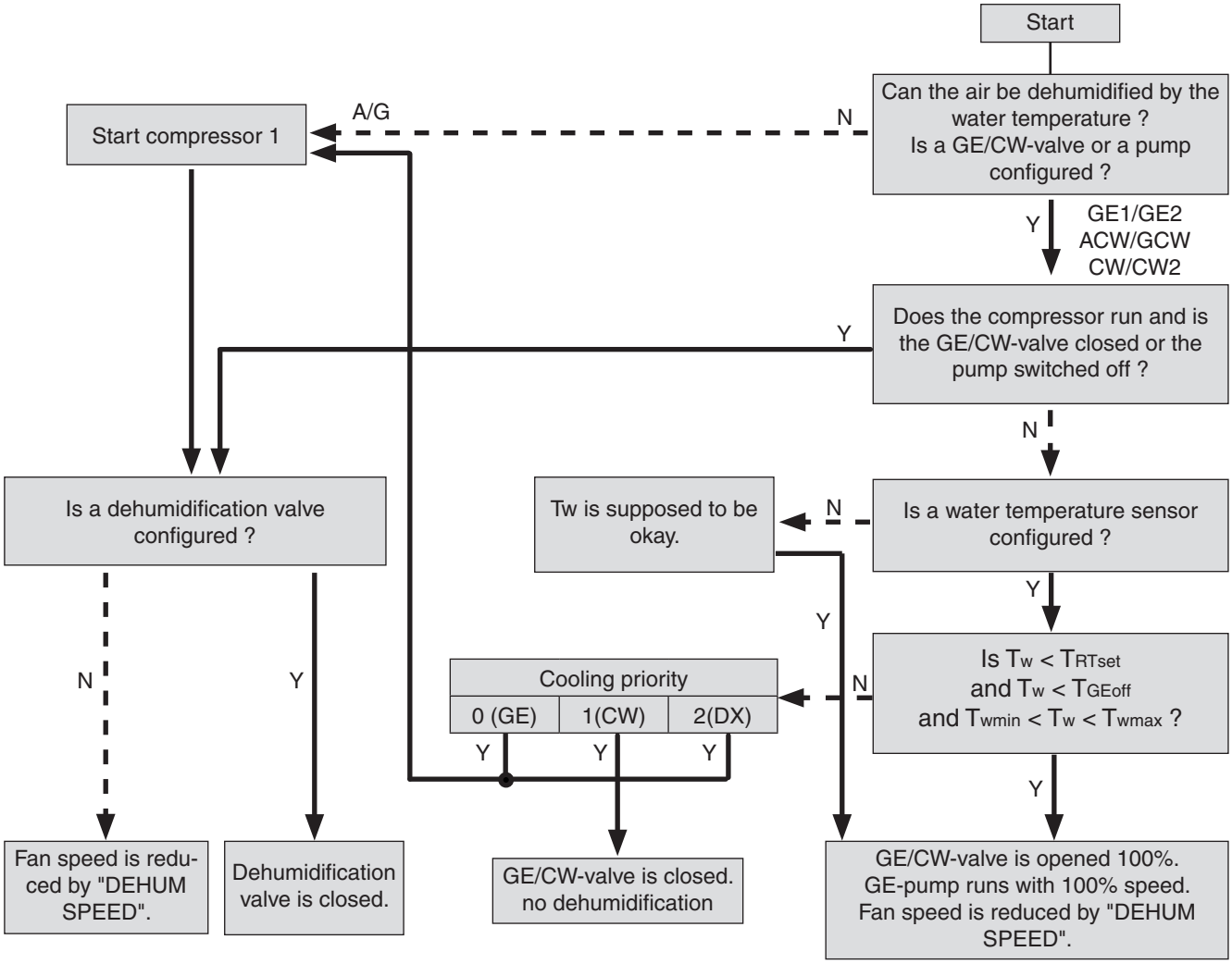
2. By shutting down a part of the evaporator with a solenoid valve.

Dehumidification type is chosen by the controller according to the following conditions: Fan speed reduction or compressor operation with a dehumidification valve present. The two dehumidification types can never be applied simultaneously. (See table 2.)

The decision processes of the controller are displayed in detail in the scheme below.

Table 2

Fan speed reduction	Dehum. valve
A, G, ACW, GCW, GE units without dehum. valve (e. g. cabinet size 1)	A,G units
ACW, GCW, GE units in mixed op. and 100% free cooling	ACW, GCW, GE units in 100% compressor operation
CW units	



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

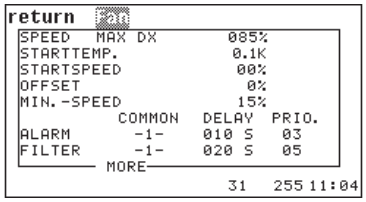
Y → yes
N → no

Display

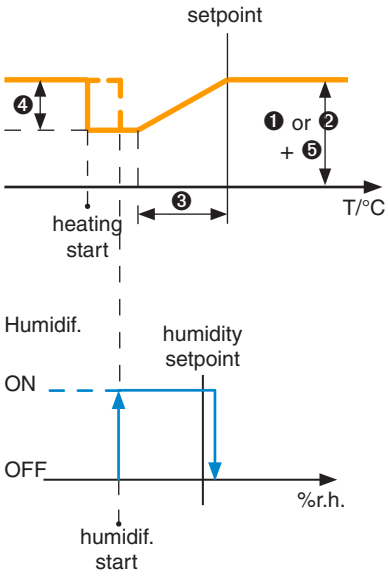
Air

Fan (Part 1)

D5 **Control**



Fan speed



*In the InRoom Controller the CW-maximum speed is actually located in the sixth line of the second menu.

The maximum fan speed can be set in accordance to the calculated required airflow. ❶❷ For the distinction DX/CW see the overnext page.*
The start temperature is entered as a negative difference to the air temperature setpoint. ❸
The start fan speed is entered as a percentage of reduction from the maximum speed. ❹
This reduced fan speed is gradually obtained with a decreasing temperature from the room temperature setpoint to the adjusted temperature difference ❸ below the setpoint. However, when heating or humidification is requested, the airflow is increased to its original value.
The offset is used to adapt the airflow to unexpected conditions on the site (lower/higher pressure loss).❺
The minimum speed, which you can adjust here, can only be bypassed by the adjustment in "REDUCE SPEED". ❻
You can determine, whether the airflow failure alarm releases a common alarm (0 = no, 1 = yes). ❼
You can determine, whether the filter alarm starts a common alarm. ❼**a**
The airflow alarm delay can be adjusted the same as the filter alarm delay. ❽,❽**a**
Setting the priorities for the airflow alarm ❾ and the filter alarm ❾**a** means assigning the corresponding alarm to an alarm relay with the adjusted number.

The corresponding commands:

❶ `fan 1 nmax 85`
❷ `fan 1 nmaxcw 90`
❸ `fan 1 start 3`
❹ `fan 1 speed 15`
❺ `fan 1 offset -5`
❻ `fan 1 min 60`
❼ `fan 1 commonalarm 1`
❼**a** `fan 1 commonalarmfi 1`

❽ `fan 1 alarmdelay 6`
❽**a** `fan 1 filteralarmdelay 6`

❾ `fan 1 alarmprio 3`
❾**a** `fan 1 filteralarmprio 4`

Times are entered in seconds.

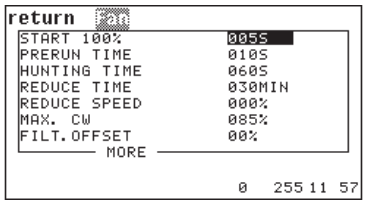
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

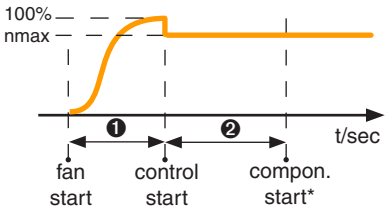
Air

Fan (Part 2)

D6 **Control**

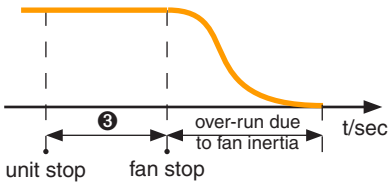


Fan start phase

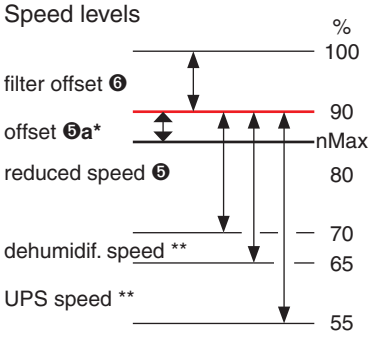


*start of all other control-relevant components except the glycol pump, which can be started earlier.

Fan stop phase



Speed levels



*this item refers to the previous page.
** these parameters are explained on the overnext page.

With the parameter "START 100%" ❶ you adjust a time which must elapse before the 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.
Using 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. This way the Pre-run parameter has the effect of a cooling unit start delay. Using different pre-runtimes for different units saves power and ensures that the power supply of the building will not overcharge.

The fan over-run time ("HUNTING TIME") ❸, which you can adjust, serves to reject hot or cold air in the cooling unit and avoids an accumulation of heat at the reheat or of cold at the evaporator.
If during a time which you adjust with "REDUCE TIME" ❹ no action (cooling, heating, humidification, dehumidification) has been taken, the fan speed is reduced by the percentage which you adjust with "REDUCE SPEED" ❺.
The "FILTER OFFSET" ❻ 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.

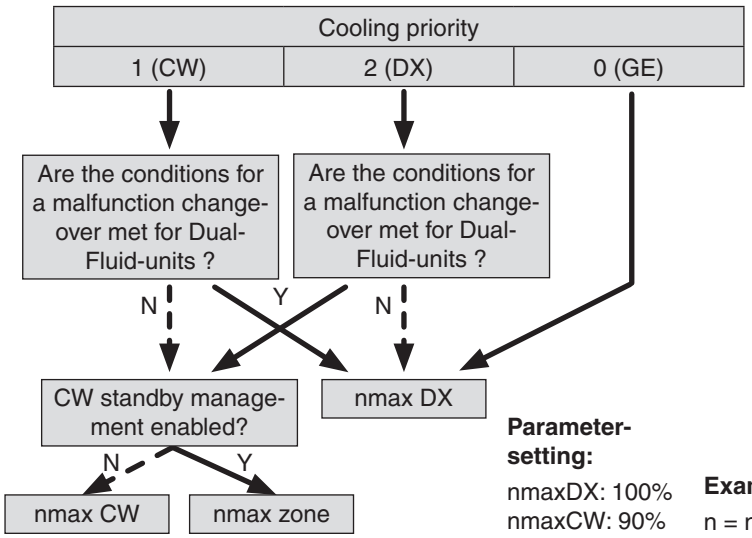
The corresponding commands:

❶ `fan 1 100 5`
❷ `fan 1 pre 15`
❸ `fan 1 after 20`
❹ `fan 1 redtime 30`
❺ `fan 1 redspeed 20`
❻ `fan 1 filteroffset 15`

Times are entered in seconds.
(except the reducing time which is entered in minutes)

The numbered callouts refer to the corresponding passages in the descriptive text.

Fan (Part 3) - Calculating the fan speed



The following decision processes are used by the controller for the fan speed calculation.
The fan speed nmaxDX or nmaxCW is chosen according to the cooling priority and the conditions for a malfunction change-over. (For details about the cooling priority, see page 71.)
Then four queries are passed, which use a multiplication of the speed with a factor, if positively answered. 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:**
	nmaxDX: 100% nmaxCW: 90%	n = nmaxDX	n = nmaxCW
Is $T_{air} \geq T_{set}$ + EMERSTART ? (overload service)		supposing: condition not ok n = nmaxDX = 100%	supposing: condition not ok n = nmaxCW = 90%
Are the conditions for STARTSPEED met?	10%	supposing: condition ok n = 100% x (100% - 10%) n = 90%	supposing: condition ok n = 90% x (100% - 10%) n = 81%
Does a dehumidification request exist with the speed reduction DEHUMSPEED?	20%	supposing: condition ok n = 90% x (100% - 20%) n = 72%	supp.: condition not ok n = 81%
Does the unit run in UPS operation with the speed reduction USV-SPEED?	30%	supposing: condition ok n = 72% x (100% - 30%) n = 50.4%	supp.: condition not ok n = 81%
Has a filter alarm occurred and must the speed be increased by the filter offset ?	10%	supposing: condition ok n = 50.4% x (100% + 10%) n = 55.44%	supposing: condition ok n = 81% x (100% + 10%) n = 89.1%
Is the minimum speed kept ?	60%	condition not ok because n $\leq$ 60% so n = 60%	condition ok so n = 89.1%
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 dehumidification n = 60%	supposing: condition ok n = 89.1% x (100% - 50%) n = 44,55%

Legend: yes, no, next step

Display

Air

Fan (Part 4)

D6 **Control**

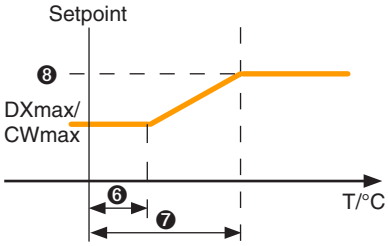
```
return  air
DEHUM.SPEED          00%
UPS-SPEED            00%
CYCLE                055
MAX ADJUST           02%
CTRL-FACTOR          04
EMERG.START          0.7K
EMERG.END            2.0K
EMERG.SPEED          095%

                0   255 11:58
```

The "DEHUM.SPEED" ❶ is entered as a negative difference in % to the maximum speed. This is the fan speed for the first option of dehumidification.
The "UPS SPEED" ❷ is also entered as a negative difference in % to the maximum speed. When the controller receives a UPS signal the controller will apply this reduced speed for an emergency operation.

The parameters:
- control cycle ❸
- max. control correction ❹
- control factor ❺

are only necessary for the GEp-control, which is explained in a separate manual.

Fan speed



If the cooling unit has low airflow during nominal operation, 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 way of cooling the room by increasing the fan speed you adjust a positive temperature difference ❻ to the setpoint, which represents the start point of the speed increase.
Then you adjust a maximum speed ❽ for the overload operation and another temperature difference ❼ 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.

The corresponding commands:

❶ `fan 1 dehum 25`
❷ `fan 1 ups 35`
❸ `fan 1 concyc 8`
❹ `fan 1 maxc 2`
❺ `fan 1 fact 2`
❻ `fan 1 emerstart 0.7`
❼ `fan 1 emerend 2.0`
❽ `fan 1 emernmax 95`

Times are entered in seconds.

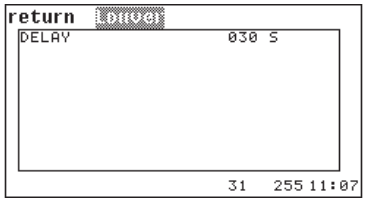
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

Air

Louver

D7 **Control**

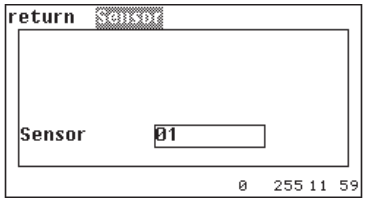


The pre-start serves to open the louver before the fan operation starts. This way a fan operation against a closed louver is avoided. ❶

Function

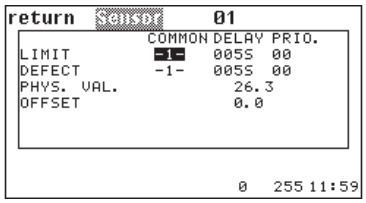
Sensor

C6

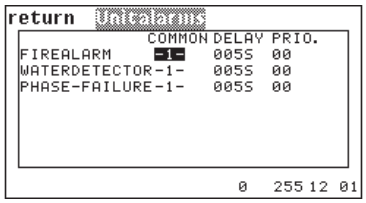


In combination with these alarms a common alarm can be released. ❶❹
The alarm delay for the limit alarm ❷ and for the sensor failure alarm ❺ is entered in seconds.
The limit value alarms ❸ can be assigned to an alarm relay as the sensor failure alarm ❻.
With the trim offset you can calibrate the sensor with the help of a reference thermometer. ❼
Compare the display of the PHYSICAL VALUE with the value of the reference thermometer.

F7



C7



Unit alarms

Three parameters can be adjusted for the fire alarm, the water alarm, and phase failure.
Release of a common alarm (0/1) ❶**a**, alarm delay ❷**a** and alarm relay assignment ❸**a** (named priority).

The corresponding commands:

❶ `louver 1 pretime 100`

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

```
❶ sensor 1 alarmprio 2
❷ sensor 1 commonalarm 1
❸ sensor 1 alarmdelay 7
❹ sensor 1 alarmpriobr 3
❺ sensor 1 commonalarmbr 1
❻ sensor 1 alarmdelaybr 8
❼ sensor 1 trim 22.3
```

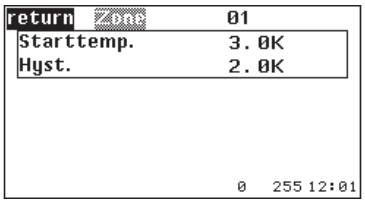
❶**a** fire → `commonalarm 1`
❷**a** water → `alarmdelay 7`
❸**a** phase → `alarmprio 8`

Times are entered in seconds.

