STULZ

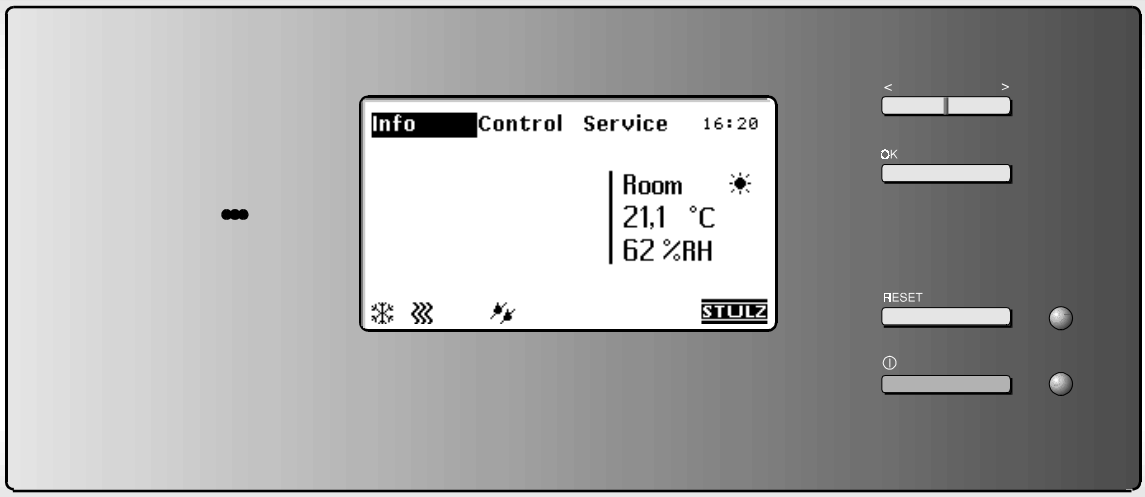
COMPTROL 5000

INDEX 52

Issue 5.99

AIR CONDITIONING

MICROPROCESSOR



OPERATING INSTRUCTIONS

Contents

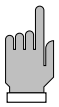
Page

Introduction

This manual describes the operation and design of the controller. The controller forms the central control station of the A/C unit. The complete A/C unit is controlled and monitored by the controller.

Notes on safety

Changing the parameters of individual components of the unit at the controller requires a high level of experience of dealing with refrigerant-conducting systems and must therefore only be carried out by an authorised trained specialist.



We recommend STULZ customer service for the adjustment and service of your A/C unit.

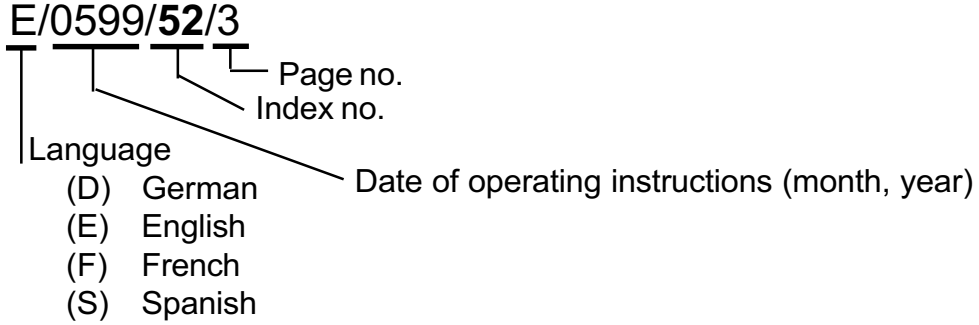
It is absolutely essential to carefully read through and comply with the operating instructions before operating the A/C unit.

If faults occur when operating the A/C unit or when changing the parameters, these are to be immediately eliminated in accordance with the respective section "fault cause/ elimination" of the operating instructions for the A/C unit. The notes on safety listed at the start of all operating instructions must be complied with without fail.

If danger occurs or if refrigerant escapes, the A/C unit must be immediately switched off with the emergency switch and the cause of the fault must be eliminated.

Page code

The page code contains the following information.