The numbered callouts refer to the corresponding passages in the descriptive text.

Display

D1 **Control**

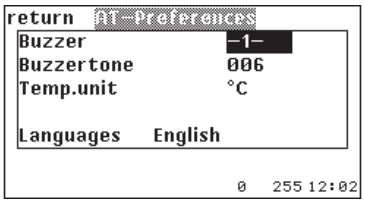


Zone

The parameters:
- Start temperature ❶
- Hysteresis ❷

are only necessary for the GE2p-control, which is explained in a separate manual.

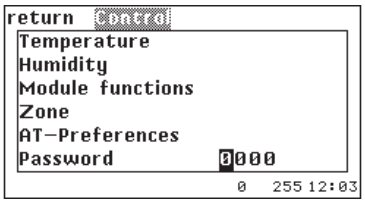
E1



AT-Preferences

The acoustic signal which resounds in the case of an alarm and the beep for pressing a key can be switched off (0=off, 1= on).
The pitch of the buzzertone can be adjusted as desired.
Further on you can adjust the temperature display in °C or °F ❶.
The operator language ❷ can also be selected.

F1



Password

At this menu item you can adjust the password for the control level.
The default password is „0000“.

The corresponding commands:

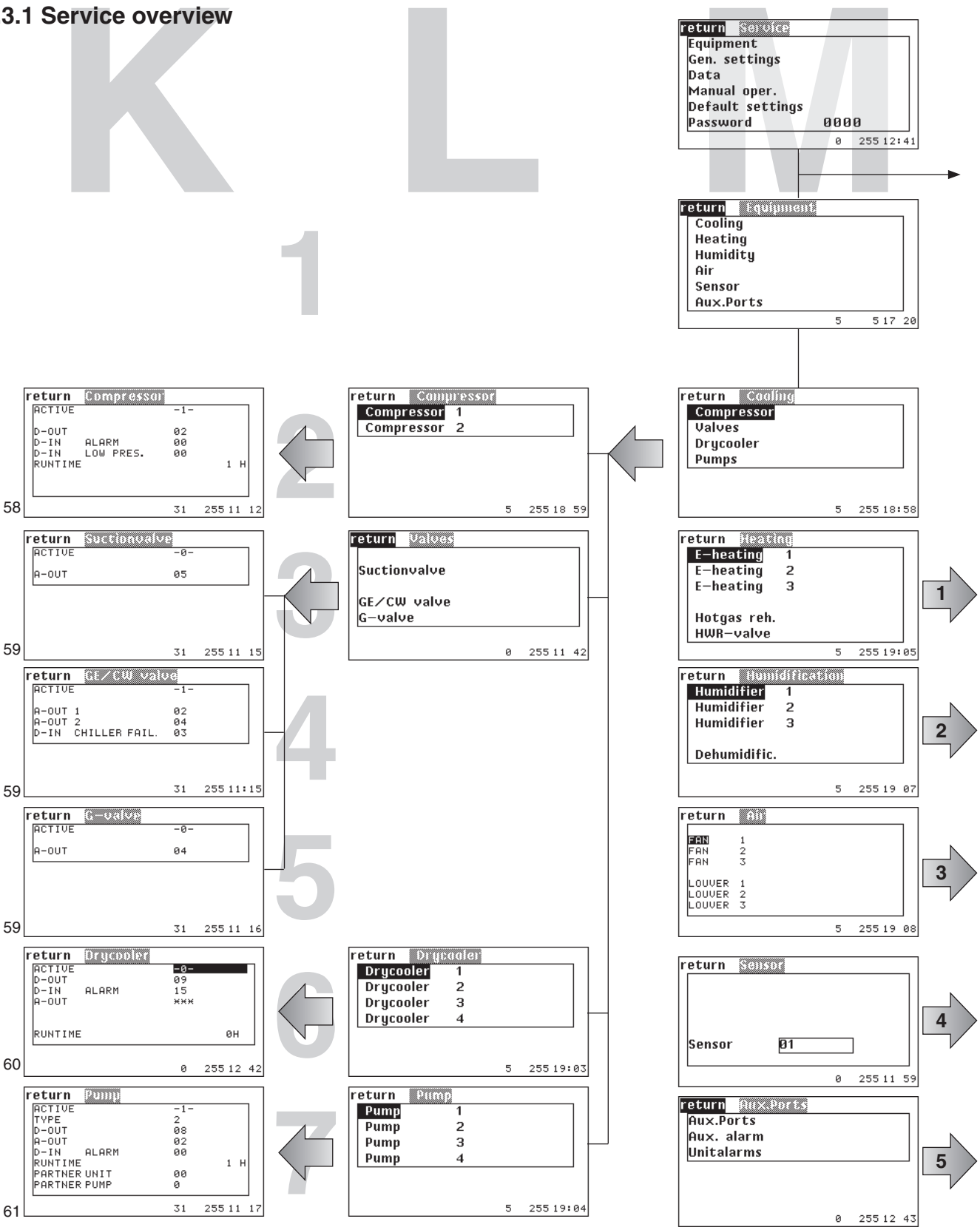
❶ `zone 1 gestart 3.0`
❷ `zone 1 gehys 2.0`

❸ `unit c / unit f` c for °Celsius, f for °Fahrenheit
❹ `language e / language g` e for English, g for German

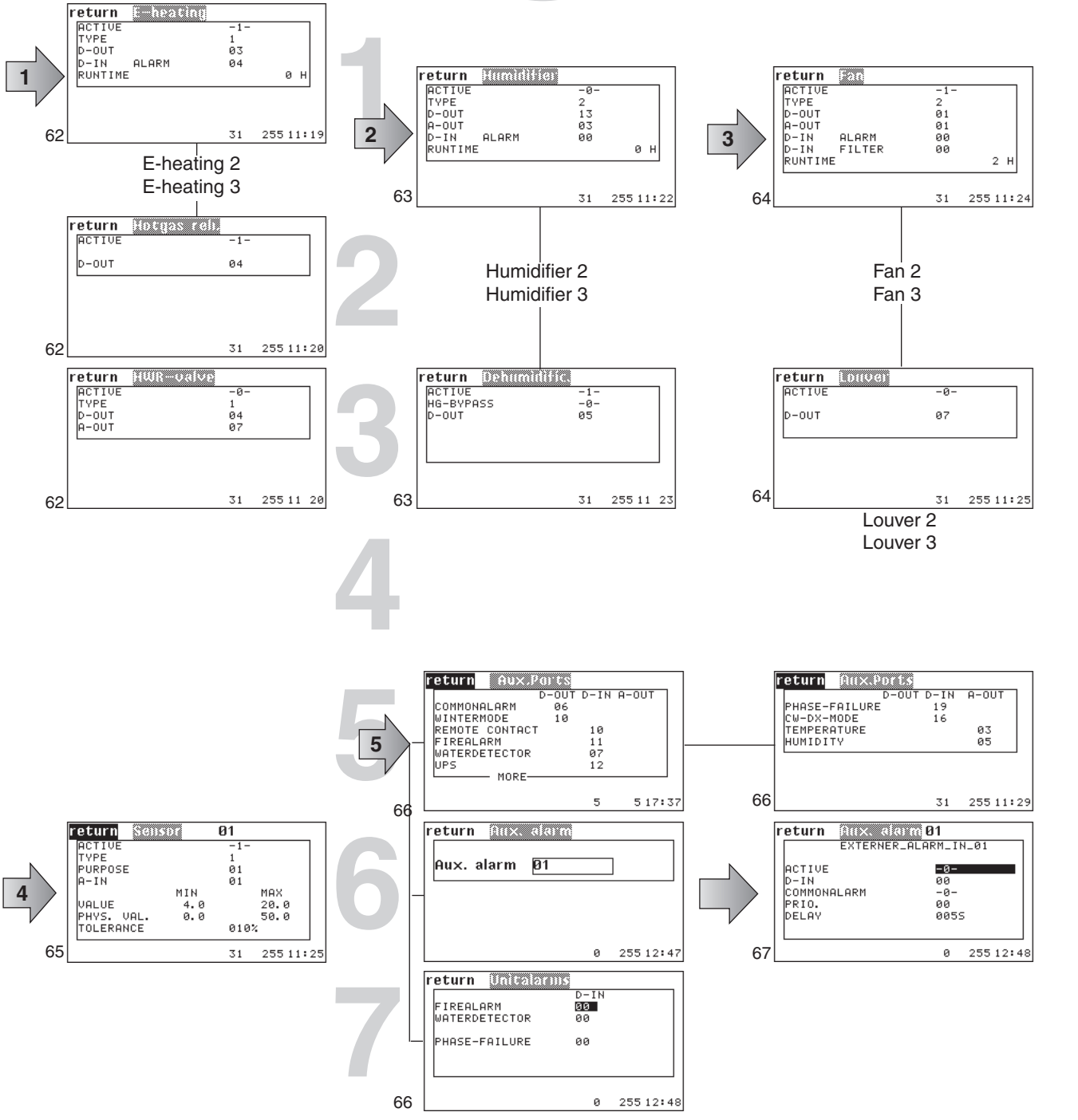
The surrounded numbers refer to the corresponding passages in the descriptive text.

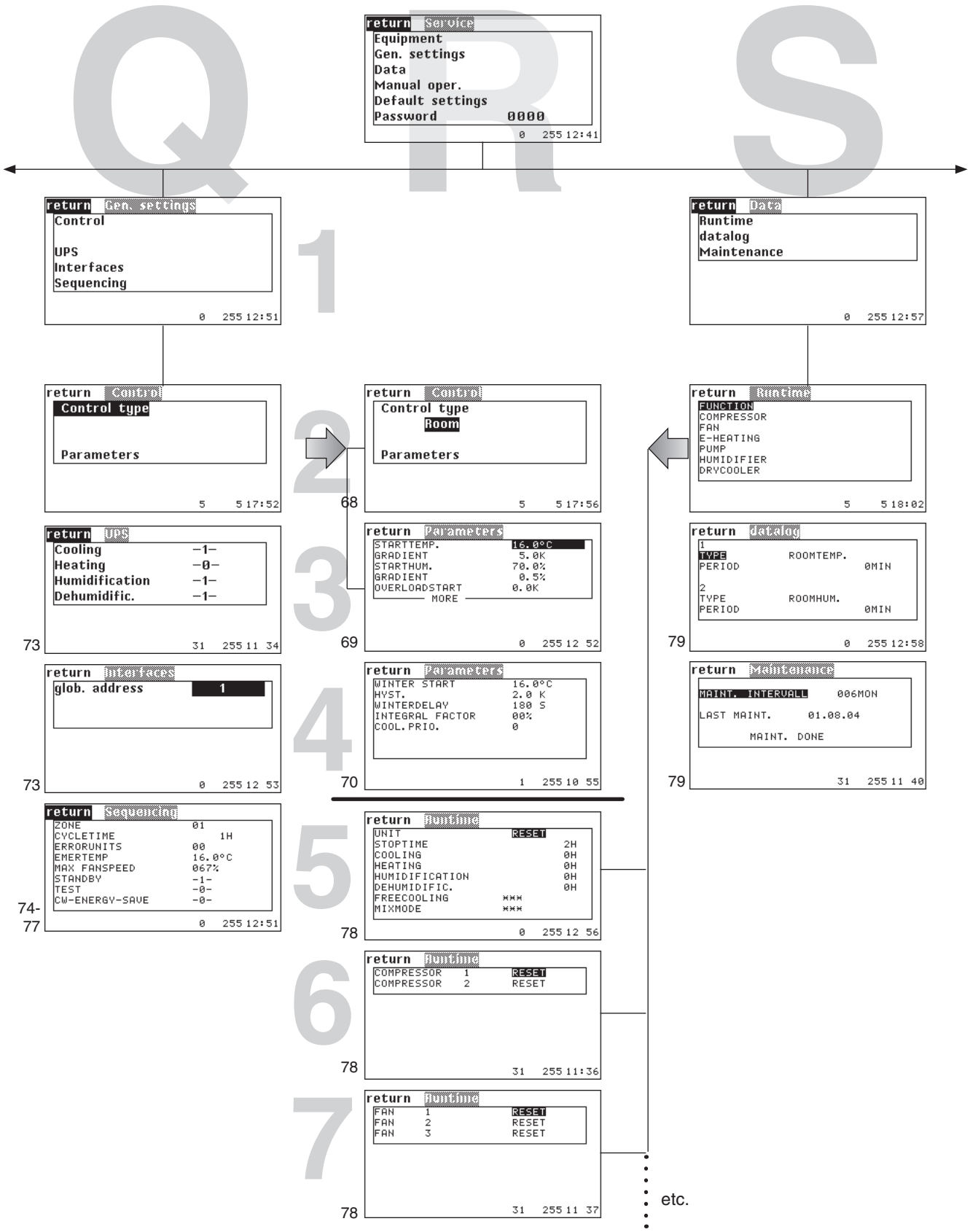
6.3 Service level

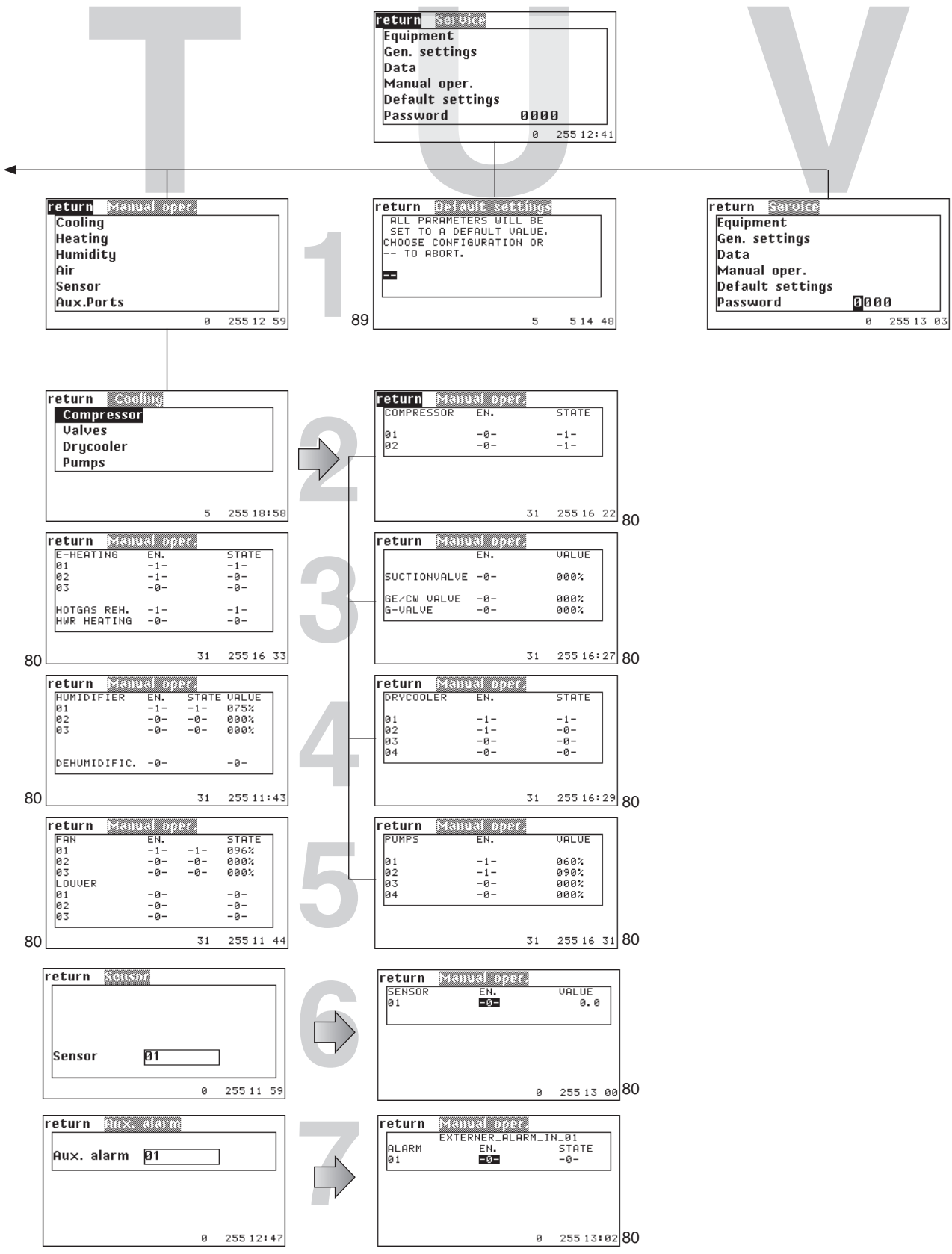
6.3.1 Service overview



N O P

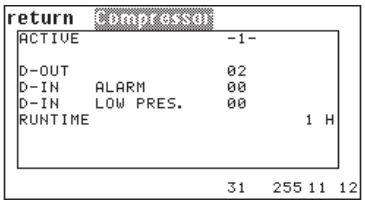

return E-heating
ACTIVE -1-
TYPE 1
D-OUT 03
D-IN ALARM 04
RUNTIME 0 H
62 31 255 11:19
E-heating 2
E-heating 3
return Hotgas reh.
ACTIVE -1-
D-OUT 04
62 31 255 11:20
return HWR-valve
ACTIVE -0-
TYPE 1
D-OUT 04
A-OUT 07
62 31 255 11 20
return Humidifier
ACTIVE -0-
TYPE 2
D-OUT 13
A-OUT 03
D-IN ALARM 00
RUNTIME 0 H
63 31 255 11:22
Humidifier 2
Humidifier 3
return Dehumidific
ACTIVE -1-
HG-BYPASS -0-
D-OUT 05
63 31 255 11 23
return Fan
ACTIVE -1-
TYPE 2
D-OUT 01
A-OUT 01
D-IN ALARM 00
D-IN FILTER 00
RUNTIME 2 H
64 31 255 11:24
Fan 2
Fan 3
return Louver
ACTIVE -0-
D-OUT 07
64 31 255 11:25
Louver 2
Louver 3
return Aux.Ports
D-OUT D-IN A-OUT
COMMONALARM 06
WINTERMODE 10
REMOTE CONTACT 10
FIREALARM 11
WATERDETECTOR 07
UPS 12
MORE
5 5 17:37
66
return Aux.Ports
D-OUT D-IN A-OUT
PHASE-FAILURE 19
CW-DX-MODE 16
TEMPERATURE 03
HUMIDITY 05
66 31 255 11:29
return Sensor 01
ACTIVE -1-
TYPE 1
PURPOSE 01
A-IN 01
MIN MAX
VALUE 4.0 20.0
PHYS. VAL. 0.0 50.0
TOLERANCE 010%
65 31 255 11:25
return Aux. alarm
Aux. alarm 01
0 255 12:47
return Aux. alarm 01
EXTERNER_ALARM_IN_01
ACTIVE -0-
D-IN 00
COMMONALARM -0-
PRIO. 00
DELAY 005S
67 0 255 12:48
return Unit-alarms
D-IN
FIREALARM 00
WATERDETECTOR 00
PHASE-FAILURE 00
66 0 255 12:48


Q
R
S
1
2
3
4
5
6
7
return Service
Equipment
Gen. settings
Data
Manual oper.
Default settings
Password 0000
0 255 12:41
return Gen. settings
Control
UPS
Interfaces
Sequencing
0 255 12:51
return Data
Runtime
datalog
Maintenance
0 255 12:57
return Control
Control type
Parameters
5 5 17:52
return Control
Control type
Room
Parameters
68
5 5 17:56
return Runtime
FUNCTION
COMPRESSOR
FAN
E-HEATING
PUMP
HUMIDIFIER
DRYCOOLER
5 5 18:02
return UPS
Cooling −1−
Heating −0−
Humidification −1−
Dehumidific. −1−
73
31 255 11 34
return Parameters
STARTTEMP. 16.0°C
GRADIENT 5.0K
STARTHUM. 70.0%
GRADIENT 0.5%
OVERLOADSTART 0.0K
MORE
69
0 255 12 52
return datalog
1
TYPE ROOMTEMP.
PERIOD 0MIN
2
TYPE ROOMHUM.
PERIOD 0MIN
79
0 255 12:58
return Interfaces
glob. address 1
73
0 255 12 53
return Parameters
WINTER START 16.0°C
HYST. 2.0 K
WINTERDELAY 180 S
INTEGRAL FACTOR 00%
COOL.PRIO. 0
70
1 255 10 55
return Maintenance
MAINT. INTERVALL 006MON
LAST MAINT. 01.08.04
MAINT. DONE
79
31 255 11 40
return Sequencing
ZONE 01
CYCLETIME 1H
ERRORUNITS 00
EMERTEMP 16.0°C
MAX FANSPEED 067%
STANDBY −1−
TEST −0−
CW-ENERGY-SAVE −0−
74-77
0 255 12:51
return Runtime
UNIT RESET
STOPTIME 2H
COOLING 0H
HEATING 0H
HUMIDIFICATION 0H
DEHUMIDIFIC. 0H
FREECOOLING ***
MIXMODE ***
78
0 255 12 56
return Runtime
COMPRESSOR 1 RESET
COMPRESSOR 2 RESET
78
31 255 11:36
return Runtime
FAN 1 RESET
FAN 2 RESET
FAN 3 RESET
78
31 255 11 37
etc.


return Service
Equipment
Gen. settings
Data
Manual oper.
Default settings
Password 0000
0 255 12:41
return Manual oper.
Cooling
Heating
Humidity
Air
Sensor
Aux.Ports
0 255 12 59
return Default settings
ALL PARAMETERS WILL BE
SET TO A DEFAULT VALUE,
CHOOSE CONFIGURATION OR
-- TO ABORT.
--
5 5 14 48
return Service
Equipment
Gen. settings
Data
Manual oper.
Default settings
Password 0000
0 255 13 03
return Cooling
Compressor
Valves
Drycooler
Pumps
5 255 18:58
return Manual oper.
COMPRESSOR EN. STATE
01 -0- -1-
02 -0- -1-
31 255 16 22
return Manual oper.
E-HEATING EN. STATE
01 -1- -1-
02 -1- -0-
03 -0- -0-
HOTGAS REH. -1- -1-
HWR HEATING -0- -0-
31 255 16 33
return Manual oper.
EN. VALUE
SUCTIONVALVE -0- 000%
GE/CW VALVE -0- 000%
G-VALVE -0- 000%
31 255 16:27
return Manual oper.
HUMIDIFIER EN. STATE VALUE
01 -1- -1- 075%
02 -0- -0- 000%
03 -0- -0- 000%
DEHUMIDIFIC. -0- -0-
31 255 11:43
return Manual oper.
DRYCOOLER EN. STATE
01 -1- -1-
02 -1- -0-
03 -0- -0-
04 -0- -0-
31 255 16:29
return Manual oper.
FAN EN. STATE
01 -1- -1- 096%
02 -0- -0- 000%
03 -0- -0- 000%
LOUVER
01 -0- -0-
02 -0- -0-
03 -0- -0-
31 255 11 44
return Manual oper.
PUMPS EN. VALUE
01 -1- 060%
02 -1- 090%
03 -0- 000%
04 -0- 000%
31 255 16 31
return Sensor
Sensor 01
0 255 11 59
return Manual oper.
SENSOR EN. VALUE
01 -0- 0.0
0 255 13 00
return Aux. alarm
Aux. alarm 01
0 255 12:47
return Manual oper.
EXTERNER_ALARM_IN_01
ALARM EN. STATE
01 -0- -0-
0 255 13:02
1
2
3
4
5
6
7
89
80

Display

K2 **Service**



Cooling

Compressor

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
You can determine a digital output for the compressor on/off signal. ❷
The digital input for the compressor alarm can be assigned in the third line. ❸
The digital input for the low pressure alarm can be assigned in the fourth line. ❹
The compressor runtime can be adjusted in the last line. ❺

The corresponding commands:

❶ `comp 1 conf 1`
❷ `comp 1 dout 3`
❸ `comp 1 alarm 5`
❹ `comp 1 alarmlp 7`
❺ `comp 1 runtime 10`

Times are entered in hours.

The numbered callouts refer to the corresponding passages in the descriptive text.

Display

Valves

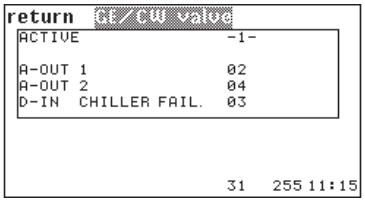
GE-CW valve

K3 **Service**

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 analogous output of the proportional signal for the suction valve. ❷

GE/CW-valve

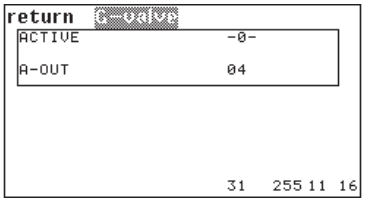
K4



In the first line you add the GE/CW-valve to the configuration by entering "1". With "0" you disable the GE/CW valve. ❸
With the parameters "A-OUT 1" and "A-OUT 2" you adjust the first and second analogous output of the proportional signal for the GE/CW-valve. ❹❺ Two GE/CW-valves exist in A/C-units of the CW2-type only.
The digital input, which receives the signal for the commutation from output 1 to output 2, can be assigned in the last line. ❻
With the reception of the signal the alarm message "CHILLER FAILURE" is displayed.

G-valve

K5



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

The corresponding commands:

❶ `suctionv 1 conf 1`
❷ `suctionv 1 aout 3`

❸ `gecwv conf 1`
❹ `gecwv aout1 3`
❺ `gecwv aout2 4`
❻ `gecwv din 17`

❼ `gvalve conf 1`
❽ `gvalve aout 4`

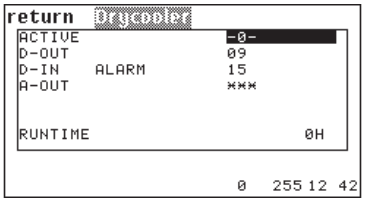
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

Cooling

Drycooler

K6 **Service**



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
The digital input for the drycooler alarm can be assigned by the "D-IN" parameter. ❸
The drycooler runtime can be set in the last line. ❹

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

The corresponding commands:

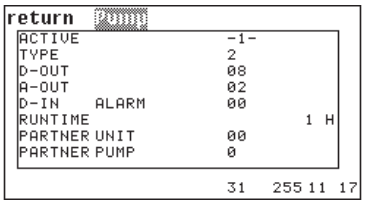
❶ `drycool 1 conf 1`
❷ `drycool 1 dout 10`
❸ `drycool 1 alarm 5`
❹ `drycool 1 runtime 150`

Times are entered in hours.

The numbered callouts refer to the corresponding passages in the descriptive text.

Display

K7 **Service**



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 (1 = G-pump, which pumps the medium through the condenser in a GE2-unit, 2 = GE-pump, which pumps the medium through the free cooling coil in a GE2-unit, 3 = Glycol-pump - all pumps for G-, GE1 units which are located outside the cooling unit). ❷

With the parameter "D-OUT" you determine a digital output for a glycol pump on/off signal. ❸

With the parameter "A-OUT" you adjust the analogous output of the proportional signal for a G/GE-pump. ❹

The digital input for the pump alarm can be assigned by the "D-IN" parameter. ❺

The pump runtime can be set in the next line. ❻

For glycol pumps you can enable a sequencing based on time and failure. With "partner unit" ❼ and "partner pump" ❽ you select the number of the 2nd pump and the ID of the unit from which this pump is controlled.

The corresponding commands:

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 runtime 60`
❼ `pump 1 partunit 17`
❽ `pump 1 partpump 1`

Times are entered in hours.

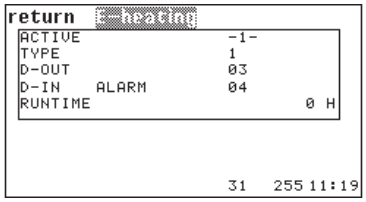
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

Heating

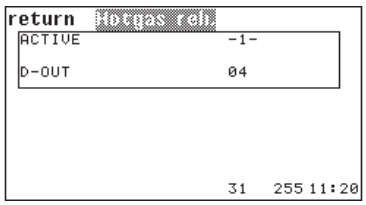
E-heating/Hotgas reheat/Hot water reheat

N1 Service

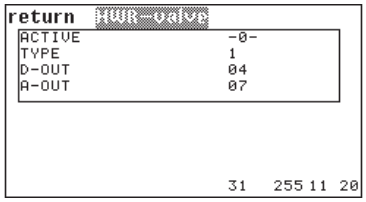


Setting the parameter ACTIVE to 1 adds a reheat to the configuration. Setting this parameter to 0 disables the reheat. ❶
In the next line you determine the reheat type (1: reheat with on/off control, 2: reheat with proportional control). ❷
With the parameter "D-OUT" you determine a digital output for the reheat. As the proportional electric reheat is controlled by pulse width modulation, the reheat receives the control signal by the digital output. ❸
The digital input for the electric reheat alarm can be assigned by the "D-IN" parameter. ❺
The electric reheat runtime can be set in the last line. ❻

N2



N3



With the parameter "A-OUT" you adjust the analogous output of the proportional signal for the pww-valve of a pww-reheat. ❹

The corresponding commands:

❶ `eheat 1 conf 1`
❷ `eheat 1 type 1`
❸ `eheat 1 dout 3`

❺ `eheat 1 alarm 7`
❻ `eheat 1 runtime 0`

❶ `gasheat 1 conf 1`
❷ `gasheat 1 dout 10`

❶ `pwwheat 1 conf 2`
❷ `pwwheat 1 type 1`
❸ `pwwheat 1 dout 5`
❹ `pwwheat 1 aout 8`

Times are entered in hours.

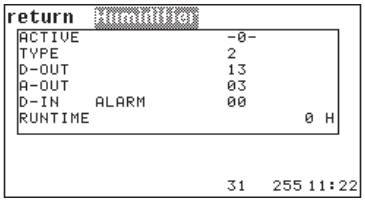
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

Humidification

Humidifier

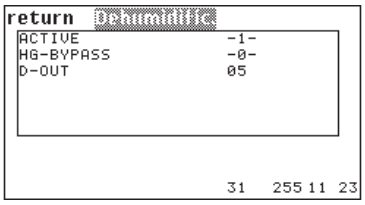
O1 **Service**



Setting the parameter ACTIVE to 1 adds a humidifier to the configuration. Setting this parameter to 0 disables the humidifier. ❶
In the next line you determine the humidifier type (1: humidifier with on/off control, 2: 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 analogous output of the proportional signal for a humidifier. ❹
The digital input for the humidifier alarm can be assigned by the "D-IN" parameter. ❺
The humidifier runtime can be set in the last line. ❻

Dehumidification

O3



Setting the parameter ACTIVE to 1 adds a dehumidification valve to the configuration. Setting this parameter to 0 disables the dehumidification valve. ❶
With the parameter "D-OUT" you determine a digital output for the dehumidification (solenoid valve for partial evaporator cut-off). ❷
In the second line you can configure a hotgas bypass for the compressor by entering a "1". ❸
When dehumidification with compressor operation is requested, the hotgas bypass 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.

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 alarm 7`
❻ `humi 1 runtime 500`
`humi 1 confcon 1`

❶ `dehumi confvalve 1`
❷ `dehumi dout 12`
❸ `dehumi confbypass 1`

Configuration of a conductivity meter by commands only.

Times are entered in hours.

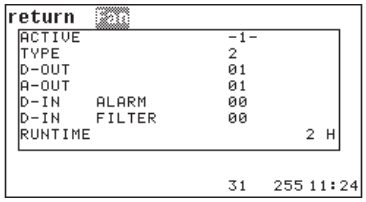
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

Air

Fan

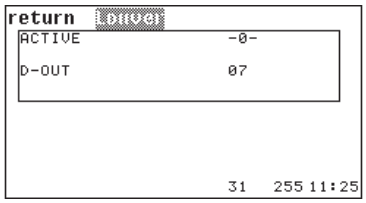
P1 **Service**



Setting the parameter ACTIVE to 1 adds a fan to the configuration. Setting this parameter to 0 disables the fan. ❶
In the next line you determine the fan type (1: fan with on/off control, 2: EC-fan with proportional speed control). ❷
With the parameter "D-OUT" you determine a digital output for an on/off fan. ❸
With the parameter "A-OUT" you adjust the analogous output of the proportional signal for a speed controlled fan. ❹
The digital input for the airflow alarm can be assigned by the "D-IN" parameter. ❺
The digital input for the filter alarm can be assigned by the "D-IN FILTER" parameter. ❻
The fan runtime can be set in the last line. ❼

Louver

P3



Setting the parameter ACTIVE to 1 adds a louver to the configuration. Setting this parameter to 0 disables the louver. ❽
With the parameter "D-OUT" you determine a digital output for the louver. ❾

The corresponding commands:

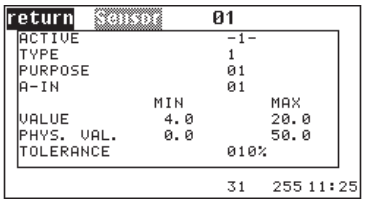
❶ `fan 1 conf 1`
❷ `fan 1 type 1`
❸ `fan 1 dout 11`
❹ `fan 1 aout 11`
❺ `fan 1 alarm 2`
❻ `fan 1 filteralarm 6`
❼ `fan 1 runtime 120`
❽ `louver 1 conf 1`
❾ `louver 1 dout 11`

Times are entered in hours.

The numbered callouts refer to the corresponding passages in the descriptive text.

Display

N6 **Service**



PURPOSE:
1 - Room temperature
2 - Room humidity
3 - Supply temperature
4 - Supply humidity
5 - Water temperature 1
6 - Outside temperature
7 - Outside humidity
8 - Condensation temperature 1
9 - Condensation pressure 1
10 - Evaporation temperature 1
11 - Evaporation pressure 1
12 - Water temperature 2
13 - Condensation temperature 2
14 - Condensation pressure 2
15 - Evaporation temperature 2
16 - Evaporation pressure 2
17 - Setpoint temperature
18 - Setpoint humidity

Sensors of the purpose 8, 10, 11, 13, 15, 16 are not used up to now.

For these sensors and for the sensor condensation pressure (9 and 14) no average value is calculated.