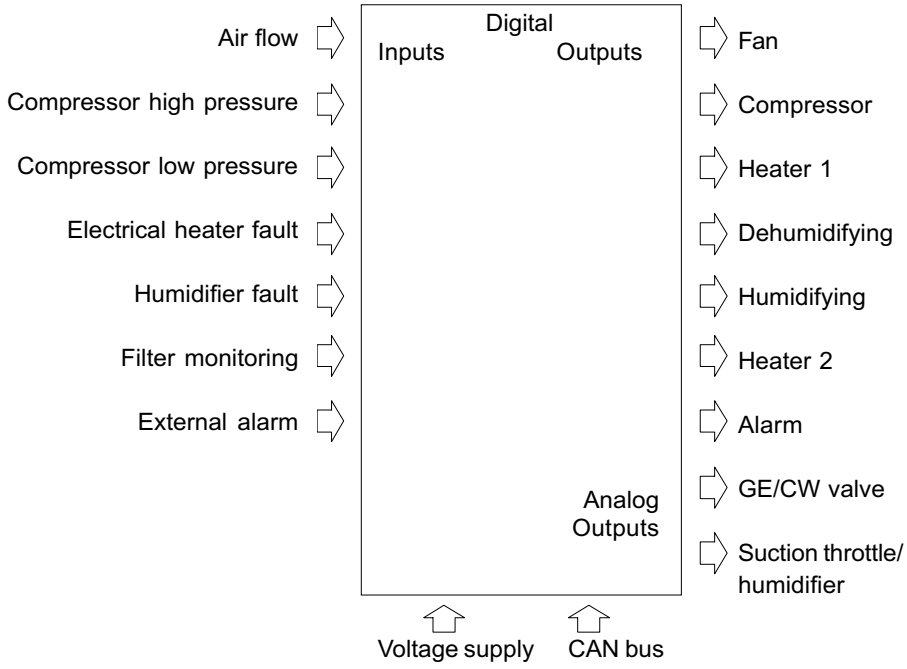
Description of the controller

The controller (CompTrol 5000) is used for operating, controlling and monitoring the complete A/C unit. It consists of a main printed circuit board with voltage processing unit. The following function groups are located on the main printed circuit board:

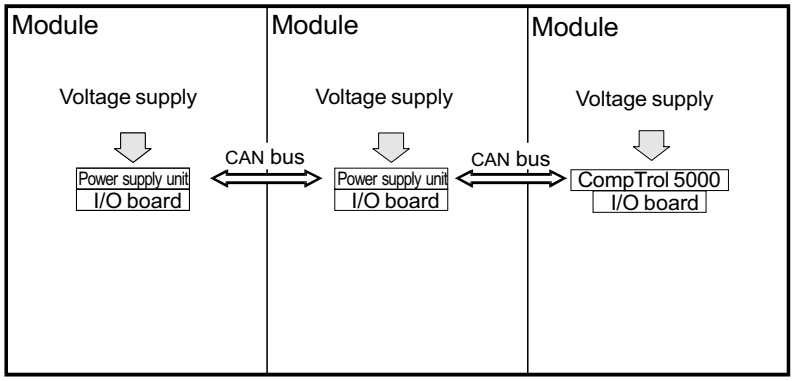
- Voltage processing unit for I/O boards
- Micro controller for controlling and monitoring the A/C unit.
- System bus interface for building services management system (BMS) options
- CAN BUS interface for connecting decentralised I/O boards
- Serial PC/RS232 printer interface
- Various analog sensor connections (temperature and humidity sensors)
- Controller handshake for linking a supervisor (second controller)
- LCD and LEDs for displaying data and operating conditions of the controller (A/C unit)
- Button for operating the controller
- Various plug connections

A basic I/O board and an expansion I/O board can be connected to the main board of the controller. The description of the expansion board can be found on the following page.

The controller can also be expanded with an interface printed circuit board (RS485, RS232C) and options for the BMS connection.
The basic I/O board is provided with the following interfaces:



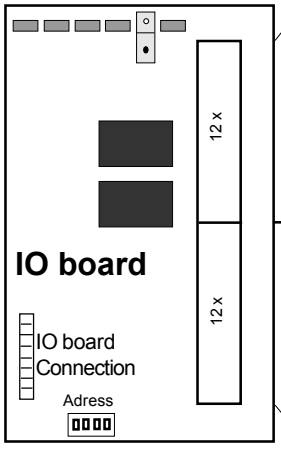
Each A/C unit is fitted as standard with a controller and each module with an I/O board. A separate power supply unit is required for the I/O board if it is not located on the controller. The controller and the I/O boards are connected to each other via a CAN bus. The following illustration shows the basic configuration of a three-module A/C unit.