Equipment

Sensor

Setting the parameter ACTIVE to 1 adds a sensor to the configuration. Setting this parameter to 0 disables the sensor. ❶
In the next line you determine the sensor type (1: current, 2: voltage, 3: PT100, 4: PT1000, 5: KTY81-121). ❷
The parameter PURPOSE specifies for what the sensor is used. ❸
See list at left.
With the parameter "A-IN" you adjust the analogous input for the proportional sensor signal. ❹
The following 5 items serve to calibrate the sensor. The minimum measure value (phys. value) ❺ is assigned to the minimum output (value). ❼
The maximum measure value (phys. value) ❻ is assigned to the maximum output (value). ❽
The unit of the adjusted measure value depends on the sensor purpose (1-16). The unit of the adjusted output depends on the sensor type (1-5).
If there are more than two sensors with the same purpose, an average value is calculated. In the last line you can adjust a maximum difference to the average value.❾ If the maximum difference is exceeded, the alarm "Sensor ## excess" is released.

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.

The corresponding commands:

❶ `sensor 1 conf 1`
❷ `sensor 1 type 3`
❸ `sensor 1 use 5`
❹ `sensor 1 ain 3`
❺ `sensor 1 minmeas -20.0`
❻ `sensor 1 maxmeas 40.0`
❼ `sensor 1 minout 0.0`
❽ `sensor 1 maxout 9.0`
❾ `sensor 1 div 20`

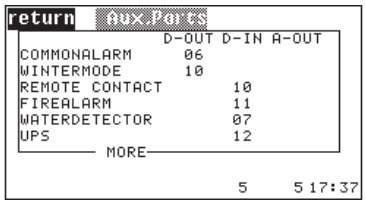
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

Equipment

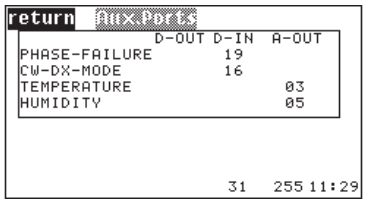
Aux. Ports/Aux. Ports

O5 **Service**



You can adjust digital in- and outputs for non-component-related alarms or messages in this window.
In detail you can adjust the digital output for the common alarm ❶ and for the wintermode ❷. The wintermode signal can be forwarded to a BMS system.
You can also adjust the digital inputs for the remote contact ❸, the fire alarm ❹ and the water detector ❺, which creates the water alarm and for the UPS operation ❻.

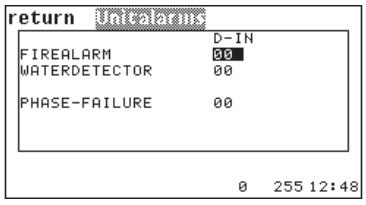
P5



In the following window you can assign the digital inputs for the phase failure alarm ❼ and for the external cooling priority ❽. (See page 71).
You can also determine the analogous outputs for the external use of the actual temperature ❾ and the actual humidity ❿.

Aux. Ports/Unit alarms

O7



In this window you can assign digital inputs to unit alarms. The fire alarm ❹, the water detector ❺, which creates the water alarm, and the phase failure alarm ❼.

The corresponding commands:

❶ `calarm dout 7`
❷ `winter dout 17`
❸ `remote din 11`
❹ `fire din 12`
❺ `water din 8`
❻ `ups din 13`
❼ `phase din 19`
❽ `cwoff din 16`
❾ `curtemp aout 3`
❿ `curhumi aout 5`

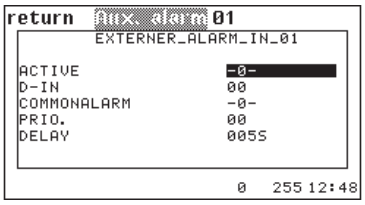
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

Equipment

Aux. Ports/Aux. Alarm

P6 **Service**



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
With the parameter "D-IN" you adjust the digital input for the alarm signal. ❸
You can adjust, whether the external alarm releases a common alarm (0 = no, 1 = yes). ❹
Setting the priority for the external alarm ❺ means assigning the alarm to an alarm relay with the adjusted number.
The external alarm delay can be adjusted. ❻

The corresponding commands:

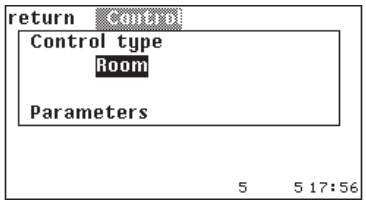
❶ `exalarmin 1 text xxx123`
❷ `exalarmin 1 conf 1`
❸ `exalarmin 1 alarm 11`
❹ `exalarmin 1 commonalarm 0`
❺ `exalarmin 1 alarmprio 9`
❻ `exalarmin 1 alarmdelay 6`

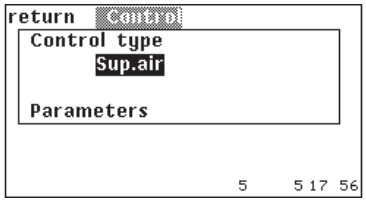
Times are entered in seconds.

The numbered callouts refer to the corresponding passages in the descriptive text.

Display

R2 **Service**





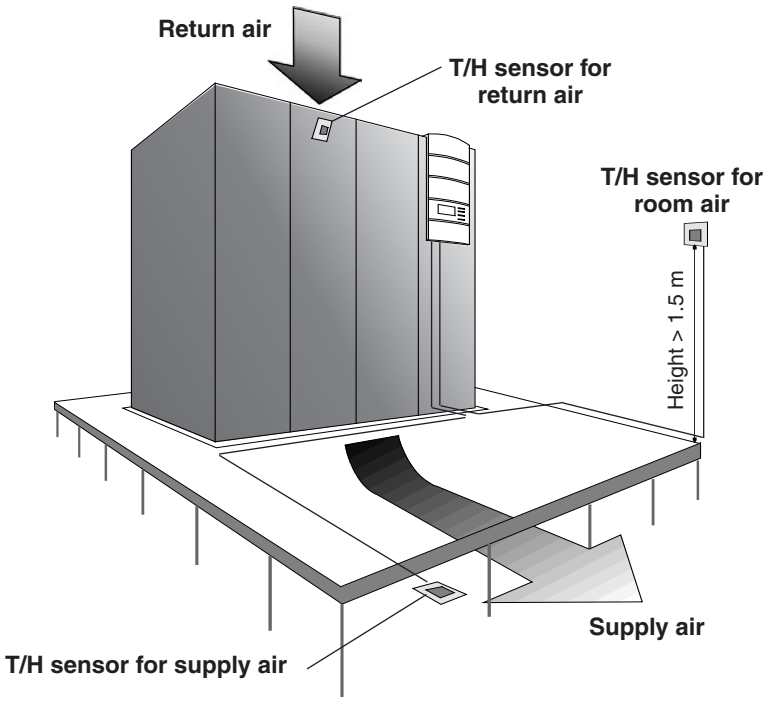
Gen. settings

Control

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 and the InRoom Controller controls in accordance with the setpoints set in the "Control/temperature/humidity" menu. The limit values of room air are monitored.

An external T/H sensor is required for supply air control. The control takes place for the room air control in accordance with setpoints for the supply air set in the "Control/temperature/humidity" menu. The limit values of the supply air are monitored.



The sensor should be positioned depending on the room conditions, the thermal load distribution in the room and selected type of control.
The maximum distance to the IOC can be 20m.

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

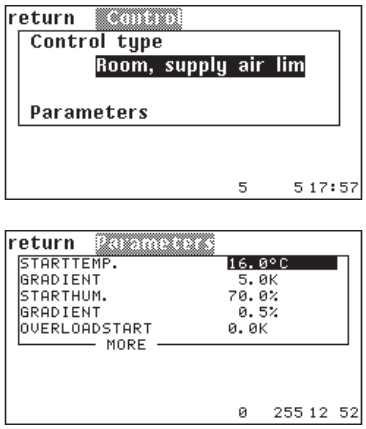
❷ `lim temp 16.3`
❸ `grad temp 0.6`
❹ `lim humi 75.0`
❺ `grad humi 0.6`

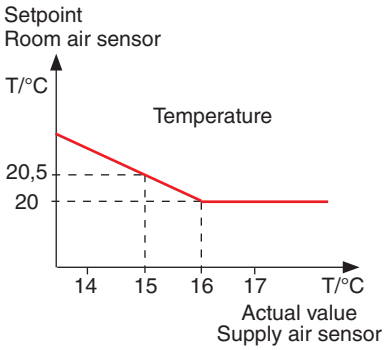
The numbered callouts refer to the corresponding passages in the descriptive text.

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

Display

R2, R3 **Service**





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

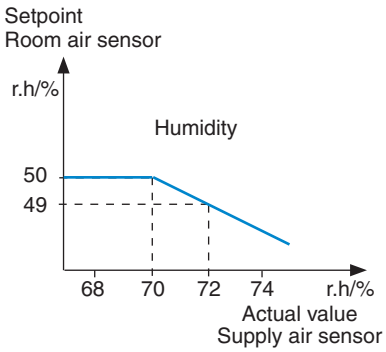
Gen. settings

Control/Parameters

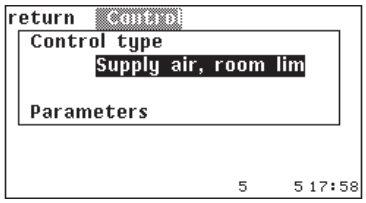
Using the room control with supply air limitation causes the control to take place using a T/H sensor in the return air intake and a second T/H sensor in the supply air intake. The control takes place in the same way as room air control, the temperature setpoint is shifted only when the supply air temperature exceeds the start temperature ❷. 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 the setpoint increase happens, is made clear by the graph on the left side. A steep gradient drastically corrects the failure to meet the supply air temperature, but has the risk that the control circuit starts to oscillate.
With humidity control the setpoint shift takes place in 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 on the right side.

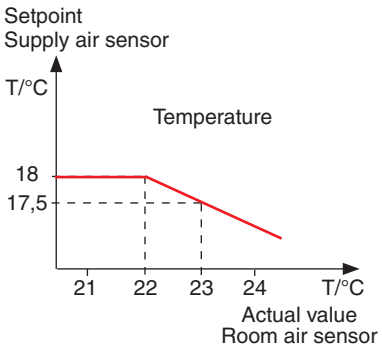
New setpoint = old setpoint + gradient • (start value - actual value)

Note:
For corresponding commands, see previous page.



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



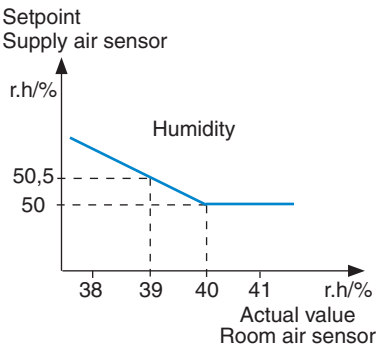


Example:
17.5 = 18 + 0.5 • (22 - 23)

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 shift works in the opposite direction, because it works on the basis that the supply air is colder than the return air.
If the room temperature exceeds the start temperature entered, the temperature setpoint is reduced.
If the room humidity drops below the starting humidity entered, the humidity setpoint is increased.

The limit values of all four input variables are monitored for room air control with supply air limitation and for supply air control with room air limitation.

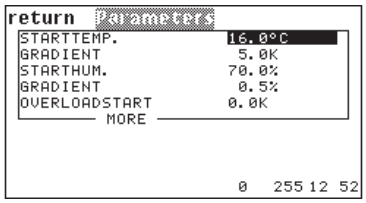
- Room air temperature
- Room humidity
- Supply air temperature
- Supply air humidity



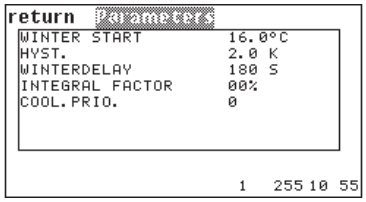
Example:
50.5 = 50 + 0.5 • (40 - 39)

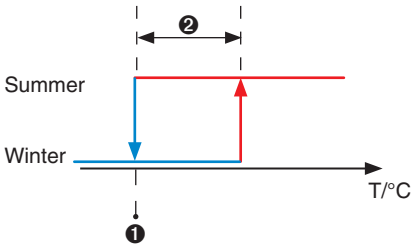
Display

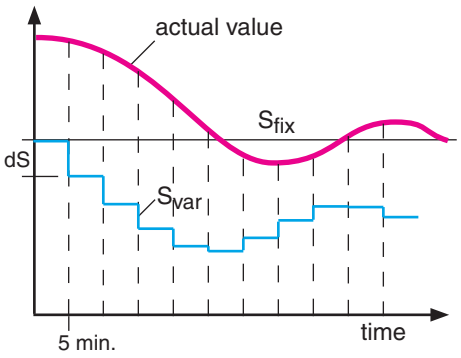
R3 **Service**



R4







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

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

s_{fix} represents the fixed setpoint which is adjusted in the menu Control/Temperature.

Gen. settings

Control/Parameters (Part 2)

The controller has the option of starting a stand-by unit after an adjustable positive temperature difference to the air temperature setpoint is achieved. This difference can be adjusted by the parameter "Load-start" ❻ . The adjustment 0.0K disables this function.
The sequencing function is not influenced by starting a standby-unit.

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 defect" is not displayed.

The winter start delay ❸ inhibits the low pressure monitoring on alarm conditions for an adjustable time in 0-255 seconds, which is relevant for the compressor operation.

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 Svar, 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 an 80%. A low value should be used to start with in order to prevent the control system from oscillating. 10% are recommended and can stepwise be increased to find out the limit of safe control.
For details of the cooling priority ❺ see next page.

The corresponding commands:

❶ `sumwin start 16.0`
❷ `sumwin hys 2`
❸ `winterdelay 180`
❹ `integral 10`
❺ `coolingprio 1`
❻ `load 2.5`

Gen. setting

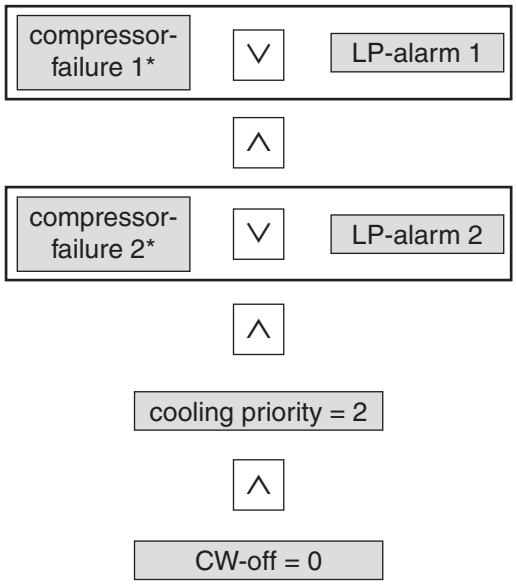
Control/Parameter (Part 3)

Cooling priority

The cooling priority determines the overriding cooling circuit for units with two different cooling systems. The parameters 0, 1, and 2 can be adjusted.

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

Malfunction change-over
DX –> CW

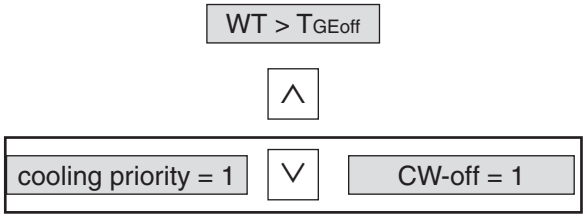


*HP-alarm or compressor failure

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

The diagram below displays the conditions for a malfunction change-over at Dual-Fluid-units (units with two different cooling systems).

Malfunction change-over
CW –> DX



WT - water temperature 1
T_{GEoff} - upper water temperature limit for GE-operation
CW-off - digital input (pre-set DIN16) to enable DX-operation or to disable CW-operation(see page 80)

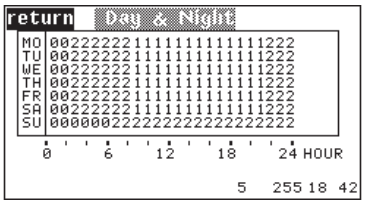
∧ - logic operation AND

∨ - logic operation OR

Display

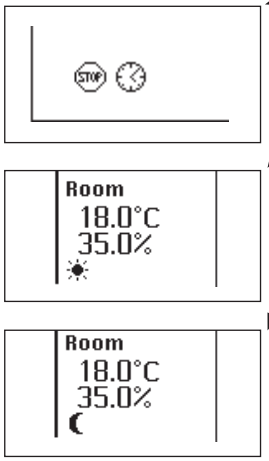
Day & Night

Service



The week timer is based upon two different temperature setpoints which you have already adjusted in the control/temperature menu. Setpoint 1 is represented by a thick line, setpoint 2 by a dotted line.
For each hour of each day of the week you choose among three settings:

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



	Display:
1. Cooling unit off	0
2. Cooling unit on with setpoint 1	1
3. Cooling 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

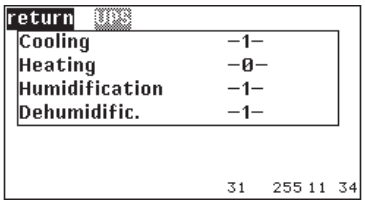
Day:	Hour:	Status:
mo = monday	0 = from 0:00 to 0:59	0 = Cooling unit off
tu = tuesday	1 = from 1:00 to 1:59	1 = Cooling unit on with setpoint 1
we = wednesday	2 = etc.	2 = Cooling unit on with setpoint 2
th = thursday		
fr = friday		
sa = saturday		
su = sunday		

Display

Gen. settings

UPS

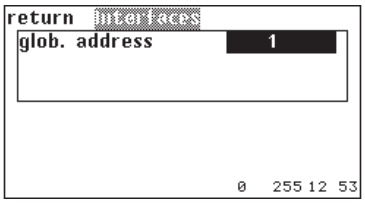
Q3 **Service**



You can define the air conditioning functions for operation with an 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 will be reduced to a pre-adjusted value in case of UPS-operation. See page 51.

Interfaces

Q4



The global address can be adjusted in a range from 1 to 255.
This address is decisive for the communication with a BMS.

The corresponding commands:

❶ `ups cool 1`
❷ `ups heat 0`
❸ `ups humi 0`
❹ `ups dehumi 0`

❺ `globadr 231`

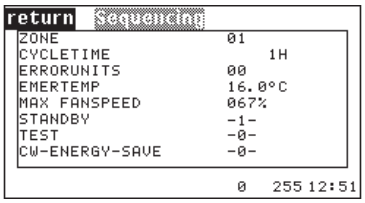
The numbered callouts refer to the corresponding passages in the descriptive text.

Display

Gen. settings

Sequencing

Q5 **Service**



The zone concept is based on the idea to obtain a homogeneous room climate within a determined space by distributed generation of conditioned air. Within a zone only one room temperature exists, which is calculated as the average value of all connected room temperature sensors of the units in operation; this also applies to the room humidity, supply temperature, and supply humidity. The set values can be individually adjusted for each unit, but they should only vary slightly.
There are two zone specific functions:

1. Sequencing 2. CW standby management

1. Sequencing

Within a zone you can have a unit sequencing with change-over dependent on time and failure.

The following parameters must be specified for this:

❶. **Unit assignment**
A zone is defined by the assignment of units. A maximum of 32 zones can be defined with the adjustments from 1 to 32. Zone 0 means that the unit is assigned to no zone. The assignment is made individually for each unit.

❷. **Standby units**
When a sequencing takes place the zone must contain at least one standby unit. This setting must be made for each unit/IOC by means of the ON/OFF-button on the InRoom Controller.

❸. **Number of defective units** (errorunits) (zone parameter)
This entry is optional. If the number, adjusted here, is reached, the emergency operation will be put into force.

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

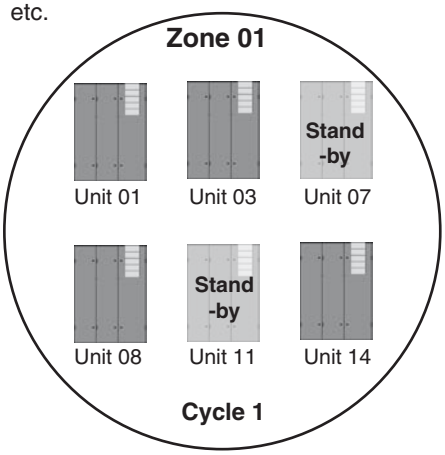
Time dependent changeover
The cycletime ❺ determines the lapse of time after which a changeover will periodically take place. This means that the standby status is changed over the units one by one. With the setting 0 (hrs) no sequencing is made.
Setting the cycletime causes the sequencing start after the sequencing menu has been left.

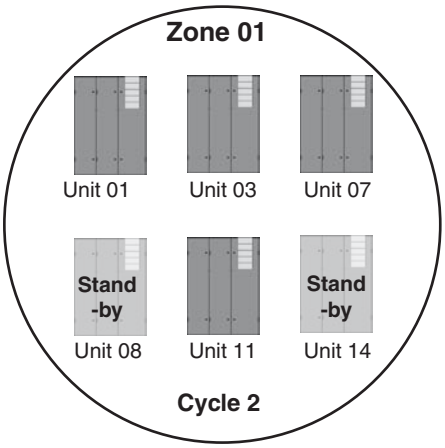
To let the standby units (set under item ❷) participate in the sequencing, they have to be locally switched on by means of the ON/OFF-button on the InRoom Controller. For this the corresponing unit must be selected in the bus overview window.

Enabling the test sequencing ❻ with the fixed cycletime of 5 minutes helps you to check the sequencing function.

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.





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 unit 3 0`	puts unit 3 into standby
	`zone 1 unit 3 1`	switches unit 3 on
❸	`zone 1 emernum 3`	
❹	`zone 1 emertemp 15.7`	
❺	`zone 1 seqtime 10`	
❻	`zone 1 test 1`	en- (1) or disables (0) test sequencing

Times are entered in hours.

The numbered callouts refer to the corresponding passages in the descriptive text.

Failure dependent change-over

Definition of valid alarms for one zone
For each zone any number out of 26 alarms in total can be defined as valid alarms. If such an alarm occurs the corresponding unit is switched off and notified as defective.
All 26 alarms are defined as valid alarms by default. The alarm "unit not available" can not be deleted from the alarm list. This alarm is always part of the valid alarms and appears due to a bus failure or when the unit has locally been switched off.
After the failure of a unit a standby unit is switched on. With the switching on of the last available standby unit the time dependent sequencing is interrupted.

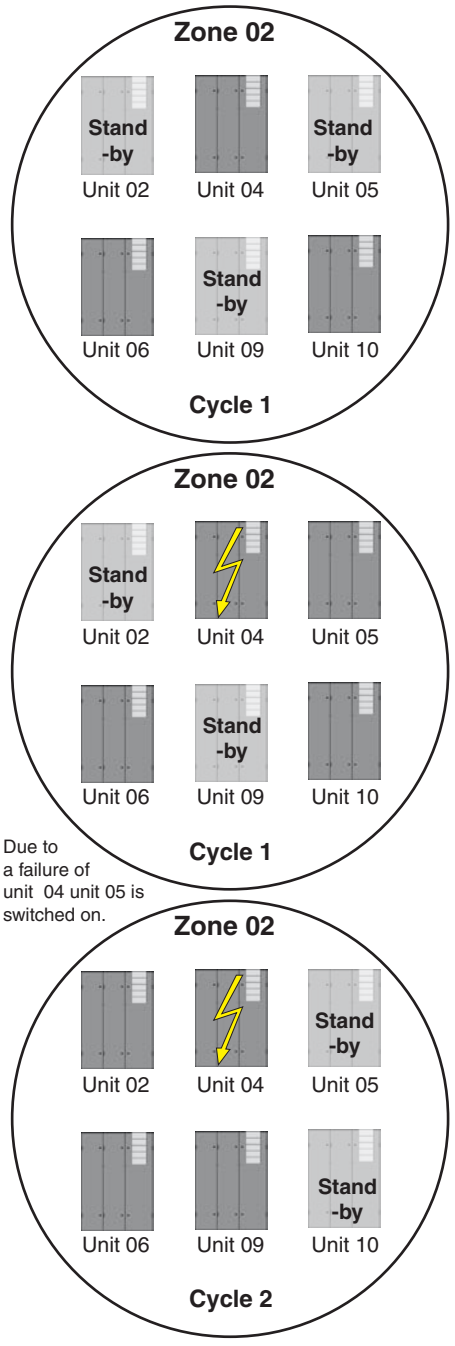
```
Valid alarms:
--.Not available                01.Local stop
02.Compressor lowpressure       03.Compressor Failure
04.E-heating Failure            05.Humidifier Failure
06.Humidifier 5uS               07.Humidifier 20uS
08.Fan error                    09.Filter clocked
10.External alarm               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.Watertemp too high           23.Watertemp too low
24.Fire/smoke detector          25.Sensor Failure
26.Sensor broken
```

When the previously adjusted number of defective units in one zone is reached the emergency operation is enabled for all zones.
Emergency operation means that the emergency temperature of the triggering zone is accepted as the new temperature set value for all the zones.
The number of defective units is independent of the number of standby units which have been started. For example, 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 achieved anymore, the adjusted number of defective units should be higher than the number of a zone's standby units.

For safety reasons, valid alarms can only be configured by commands.

Failure dependent change-over

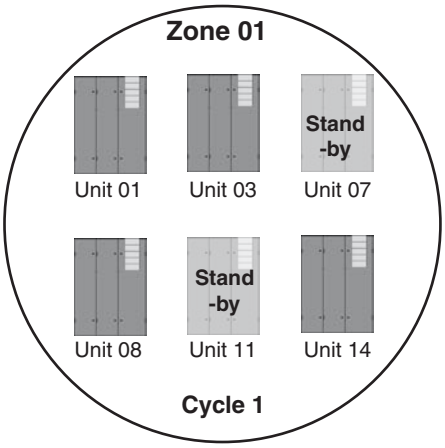


The corresponding commands:

`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

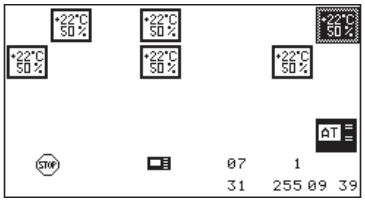
Example for a Sequencing configuration:

The zone shown on the right is to be configured.
- All alarms shall remain valid.
- The number of defective units shall be 3.
- The emergency temperature shall be 17°C.
- The sequencing cycle shall be 5 hours.

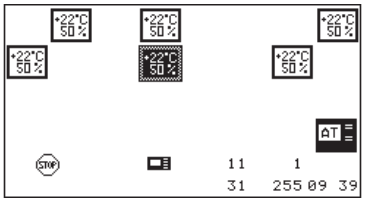


1. Determinating the standby units in the general overview

Select the units one by one and set the operating status by means of the ON/OFF switch at the InRoom Controller. A locally stopped unit is counted as a standby unit at the start of the sequencing.



IOC 07 operating status: Stop



IOC 11 operating status: Stop

2. Unit assignment

Now the units 01, 03, 07, 08, 11 and 14 are assigned to zone 01. This must be done separately for each unit in the menu "Service/Gen. settings/Sequencing".

3. Number of defective units

Settings can also be made in this menu concerning the zone in total.
The number of defective units is part of these adjustments.

4. Emergency temperature

Set the emergency temperature to 17°C.

5. Sequencing cycle

Entering the sequencing cycle starts the sequencing.

6. Switching on the standby units

The standby units 07 and 11 must now be selected in the overview and be switched on by setting "1" in menu item "standby".

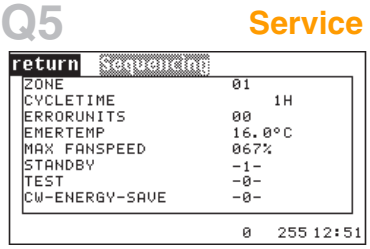
Commands

At the configuration by the terminal program the sequence is different. First assign the units to the zone, then set the standby units.

```
zone 1 + 1
zone 1 + 3
zone 1 + 7
zone 1 + 8
zone 1 + 11
zone 1 + 14

zone 1 unit 7 0
zone 1 unit 11 0

zone 1 emernum 3
zone 1 emertemp 17
zone 1 seqtime 5
```

Switching on the standby units belatedly is not necessary here.

Display



2. CW Standby Management

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 units as possible in order to reduce the fan speed of all units and thus to save energy. As a result, the provided standby units must constantly take part in the cooling process. The total airflow is below the maximum airflow possible and is equalled in case of failure of one or more units by increasing the fanspeed of the remaining units.

Use "MAXFANSPEED" ❽ to adjust the fan speed which is to be kept in the zone when all units are running. Use CW-ENERGY-SAVE ❾ to enable the CW-standby management and to turn on all standby units of the zone. Both parameters are related to the zone and only need 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.

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

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

A cooling unit is switched off as a defective unit if a valid alarm occurs at this unit, in the same way as in the sequencing.
When a Dualfluid unit changes over to DX operation due to a fault like a water temperature exceeding the GE-off limit (see page 71), this unit applies the nMaxDX 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.

The corresponding commands:

❽ `zone 1 nmax 85`
❾ `zone 1 cwmode 1`

The numbered callouts refer to the corresponding passages in the descriptive text.

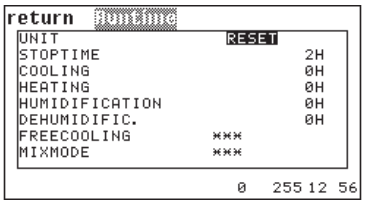
Display

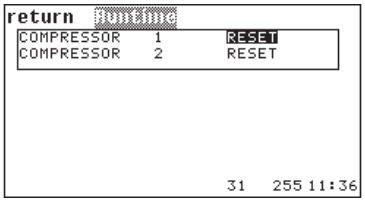
Data

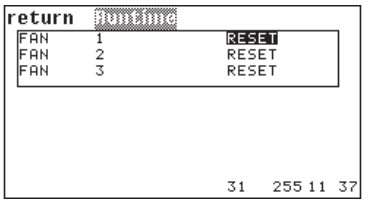
Runtime

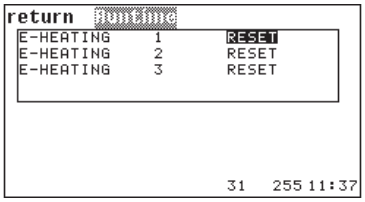
R5-R7 **Service**

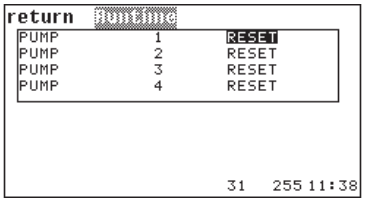
Being an exact copy of the same submenu in the Info menu, the Service Runtime menus provide the possibility to reset the runtimes.

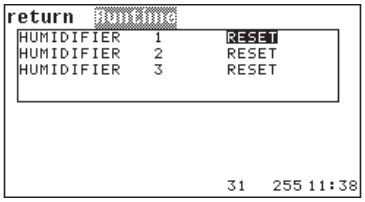


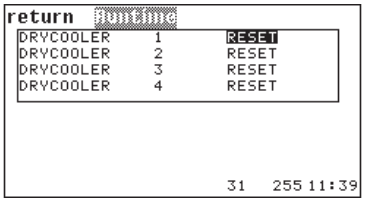












The corresponding commands:

❶ `comp 1 runtime 0`
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`

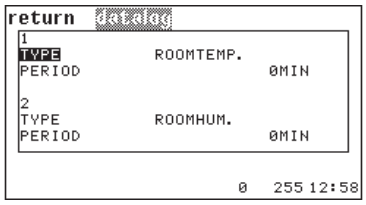
Times are entered in hours.

The numbered callouts refer to the corresponding passages in the descriptive text.

Display

Data

S3 Service



TYPE parameters :
1 - Unit room temperature
2 - Unit room humidity
3 - Unit supply temperature
4 - Unit supply humidity
5 - Water temperature 1
6 - Outside temperature
7 - Outside humidity
8 - Condensation pressure 1
9 - Condensation temp. 1
10 - Evaporation pressure 1
11 - Evaporation temp. 1
12 - Zone room temperature
13 - Zone room humidity
14 - Zone supply temperature
15 - Zone supply humidity

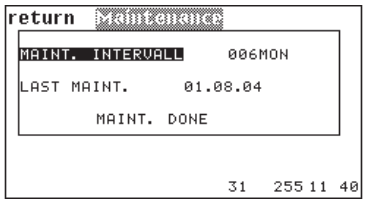
Data logger

Here you can adjust the basic conditions for the data logger.
You can adjust sensor type ❶ and cycle ❷, the interval in which measured values of the corresponding sensor are stored.
Each data logger can store a maximum of 1440 datapoints. The 1441 datapoint deletes the first datapoint, the 1442 datapoint deletes the second 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.

At the modification of a parameter (type or cycle) all data of the corresponding data logger is deleted.

S4



Maintenance

This functionality helps you to maintain the cooling unit by monitoring the service intervals.
If the service interval has expired the message "service required" in combination with the symbol is displayed in the standard window.
Enter the desired service interval on the first line. Possible values are 0-12 months, with 0 months you avoid the monitoring ❷.
If you are on the field "MAINT. DONE" and you press the OK key, you confirm the executed maintenance ❶. The controller then sets the actual date in the middle line and saves it.

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 measured values listed at the top-left.

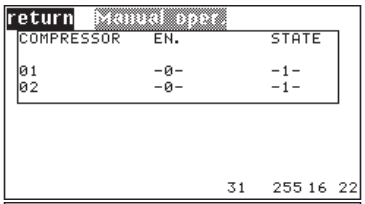
❸ `service 1` ← By "1" you confirm the executed maintenance.
❹ `service int 4`

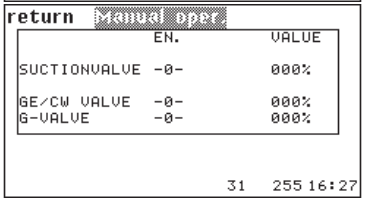
The numbered callouts refer to the corresponding passages in the descriptive text.