The A/C unit can be equipped with an additional controller (supervisor). If the controller fails, the supervisor takes over the control and monitoring of the complete A/C unit.

Expansion I/O board

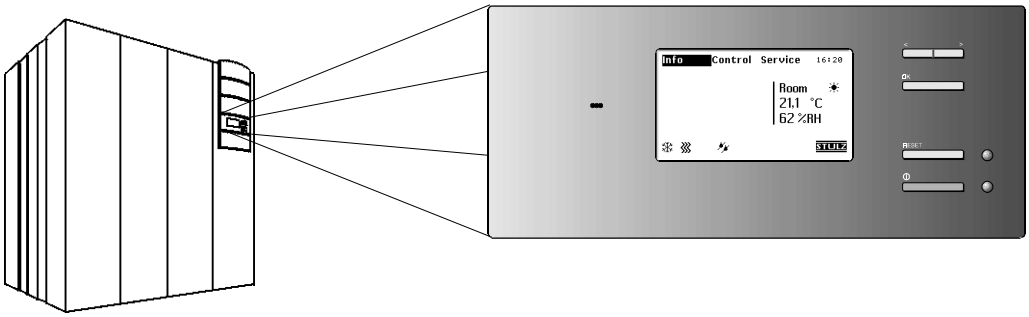
The expansion I/O board enables you to equip your A/C unit with further options. You can see from the following table which options you require an expansion I/O board for.



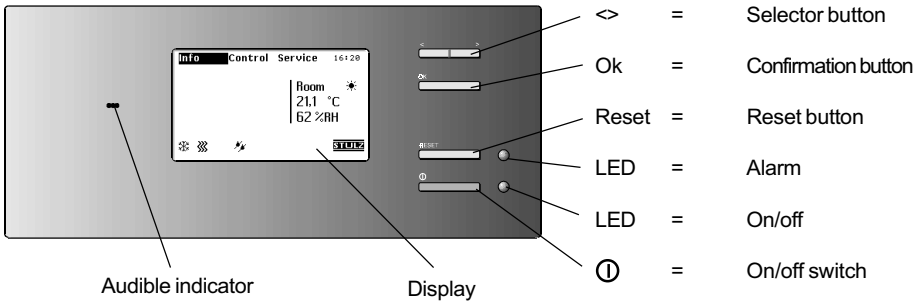
	Standard board (N02)	Expansion board (N03)
X1.1	GND	GND
X1.2	Fan	GE pump
X1.3	1-stage compressor	2-stage compressor
X1.4	Heater 1	Heater 3
X1.5	Heater 2	Dry cooler
X1.6	Dehumidifying	Louver
X1.7	GND	GND
X1.8	Humidifying (R)	Pump changer (R)
X1.9	Humidifying (A)	Pump changer (A)
X1.10	Humidifying (B)	Pump changer (B)
X1.11	Alarm 1 (R)	Alarm 2 (R)
X1.12	Alarm 1 (A)	Alarm 2 (A)
X1.13	Alarm 1 (B)	Alarm 2 (B)
X1.14	GND	GND
X1.15	GE/CW 0-10V	PWW valve 0-10V
X1.16	GND	GND
X1.17	Suction/humidif./PWW 10V	Humidifying 0-10V
X1.18	Air flow	Conductivity meter
X1.19	Compressor high pressure	UPS (heater,humidifier off)
X1.20	Compressor low pressure	Water detector
X1.21	Electrical heater alarm	Dry cooler alarm
X1.22	Filter monitor	Pump alarm
X1.23	Humidifier alarm	Auxiliary alarm 3
X1.24	Auxiliary alarm 1	Auxiliary alarm 2

Operator interface

The "C 5000" controller is installed in the control section of the A/C unit and can be operated from the front of the A/C unit.