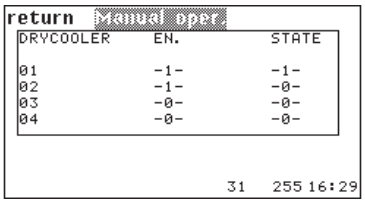
Display

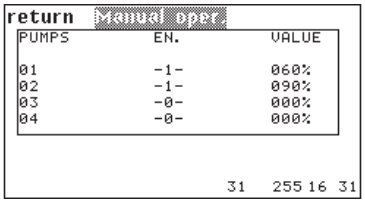
Manual Operation

U2-U5 Service

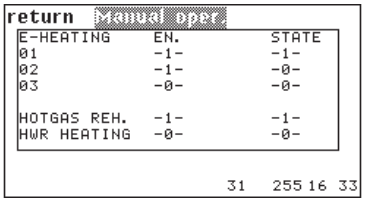


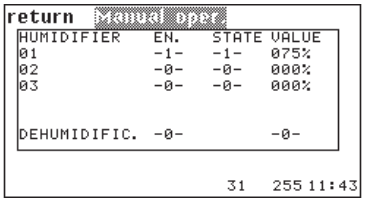


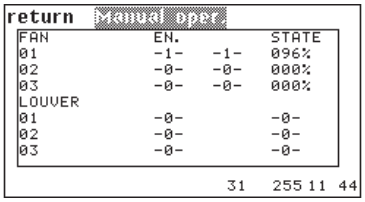




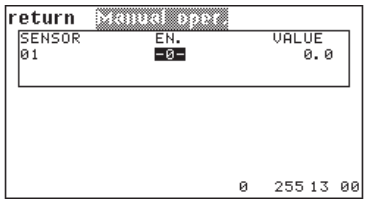
T3-T5

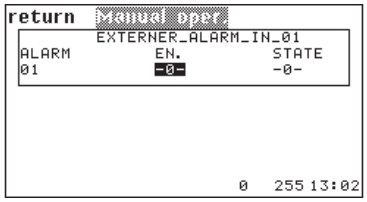






U6-U7





The manual operation menu consists of two columns of parameters which are needed 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 can be changed.

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 main menu of the service level is reached again), the manual operation of each component is disabled and the controller takes over the control again.

The corresponding commands:

❶ `comp 1 hand 1`
❷ `comp 1 handon (0)` ← Instead of 0/1 for "off/on" you can enter a percentage from 0 to 100 if the component is proportionally controlled.

`sensor 1 handon 25`
`sensor 1 hand 1`

When the fan is switched off, any other component is electrically blocked and can not be started.

The numbered callouts refer to the corresponding passages in the descriptive text.

6.4 Default configurations

Unit parameters	Range	Value
System name	20 characters	System name
Unit name	20 characters	Unit name
Unit ID	0 - 31	13
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	1
PT language		1
Temperature unit	0: °C 1: °F	0
Temperature setpoint	5 - 35	24°C
Temperature setpoint, night	5 - 35	27°C
Humidity setpoint	5 - 90	45% r. h.
Winter start delay	0 - 300	180 s
Summer/winter change-over	5 - 35	16°C
Summer/winter hysteresis	1 - 9,9	2 K
Cooling priority	0: GE 1: CW 2: DX	0
Overload	0 - 9.9	0,0 K
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
Input D CW stop	0 - 43	0
Type of control	1 - 4	1
Limiting control - start temperature	0 - 40	16°C
Limiting control - temp. gradient	0 - 20	0.5 K
Limiting control - humidity start	0 - 90	70% r.h.
Limiting control - humidity gradient	0 - 20	0,5%
Unit runtime	0 - 4294967295*	0 h
Stop time	0 - 4294967295	0 h
Cooling runtime	0 - 4294967295	0 h
Heating runtime	0 - 4294967295	0 h
Humidification runtime	0 - 4294967295	0 h
Dehumidification runtime	0 - 4294967295	0 h
Last service - day	1 - 31	1
Last service - month	1 - 12	8
Last service - year	0 - 255	4
Service interval	0 - 20	6
UPS - input D	0 - 43	0
UPS - cooling admitted	0 - 1	1
UPS - heating admitted	0 - 1	1
UPS - humidification admitted	0 - 1	1
UPS - dehumidification admitted	0 - 1	1

* 2^{32} - 1 = 4294967295

Zone parameters	Range	Value
Zone	1 - 32	0
Sequencing time	0 - 65535	0 h
Test sequencing	0 - 1	0
Valid alarms	1 - 26	all valid
Number of defective units	0 - 32	0
Emergency temperature	0 - 40	16°C
Zone fan speed nMax	60 - 100	85%
CW standby management	0 - 1	0

The parameter "zone" is not a zone parameter but can be adjusted separately for each unit.
Due to its context it is displayed in this table.

General alarms

Alarms	Range	Fire	Water	Phase
Alarm input D	0 - 43	0	0	0
Alarm priority	0 - 31	0	0	0
Common alarm	0 - 1	1	1	1
Alarm delay	0 - 100	5 s	5 s	5 s

Limit alarms

	Room temperature		Supply temperature		Water temperature	
	min	max	min	max	min	max
Value	5°C (0-20)	35°C (15-40)	5°C (0-20)	35°C (15-40)	-20°C (-20-30)	45°C (10-50)
Alarm delay	30 s (0-300)	30 s (0-300)	30 s (0-300)	30 s (0-300)	30 s (0-300)	30 s (0-300)
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 humidity	
	min	max	min	max
Value	5%h.r (0-50)	90%h.r (50-100)	5%h.r (0-50)	90%h.r (50-100)
Alarm delay	30 s (0-300)	30 s (0-300)	30 s (0-300)	30 s (0-300)
Alarm priority	0 (0-31)	0 (0-31)	0 (0-31)	0 (0-31)
Common alarm	1	1	1	1

The values in brackets display the range.

Week program

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

Data 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 - 15)	1 (1 - 15)

Components

Compressor

	Range	Compressor 1	Compressor 2
Summer start	0 - 9.9	0.4 K	0.6 K
Summer hysteresis	0 - 9.0	0.7 K	0.7 K
Winter start	0 - 9.9	0.7 K	0.9 K
Winter hysteresis	0 - 9.0	0.7 K	0.7 K
Component configured	0 - 1	0	0
Output D	0 - 31	2	7
Alarm input D	0 - 43	2	8
Alarm priority	0 - 31	0	0
Common alarm	0 - 1	1	1
Alarm delay	0 - 100	5 s	5 s
Alarm input LP	0 - 43	3	9
Alarm priority LP	0 - 31	2	2
Common alarm LP	0 - 1	1	1
Alarm delay LP	0 - 100	5 s	5 s
LP management time	0 - 100	0 h	0 h
LP management press.	0 - 10	5 bar	5 bar
LP management restart	0 - 10	0	0
HP management time	0 - 100	0 h	0 h
HP management press.	0 - 35	21 bar	21 bar
HP management restart	0 - 10	0	0
HP management mode	0 - 1	0	0
Pause	10 - 1000	180 s	180 s
Runtime	0 - 4294967295	0 h	0 h

Valves

	Suction valve 1	Suction valve 2
Start	0 K (0 - 9.9)	0.4 K (0 - 9.9)
Gradient	0.5 K (0.5 - 9.9)	0.5 K (0,5 - 9.9)
Component configured	0	0
Output A	5 (0 - 20)	6 (0 - 20)

	GE/CW-Valve
Start	0.1 K (0 - 9.9)
Gradient	0.6 K (0,5 - 9.9)
Component configured	0
Output A 1	2 (0 - 20)
Output A 2	4 (0 - 20)
Input D	0 (0 - 43)
GE-off	23°C (0 - 50)
Setpoint	95% (50 - 100)

	G-Valve
Pressure setpoint	18 bar (5 - 25)
Component configured	0
Control cycle	5 s (1 - 10)
Max. alternation	2% (1 - 10)
Control factor	4 (1 - 10)
Output A	4 (0 - 20)
Pre-open time	30 s (0 - 255)
Pre-opening	100 (0 - 100)

Drycooler

	Range	Drycooler 1	Drycooler 2	Drycooler 3	Drycooler 4
Winter start	5 - 35	10°C	11°C	12°C	13°C
Summer start	10 - 50	34°C	35°C	36°C	37°C
Stop hysteresis	1 - 9,9	2 K	2 K	2 K	2 K
Component configured	0 -1	0	0	0	0
Output D	0 - 31	9	10	17	18
Alarm input D	0 - 43	15	15	15	15
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
Pre-open time	0 - 20	10 s	0 s	0 s	0 s
Preliminary speed	50 - 100	100%	0%	0%	0%
Control cycle	1 - 10	1 s	0 s	0 s	0 s
Max. alternation	1 - 10	2%	0%	0%	0%
Control factor	1 - 10	4	0	0	0
Runtime	0-4294967295	0 h	0 h	0 h	0 h

Pumps

	Range	Pump 1	Pump 2	Pump 3	Pump 4
Type	1 - 3	2	1	3	3
Start	0 - 9.9	0.1 K	0.1 K	0.1 K	0.1 K
Stop hysteresis	0 - 9.9	0.3 K	0.3 K	0.3 K	0.3 K
Gradient	0.5 - 20	0.6 K	0.6 K	0.6 K	0.6 K
Pressure setpoint	0 - 30	18 bar	18 bar	18 bar	18 bar
Component configured	0 - 1	0	0	0	0
Partner unit	0 - 31	0	0	0	0
Partner pump	0 - 4	0	0	0	0
Speed setpoint	50 - 100	95%	95%	95%	95%
Output D	0 - 31	8	11	14	15
Output A	0 - 20	2	4	0	0
Alarm input D	0 - 43	13	14	22	23
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
Pre-open time	0 - 20	10 s	10 s	10 s	10 s
Preliminary speed	0 - 100	100%	100%	100%	100%
Control cycle	1 - 10	5 s	5 s	5 s	5 s
Max. alternation	1 - 10	2%	2%	2%	2%
Control factor	1 - 10	4	4	4	4
Runtime	0 - 4294967295	0 h	0	0	0

Reheats

	Range	electr. reheat 1	electr. reheat 2	electr. reheat. 3	electr. reheat 4
Type	1 - 2	1	1	1	1
Start	0 - 9.9	1.5 K	2 K	2.5 K	3 K
Stop hysteresis	0 - 9.9	0.5 K	0.5 K	0.5 K	0.5 K
Gradient	0.5 - 9.9	0.5 K	0.5 K	0.5 K	0.5 K
Component configured	0 - 1	0	0	0	0
Output D	0 - 31	3	4	12	15
Alarm input D	0 - 43	4	4	4	23
Alarm priority	0 - 31	0	0	0	0
Common alarm	0 - 1	1	1	1	1
Alarm delay	0 - 100	4 s	4 s	4 s	4 s
Runtime	0 - 4294967295	0 h	0 h	0 h	0 h

	Range	Hot water reh.
Type	1 - 2	1
Start	0 - 9.9	1.5 K
Stop hysteresis	0 - 9.9	0.5 K
Gradient	0.5 - 9.9	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

Humidifiers

	Range	Humidifier 1	Humidifier 2	Humidifier 3
Type	1 - 2	2	2	2
Start	0 - 20	0 %r.h.	0 %r.h.	0 %r.h.
Stop hysteresis	0 - 20	5 %r.h.	5 %r.h.	5 %r.h.
Gradient	0.5 - 20	10	10	10
Component configured	0 - 1	0	0	0
Conductivity meter configured	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 - 100	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 - 1000	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 - 1000	300 s	300 s	300 s
Runtime	0 - 4294967295	0 h	0 h	0 h

Dehumidifier

	Range	Dehumidifier
Start	0 - 100	10 %r.h.
Stop hysteresis	0 - 30	5 %r.h.
Dehumidification stop	0 - 10	5 K
Dehumidif. valve conf.	0 - 1	0
Bypass valve conf.	0 - 1	0
Output D	0 - 31	5
min water temp.	0 - 50	5°C
max water temp.	0 - 50	14°C

Fans

	Range	Fan 1	Fan 2	Fan 3
Type	1 - 2	2	2	2
Speed nMax	40 - 100	85%	85%	85%
Speed CW nMax	40 - 100	85%	85%	85%
Offset	-10 - 10	0%	0%	0%
Pre-start	0 - 100	10 s	10 s	10 s
Overrun	0 - 100	60 s	60 s	60 s
Start temperature	0 - 9.9	0 K	0 K	0 K
Start speed	0 - 10	0 %	0 %	0 %
100% start time	0 - 100	5 s	5 s	5 s
Reduction time	30 - 120	30 min	30 min	30 min
Reduction speed	0 - 100	0 %	0 %	0 %
Dehumidific. reduction	0 - 20	0 %	0 %	0 %
UPS reduction	0 - 20	0 %	0 %	0 %
Filter offset	0 - 10	0 %	0 %	0 %
Minimum speed	0 - 100	70 %	70 %	70 %
Output D	0 - 31	1	2	9
Output A	0 - 20	1	0	0
Alarm input D	0 - 43	1	2	15
Alarm priority	0 - 31	0	0	0
Common alarm	0 - 1	1	1	1
Alarm delay	0 - 100	10 s	10 s	10 s
Filter alarm input D	0 - 43	5	5	3
Filter alarm priority	0 - 31	0	0	0
Filter common alarm	0 - 1	1	1	1
Filter alarm delay	0 - 100	20 s	20 s	20 s
Emergency start	0 - 9.9	0 K	0 K	0 K
Emergency speed	0 - 100	0 %	0 %	0 %
Control cycle	0 - 10	5 s	0 s	0 s
Max. alternation	0 - 10	2 %	0 %	0 %
Control factor	0 - 10	4	0	0
Component configured	0 - 1	1	0	0
Runtime	0 - 4294967295	0 h	0 h	0 h

Louver

	Range	Louver 1	Louver 2	Louver 3
Pre-start	0 - 180	90 s	90 s	90 s
Output D	0 - 31	7	10	18
Component configured	0 - 1	0	0	0

Sensors

	Range	Sensor 1	Sensor 2	Sensor 3	Sensor 4
Purpose	1 - 16	1	2	3	4
Input A	1 - 21	1	2	3	4
Type	1 - 5	1	1	1	1
Component configured	0 - 1	1	1	1	1
Min. measure value	-50 - 100	0°C (-50 - 100)	0%r.h (0 - 100)	0°C (-50 - 100)	0%r.h (0 - 100)
Max. measure value	-50 - 100	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	-10.0 - 10.0	0°C	0% r.h.	0°C	0% r.h.

	Range	Sensor 5	Sensor 6	Sensor 7	Sensor 8
Purpose	1 - 16	5	7	11	12
Input A	1 - 21	5	6	7	8
Type	1 - 5	1	2	1	1
Component configured	0 - 1	1	1	1	1
Min. measure value	-50 - 100	-50°C (-50 - 100)	-20°C (-50 - 100)	0 bar (0 - 35)	0 bar (0 - 35)
Max. measure value	-50 - 100	50°C (-50 - 100)	40°C (-50 - 100)	30 bar (0 - 35)	30 bar (0 - 35)
Min. output value	0 - 20	0 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	-10.0 - 10.0	0°C	0°C	0 bar	0 bar

Sensors (continued)

	Range	Sensor 9 - 21
Purpose	1 - 16	0
Input A	1 - 21	0
Type	1 - 5	0
Component configured	0 - 1	0
Min. measure value	-50 - 100	0
Max. measure value	-50 - 100	0
Min. output value	0 - 20	0
Max. output value	0 - 20	0
Max. difference	0 - 100	10%
Limit - alarm priority	0 - 31	0
Limit - common alarm	0 - 1	1
Limit - alarm delay	0 - 100	5 s
Failure - alarm priority	0 - 31	0
Failure -common alarm	0 - 1	1
Failure - alarm delay	0 - 100	5 s
Offset	-10.0 - 10.0	0

External alarms

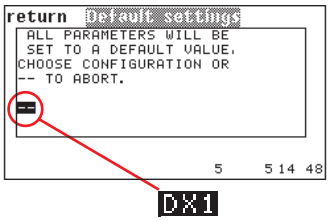
	Range	External alarm 1	External alarm 2	...	External alarm 10
Component configured	0 - 1	0	0	...	0
Input D	0 - 43	0	0	...	0
Alarm priority	0 - 31	0	0	...	0
Common alarm	0 - 1	0	0	...	0
Alarm delay	0 - 100	5 s	5 s	...	5 s
Alarm text	20 characters	Externer_Alarm_in_01	Externer_Alarm_in_02	...	Externer_Alarm_in_10

Actual value output

	Range	Actual value output 1	...	Actual value output 4
Purpose	1 - 16	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

6.4.1 Preconfigurations

U1



10 default configurations for different unit cooling systems are stored in the I/O controller.

Unit type	DX	GE1	GE2	AGCW	CW
1 circuit	dx1	ge11	ge21	agcw1	cw
2 circuits	dx2	ge12	ge22	agcw2	cw2

Command:

```
loaddefault dx1
```

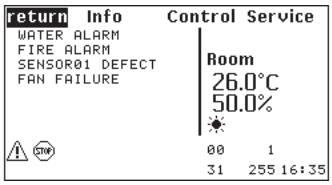
The table contains the parameters for the IOC-command.

The following table displays the differences in relation to the default settings when a pre-configuration is selected.

	DX1	DX2	CW	CW2	AG/CW1	AG/CW2	GE1-1	GE1-2	GE2-1	GE2-2
Compressor 1 configured	1	1			1	1	1	1	1	1
Compressor 2 configured		1				1		1		1
Sensor 5 configured					1	1	1	1	1	1
Sensor 6 configured							1	1	1	1
Sensor 7 configured							1	1	1	1
Sensor 8 configured								1		1
Pump 1 configured									1	1
Pump 2 configured									1	1
Deshum. configured	1	1			1	1	1	1	1	1
GE/CW valve configured			1	1	1	1	1	1		
G valve configured							1	1		
Dehumidification reduction			20%	20%	20%	20%	20%	20%	20%	20%
Input D GE/CW valve				3						
Cooling priority					1	1				

7. Alarm treatment

7.1 Alarm display



The alarm messages are displayed in the standard window of each unit with IOC. At the same time the symbol ⚠ in the bottom-left corner of the window indicates that an alarm has occurred.
An alarm tone proves the presence of an alarm independantly of the actual menu window of the InRoom Controller.
Attention: The alarm tone can be disabled. (See page 22).

Commands

The alarm display in the command level is passive. This means that you have to type in the command "state" to see the occurred alarms.

```
„state“

Unit:Running

- Runtime:32167 min
- Stoptime:2167 min

Cooling:active (15356 min)
- Compressor 1:1
- CW/GE-valve:66 %

Heating:not active (3472 min)

Humidification:active (9265 min)
- Humidificator 1:31 %

Dehumidification:not active (28 min)


Alarms:
- Common alarm
- Drycooler 1
- Sensor break 11
```

7.2 Alarm messages

Cause	Alarm message	Effect
LP switch/LP threshold passed under	LOW PRESSURE 1	Compressor 1 off, compressor 2 on, if present
HP switch/HP threshold exceeded Internal compressor power switch	COMP 1 FAILURE/HP	Compressor 1 off, compressor 2 on, if present
LP switch/LP threshold passed under	LOW PRESSURE 2	Compressor 2 off, compressor 1 on
HP switch/HP threshold exceeded Internal compressor power switch	COMP 2 FAILURE/HP	Compressor 2 off, compressor 1 on
Temperature switch/heating MCB	E-HEAT # FAILURE	Heating # off
Humidifier MCB	HUMIDIFIER # FAIL	Humidifier # off
Airflow differential switch	AIRFLOW FAILURE #	all components off
Filter differential switch	FILTER ALARM	no direct effect*
External alarm signal	EXTERNAL ALARM #	no direct effect*
Conductivity >5µS	HUMIDIFIER # 5µS	no direct effect*
Conductivity >20µS	HUMIDIFIER # 20µS	Ultrasonic humidifier off
Glycol pump MCB	GLYCOL PUMP # FAILURE	Compressors & pump off
G-Pump MCB	G-PUMP FAILURE	Compressors & pump off
GE-Pump MCB	GE-PUMP FAILURE	Compressors & pump off
Drycooler # MCB	DRYCOOLER # FAIL	Compressor, pump & drycooler # off
Water detector	WATER ALARM	Humidifier, dehumidification off
Return air temp. > limit value	RETURN AIR TEMP TOO HIGH	no immediate effect
Return air humidity > limit value	RETURN AIR HUM TOO HIGH	no immediate effect
Supply air temp. > limit value	SUPPLY AIR TEMP TOO HIGH	no immediate effect
Supply air humidity > limit value	SUPPLY AIR HUM TOO HIGH	no immediate effect
Water temp. > limit value	WATER TEMP TOO HIGH	no immediate effect
Return air temp. < limit value	RETURN AIR TEMP TOO LOW	no immediate effect
Return air humidity < limit value	RETURN AIR HUM TOO LOW	no immediate effect
Supply air temp. < limit value	SUPPLY AIR TEMP TOO LOW	no immediate effect
Supply air humidity < limit value	SUPPLY AIR HUM TOO LOW	no immediate effect
Water temp. < limit value	WATER TEMP TOO LOW	no immediate effect
Fire/smoke detector	FIRE ALARM	all components off
Tolerance exceeded	SENSOR # EXCESS	faulty sensor # excluded
Measured voltage/current out of defined range	SENSOR # DEFECT	faulty sensor # excluded

stands for a number.
* The corresponding alarm can be cofigured to release a common alarm which can control further equipment by a digital output.
** The alarm text can be configured.

7.3 Component-related alarms

The table shows the main components with their standard alarm input and the possible alarms.

DX/DX2-unit:

Component	Alarm input	on board	Alarm
Compressor 1	DIN 2	IOC	COMP 1 FAILURE/HP
	DIN 3	IOC	LOW PRESSURE 1
Compressor 2	DIN 8	IOC	COMP 2 FAILURE/HP
	DIN 9	IOC	LOW PRESSURE 2
Fan	DIN 1	IOC	AIRFLOW FAILURE 1
	DIN 5	IOC	FILTER 1 ALARM
E-heating	DIN 4	IOC	E-HEAT # FAILURE
Steam-Humidifier	DIN 6	IOC	HUMIDIFIER 1 FAIL
GE-pump	DIN 13	EDIO 1	GE-PUMP 1 FAILURE
G-pump	DIN 14	EDIO 1	G-PUMP FAILURE
Drycooler	DIN 15	EDIO 1	DRYCOOLER 1 FAIL

CW/CW2-unit:

Component	Alarm input	on board	Alarm
Fan	DIN 1	IOC	AIRFLOW FAILURE 1
	DIN 5	IOC	FILTER 1 ALARM
E-heating	DIN 4	IOC	E-HEAT 1 FAILURE
Steam-Humidifier	DIN 6	IOC	HUMIDIFIER 1 FAIL
Pump 1	DIN 2	IOC	PUMP 1 FAILURE
Pump 2	DIN 14	EDIO 1	PUMP 2 FAILURE
ext. Chiller	DIN 3	IOC	CHILLER FAILURE

7.4 Alarm Reset

The alarms are reset 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.

Command

The alarms for one unit are reset with the command "`alarmreset`".

7.5 Alarm texts in case of hardware errors

These alarms are edited using numeral codes of the terminal program:

Numeral code	Signification
000	Erase sector 6 flash 2 error
001	Write in sector 6 flash 2 error
002	Erase sector 7 flash 2 error
003	Write in sector 7 flash 2 error
004	Read of digital input error
005	Write of digital output error
006	Read of analogous input error
007	Write of analogous output error
008	Digital extension card error
009	Cannot select extension port
010	Analogous extension card error
011	Analogous extension card: cannot read input
012	Analogous extension card: cannot set output

8. Configuration notes

First steps after installing new software

1. Load software on IOC, respectively on InRoom Controller. (See 8.1 Loading a new software).
2. Check bus configuration (Configuration is kept after loading the software).
3. Load a default configuration according to the unit type (See 6.4.1 pre-configurations).
4. Check the equipment using the command "equip".
5. Configure additional components.
   On the InRoom Controller you can do this in the Service-level in the submenus of the menu "Equipment". Part of the configuration is the activation of the component, the allocation of an output for the component control, and eventually the assignment of an alarm input.

Possible maximum equipment according to unit type

Component	A	G	GE1	GE2	ACW	GCW	CW	CW2	max.
Louver	1	1	1	1	1	1	1	1	3
Fan	1	1	1	1	1	1	1	1	3
Compressor	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2			2
Suction valve	1	1	1	1	1	1			2
Hotgas-Bypass	1	1	1	1	1	1			1
Dehumidification valve	1	1	1	1	1	1			1
G-valve		1	1			1			1
GE/CW-valve			1		1	1	1	1 (2)*	1
G-pump				1					1
GE-pump				1					1
Glycol pump		1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	2
Drycooler		1 - 4	1 - 4	1 - 4		1 - 4			4
E-Heating	1 - 4	1 - 4	1 - 4	1 - 4	1 - 4	1 - 4	1 - 4	1 - 4	4
Hotgas reheat	1	1	1	1	1	1			1
PWW-reheat	1	1	1	1	1	1	1	1	1
Humidifier	1 - 3	1 - 3	1 - 3	1 - 3	1 - 3	1 - 3	1 - 3	1 - 3	3
Conductivity meter	1	1	1	1	1	1	1	1	1

* Only one GE/CW-valve can be configured, but 2 analogous outputs are available.
The same parameters are valid for both valves.

The following components can only be configured in a single quantity.

Hotgas-Bypass	`dehumi confbypass 1`
Dehumidif. valve	`dehumi confvalve 1`
G-valve	`gvalve conf 1`
GE/CW-valve	`gecwv conf 1`
Hotgas reheat	`gasheat conf 1`
PWW-reheat	`pwwheat conf 1`
Conductivity meter	`humi 1 confcon 1`

Further components

Component	max.
Sensor	21
external alarm	10

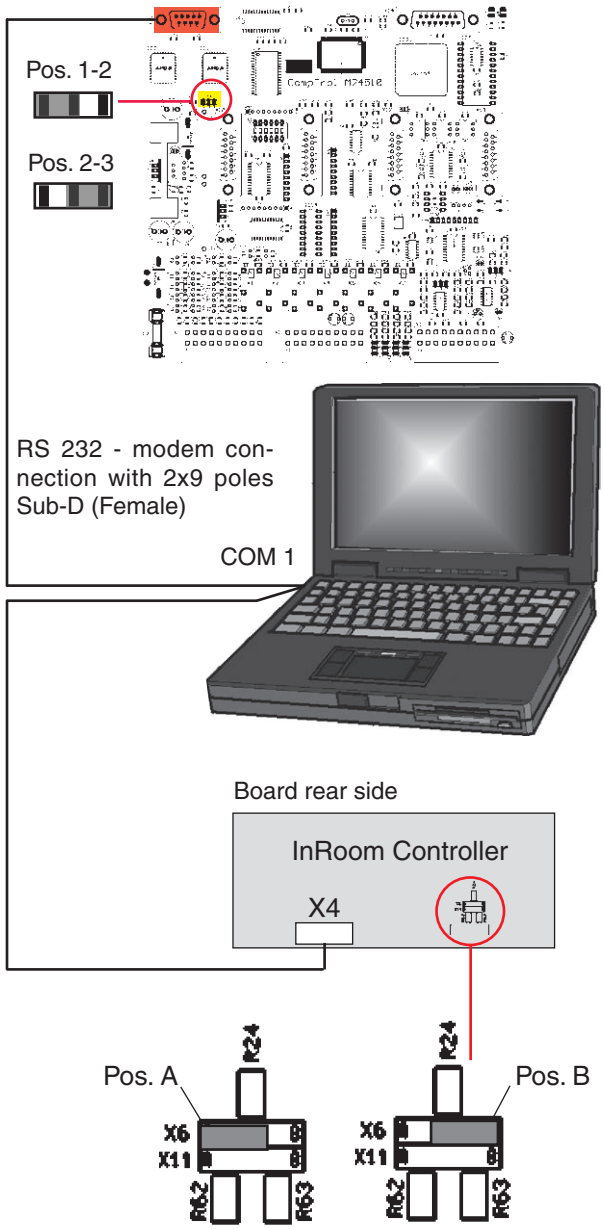
8.1 Loading new Software

For the control system there are two types of software. The essential control software is located in the Flash-EPROM on the IOC-board. The second software contains the menu structure and is located in the EPROM of the InRoom Controller board.
The control parameters in the IOC 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 InRoom Controller.

To load software in the flash-EPROM of the IOC you must connect the service port of the IOC to a serial interface of your computer (System requirements: Windows 95/98/NT/2000/ME/XP) by means of a RS232 modem connection.
Turn off the master switch. Set the jumper JP7 to position 2-3. Turn on the master switch. The IOC is now in the Download-mode. Start the program "InRoom-Service.exe" on your PC. This program can be downloaded from the APC website.
After the new software has been loaded, the master switch must be turned off and the jumper JP7 must be set in the position 1-2.

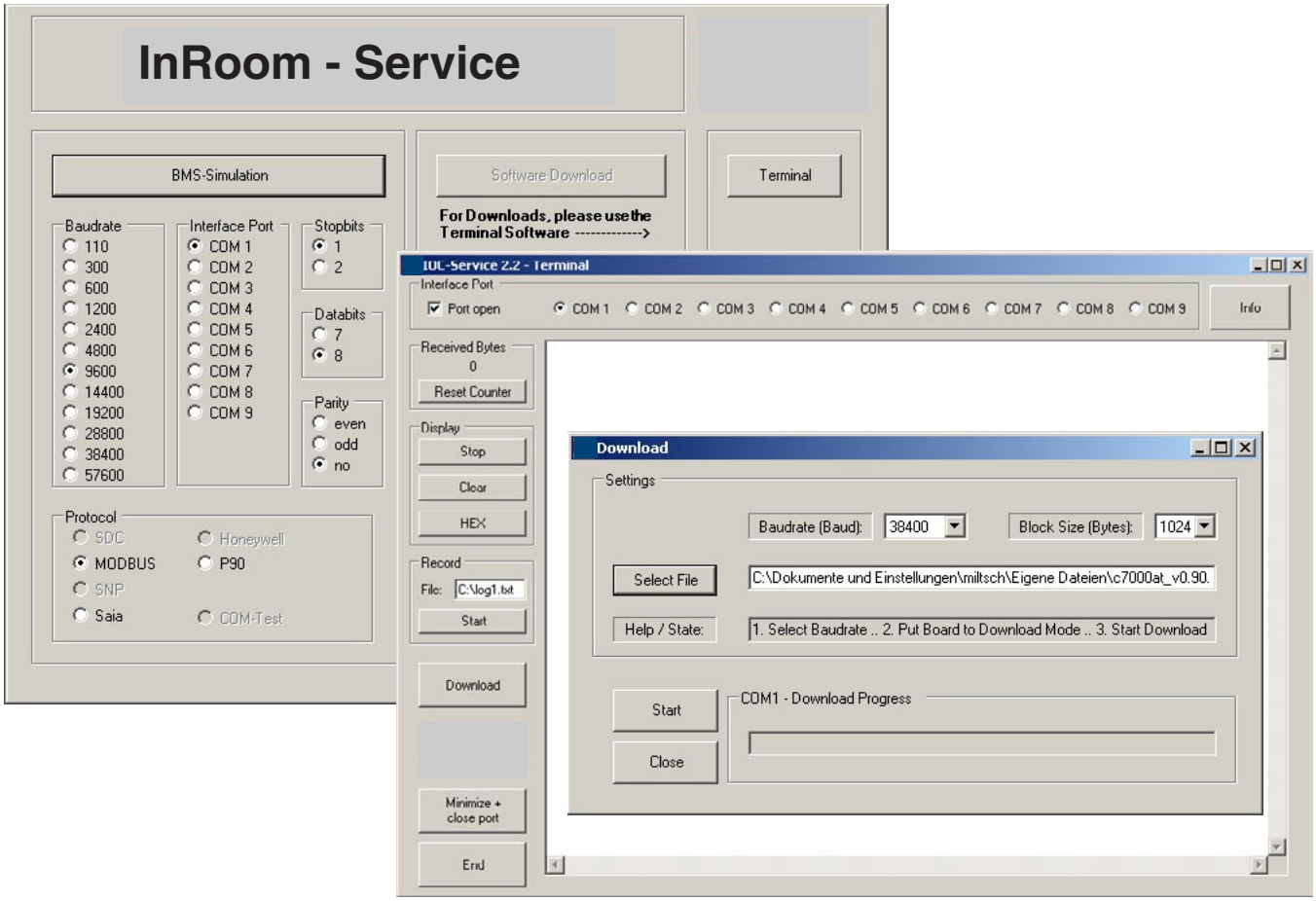
To load software in the flash-EPROM of the InRoom Controller you must connect the service port of the InRoom Controller to a serial interface of your computer by means of a RS232 modem connection.
Turn off the master switch. After this the jumper X6 must be set to position A. Turn on the master switch. The InRoom Controller is now in the Download-mode. Start the program "InRoom-Service.exe" on your PC.
After the new software has been loaded, turn off the master switch and set the jumper X6 to position B. When turning on, ensure that the new version number is correctly displayed.

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 "Control\Preferences\Languages" menu.



8.1.1 Operation of the program "InRoom-Service.exe"

With an up-to-date Windows XP system the program must only be copied onto the computer hard disk and can directly be started by a doubleclick. The files (InRoom-Service.exe and IOC-Service.exe) must be stored in the same folder. With former Windows XP versions, Windows 2000, Windows ME, and Windows 98 the install-package that can be obtained from the APC website must be carried out.



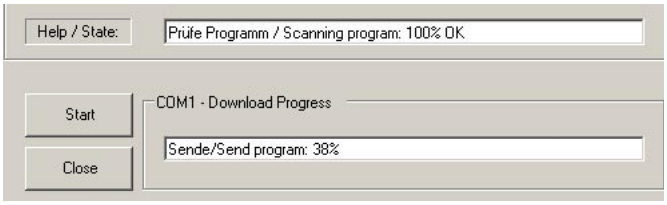
Start InRoom-Service.exe und click on the button "Terminal", which starts the program IOC-Service.exe.

Select an interface to the PC (COM 1 - 9) and check the connection to the IOC or InRoom Controller by pressing the Return key. If you receive a response from the controller the connection is established.

Clicking on the "Download" button opens a window, in which you can enter the file that will be loaded. This is done by clicking on the button "Select file," which opens a dialog box for the selection of a file. The file is a hexadecimal file with the extension *.h86.

The file name gives information about the software destination. AT-Vxxx.H86 is for the InRoom Controller. IOC-Vxxx.h86 is for the IO-controller. The number behind the V indicates the version.

Concerning the block size and the transmission rate, you can take the preadjusted values (1024 Bytes and 38400 kBit/s). The transmission will then take approximately 2 minutes for each software. The rate may need to be reduced if using a longer cable.



You can start the download by clicking the Start button. The single steps are indicated in the "Help/State" line, the progress of each step in the "Download Progress" line.

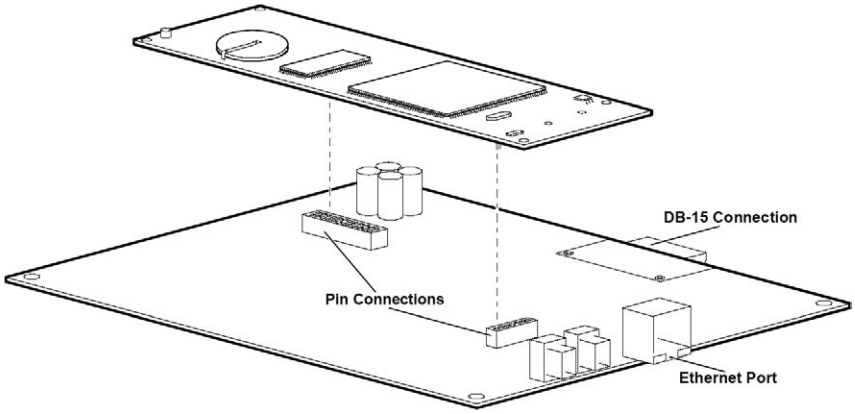
Clicking on "Close" closes the download window. Pressing the "End" button quits the program IOC-Service.

9. Network Management Card

9.1 Quick Configuration

The InRoom Precision Air Conditioner is shipped with a Network Management Card that enables you to manage the air conditioner over your network. You must set up the Network Management Card to control the InRoom Precision Air Conditioner through a network.

The Network Management Card comes pre-assembled to an interface board using two sets of pin connections. The interface board then connects to the controller board of the InRoom Precision Air Conditioner using a DB-15 connection, and a network connection is made by inserting an RJ-45 cable in to the ethernet port on the interface board. The Network Management Card can be configured via a serial cable connected to the service port of the controller board by using the nmcservice command.



Overview

You must configure the following TCP/IP settings before the InRoom Precision Air Conditioner can operate on a network:

- IP address of the Network Management Card
- Subnet mask
- Default gateway

Note: Never use the loopback address (127.0.0.1) as the default gateway address for the Network Management Card. Doing so will disable the card and will require you to reset TCP/IP settings to their defaults using a local serial login.

If a default gateway is unavailable, use the IP address of a computer that is located on the same subnet as the Network Management Card and that is usually running. The Network Management Card uses the default gateway to test the network when traffic is very light.

See “Watchdog Features” online at **www.apc.com** for more information about the watchdog role of the default gateway.

TCP/IP configuration methods

Use one of the following methods to define the TCP/IP settings needed by the Network Management Card:

- APC Device IP Configuration Wizard (See “APC Device IP Configuration Wizard” on page 98.)
- BOOTP or DHCP server (See “BOOTP and DHCP configuration” on page 98.)
- Networked computer (See “Remote access to the control console” on page 100.)

APC Device IP Configuration Wizard

You can use the APC Device IP Configuration Wizard at a computer running Microsoft Windows 2000, Windows 2003, or Windows XP to configure a Network Management Card.

1. Insert the Utility CD into a computer on your network and click the „Device IP Configuration Wizard“ link.
2. Launch the Device IP Configuration Wizard, when prompted, or, if prompted to restart the computer, access the Wizard from the **Start** menu after the computer has restarted.
3. Wait for the Wizard to detect the unconfigured Network Management Card, then follow the on-screen instructions.

Note: If you leave the **Start a Web browser when finished** option enabled, you can use **apc** for both the user name and password to access the Network Management Card through your browser.

BOOTP and DHCP configuration

TCP/IP Configuration, which you access by selecting the **Administration** tab, the **Network** option on the top menu bar, and **TCP/IP** on the left navigation menu, identifies how the TCP/IP settings will be defined. The possible settings are **Manual, DHCP, BOOTP**, and **DHCP & BOOTP** (the default setting).

Note: The **DHCP & BOOTP** setting assumes that a properly configured DHCP or BOOTP server is available to provide TCP/IP settings to Network Management Cards.

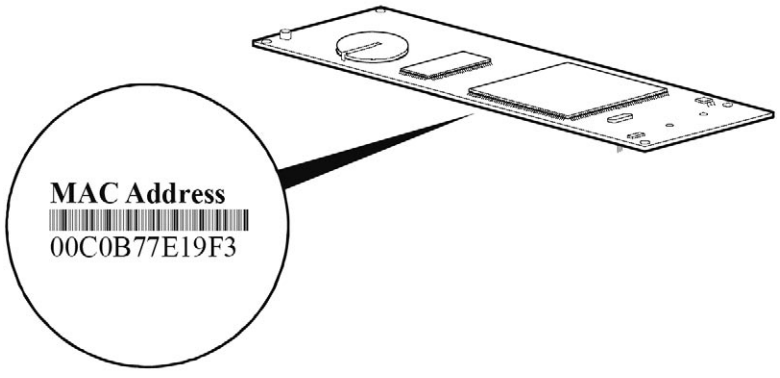
With **Boot Mode** set to DHCP & BOOTP (the default setting), the Network Management Card attempts to discover a properly configured server. It first searches for a BOOTP server, then a DHCP server, and repeats this pattern until it discovers a BOOTP or DHCP server.

See “BOOTP” on this page or “DHCP” on page 99 for configuration information.

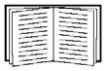
BOOTP. You can use an RFC951-compliant BOOTP server to configure the TCP/IP settings for the Network Management Card.

1. Enter the Network Management Card MAC and IP addresses, the subnet mask and default gateway settings, and an optional bootup file name in the BOOTPTAB file of the BOOTP server.

Note: The MAC address is located on a label on the underside of the Network Management Card. The MAC address can also be accessed by using a Web browser to log in to the Network Management Card and then selecting the **Administration** tab, the **Network** option on the top menu bar, and **TCP/IP** on the left navigation menu.



2. When the Network Management Card reboots, the BOOTP server provides it with the TCP/IP settings.
   – If you specified a bootup file name, the Network Management Card attempts to transfer that file from the BOOTP server using TFTP or FTP. The Network Management Card assumes all settings specified in the bootup file.
   – If you did not specify a bootup file name, the Network Management Card can be configured remotely by using the control console or the Web interface (user name and password are both apc, by default).



To create the bootup file, see your BOOTP server documentation.

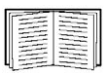
DHCP. You can use an RFC2131/RFC2132-compliant DHCP server to configure the TCP/IP settings for the Network Management Card.

This section briefly summarizes the Network Management Card communication with a DHCP server. For more detail about how a DHCP server is used to configure the network settings for a Network Management Card, see “DHCP Configuration” in the InRoom Precision Air Conditioner *User’s Guide*.

1. A Network Management Card sends out a DHCP request that uses the following to identify itself:
   – A Vendor Class Identifier (APC by default)
   – A Client Identifier (by default, the MAC address value of the Network Management Card)
   – A User Class Identifier (by default, the identification of the application firmware of the Network Management Card)
2. A properly configured DHCP server responds with a DHCP offer that includes all of the settings that the Network Management Card needs for network communication. The DHCP offer also includes the Vendor Specific Information option (DHCP option 43). By default, the Network Management Card will ignore DHCP offers that do not encapsulate the APC cookie in the Vendor Specific Information option using the following hexadecimal format:

   ```
   Option 43 = 01 04 31 41 50 43
   ```

   where
   – the first byte (`01`) is the code
   – the second byte (`04`) is the length
   – the remaining bytes (`31 41 50 43`) are the APC cookie



See your DHCP server documentation to add code to the Vendor Specific Information option.

To change the control console **DHCP Cookie Is** setting, use the **Advanced** option in the TCP/IP menu. See “Remote access to the control console” on page 100.

To change the Web interface setting **Require vendor specific cookie to accept DHCP Address**, which is enabled by default, first choose **DHCP** under the **TCP/IP Configuration** heading by selecting the **Administration** tab, the **Network** option on the top menu bar, and **TCP/IP** on the left navigation menu. To disable the APC cookie requirement, click **Next** to access the **DHCP Configuration** page, and unmark the checkbox „Require vendor specific cookie to accept DHCP Address.“

Remote access to the control console

From any computer on the same subnet as the Network Management Card, you can use ARP and Ping to assign an IP address to a Network Management Card, and then use Telnet to access the control console of that Network Management Card and configure the needed TCP/IP settings.

Note: After a Network Management Card has its IP address configured, you can use Telnet, without first using ARP and Ping, to access that Network Management Card.

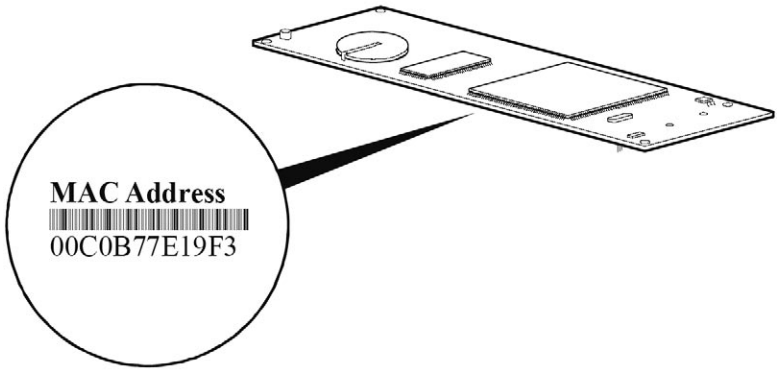
1. Use ARP to define an IP address for the Network Management Card, and use the MAC address of the Network Management Card in the ARP command. For example, to define an IP address of 156.205.14.141 for a Network Management Card that has a MAC address of 00 c0 b7 7E 19 F3, use one of the following commands:
   - Windows command format:

     ```
     arp -s 156.205.14.141 00-c0-b7-7E-19-F3
     ```

   - LINUX command format:

     ```
     arp -s 156.205.14.141 00:c0:b7:7E:19:F3
     ```

     Note: The MAC address is located on a label on the underside of the Network Management Card.The MAC address can also be accessed by using a Web browser to log in to the Network Management Card and then selecting the **Administration** tab, the **Network** option on the top menu bar, and **TCP/IP** on the left navigation menu



2. Use Ping with a size of 113 bytes to assign the IP address defined by the ARP command. For the IP address defined in step 1, use one of the following Ping commands:
   - Windows command format:
     ```
     ping 156.205.14.141 -l 113
     ```
   - LINUX command format:
     ```
     ping 156.205.14.141 -s 113
     ```
3. Use Telnet to access the Network Management Card at its newly assigned IP address. For example:

   ```
   telnet 156.205.14.141
   ```

4. Use **apc** for both user name and password.

See “Control console” on page 101 to finish the configuration.

Control console

After you log on at the control console, as described in “Remote access to the control console” on page 100:

1. Choose **Network** from the **Control Console** menu.
2. Choose **TCP/IP** from the **Network** menu.
3. If you are not using a BOOTP or DHCP server to configure the TCP/IP settings, select the **Boot Mode** menu. Select **Manual boot mode**, and then press ESC to return to the **TCP/IP** menu. (Changes will take effect when you log out.)
4. Set the **System IP, Subnet Mask**, and **Default Gateway** address values.
5. Press CTRL+C to exit to the **Control Console** menu.
6. Log out (option 4 in the **Control Console** menu)

9.2 Access a Configured Unit

Overview

After the InRoom Precision Air Conditioner is running on your network, you can use the interfaces summarized here to access the InRoom Precision Air Conditioner.

See the *User's Guide* for more information on the interfaces.

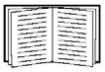
Web interface

As your browser, you can use Microsoft® Internet Explorer 5.5 and higher (on Windows operating systems only), Firefox 1.x by Mozilla (on all operating systems), or Netscape® 7.x and higher (on all operating systems) to access the Management Card through its Web interface. Other commonly available browsers also may work but have not been fully tested by APC. To use the Web browser to configure InRoom Precision Air Conditioner options or to view the event log, you can use either of the following:

- The HTTP protocol (enabled by default) provides authentication by user name and password but no encryption.
- The more secure HTTPS protocol provides extra security through Secure Sockets Layer (SSL) and encrypts user names, passwords, and data being transmitted. It also provides authentication of InRoom Precision Air Conditioners by means of digital certificates.

To access the Web interface and configure the security of your device on the network:

1. Address the Network Management Card by its IP address (or DNS name, if configured).
2. Enter the user name and password (by default, **apc** and **apc** for an Administrator, or **device** and **apc** for a Device Manager).
3. Select and configure the type of security you want. (This option is available only for Administrators.) On the **Administration** tab, select **Network** on the top menu bar and the **access** option under the **Web** heading on the left navigation menu to enable or disable the HTTP or HTTPS protocols.

   See "Security" in the *Security Handbook* available on the Utility CD or on the APC Web site, **www.apc.com**, for information on choosing and setting up your network security.

Telnet/SSH

You can access the control console through Telnet or Secure SHell (SSH), depending on which is enabled. (An Administrator can enable these access methods in the Web interface by selecting the **Administration** tab, then **Network** on the top menu bar, and the **access** option under the **Console** heading on the left navigation menu.) By default, Telnet is enabled. Enabling SSH automatically disables Telnet.

Telnet for basic access. Telnet provides the basic security of authentication by user name and password, but not the high-security benefits of encryption. To use Telnet to access the Network Management Card control console from any computer on the same network:

1. At a command prompt, use the following command line, and press ENTER:

   `telnet` *`address`*

   As address, use the Network Management Card IP address (or DNS name, if configured).

2. Enter the user name and password (by default, **apc** and **apc** for an Administrator, or **device** and **apc** for a Device User).

SSH for high-security access. If you use the high security of SSL for the Web interface, use Secure SHell (SSH) for access to the control console. SSH encrypts user names, passwords, and transmitted data.

The interface, user accounts, and user access rights are the same whether you access the control console through SSH or Telnet, but to use SSH, you must first configure SSH and have a SSH client program installed on your computer.

See the *User's Guide* for more information on configuring and using SSH.

Note: The menu structure for administration and device management in the control console differs from the menu structure for these areas in the Web interface. See the User's Guide for an overview of the control console menus

SNMP

After you add the PowerNet® MIB to a standard SNMP MIB browser, you can use that browser for SNMP access to the InRoom Precision Air Conditioner. The default read community name is **public**; the default read/write community name is **private**.

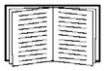
Note: If you enable SSL and SSH for their high-security authentication and encryption, disable SNMP. Allowing SNMP access to the InRoom Precision Air Conditioner compromises the high security you implement by choosing SSL and SSH. To disable SNMP, you must be an Administrator; use the **SNMP** option of the **Network** menu.

FTP/SCP

You can use FTP (enabled by default) or Secure CoPy (SCP) to transfer new firmware to the Network Management Card, or to access a copy of the event logs of the InRoom Precision Air Conditioner.
SCP provides the higher security of encrypted data transmission and is enabled automatically when you enable SSH.

Note:If you enable SSL and SSH for their high-security authentication and encryption, disable FTP. Allowing file transfer to the InRoom Precision Air Conditioner through FTP compromises the high security you implement by choosing SSL and SSH. To disable FTP, you must be an Administrator; use the **FTP Server** option of the **Network** menu.

To access the Network Management Card through FTP or SCP, the default user name and password are **apc** and **apc** for an Administrator, or **device** and **apc** for a Device Manager. In the command line, use the IP address of the unit.



See the *User's Guide* to use FTP or SCP to transfer firmware files to or to retrieve the log file from the InRoom Precision Air Conditioner.

9.3 Recover From a Lost Password

To access the control console, you can use a local computer (a computer that connects to the Network Management Card or other device through the serial port).

1. Select a serial port at the local computer, and disable any service that uses that port.
2. Use the supplied configuration cable to connect the selected port to the serial port (X15) on the controller board.

   Electrical Hazard: Potentially dangerous and lethal voltages exist within the electrical cabinet. Do not touch components on the electrical panel other than the serial port.
3. Run a terminal program (such as HyperTerminal®) and configure the selected port as follows:
   – 9600 bps
   – 8 data bits
   – no parity
   – 1 stop bit
   – no flow control
4. Press ENTER to display the **IOC XX:>** prompt.
5. Type the command **nmcservice** to access the NMC console port.
6. Press ENTER, repeatedly if necessary, to display the **User Name** prompt. If you are unable to display the **User Name** prompt, verify the following:
   – The serial port is not in use by another application.
   – The terminal settings are correct as specified in step 3.
   – The correct cable is being used as specified in step 2.
7. Press the **Reset** button on the daughter board of the Network Management Card. The Status LED will flash alternately orange and green. Press the **Reset** button a second time immediately while the LED is flashing to reset the user name and password to their defaults temporarily.
8. Press ENTER as many times as necessary to re-display the **User Name** prompt, then use the default, **apc**, for the user name and password. (If you take longer than 30 seconds to log on after the **User Name** prompt is re-displayed, you must repeat step 5 and log on again.)
9. From the **Control Console** menu, select **System**, then **User Manager**.
10. Select **Administrator**, and change the **User Name** and **Password** settings, both of which are now defined as **apc**.
11. Press CTRL+C, log off, reconnect any serial cable you disconnected, restart any service you disabled, close all panels, and re-install doors.

    Electrical Hazard: Potentially dangerous and lethal voltages exist within the electrical cabinet. Do not touch components on the electrical panel, other than the serial port.

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