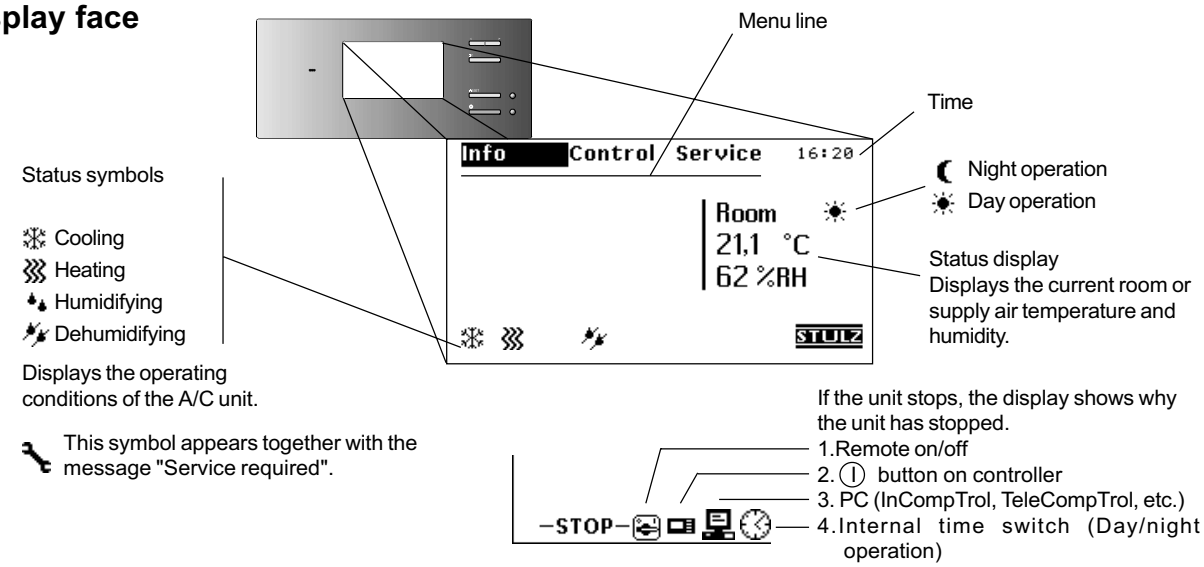


Operational controls of the controller



Selector button	You can select menus and change parameters with the selector button
Confirmation button	You acknowledge the functions/parameters selected with the selector button with the confirmation button
Reset button	Alarm signals are acknowledged with the reset button, whereby the alarm tone is silenced. The changed parameter values can also be reset to the standard setting.
LED alarm	This LED display lights up in the event of an alarm.
LED on/off	This LED display lights up when the A/C unit is switched on.
On/off switch	The A/C unit is switched on/off with this button.
Audible indicator	The audible indicator issues an alarm tone when there are alarm signals in the display
Display	The display shows data, operating conditions and information for the operator's guidance.

Display face



Operating the controller

The controller is operated in three function levels (info, control, service) which are shown in the menu line of the display.

All set parameters and function states of the A/C unit can be called up in the info menu by the operator. This menu is basically only intended for displaying all values and parameters. However there is the possibility of changing parameters after entering a password in the info/total climate/display/change menu and in the info/day, night/change menu.

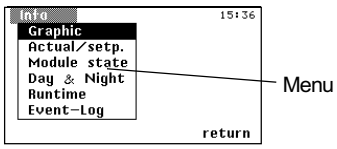
The parameters of the A/C unit such as specified temperature, specified humidity and switching on/off values of the individual components can be changed and entered in the control menu.

The service menu is used to configure the A/C unit and should only be operated by experienced customer service staff.

You will find the following parameter settings in the dialogue windows:

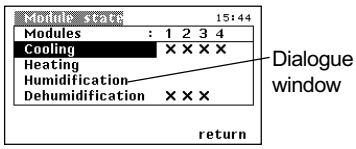
S	=	constant actuation (0 - 10V)
0	=	off
1/2	=	single (stage)/2-stage
0-99	=	degree of opening of a valve
-	=	components not fitted
✓	=	option selected
✗	=	components currently active

Selecting menu contents



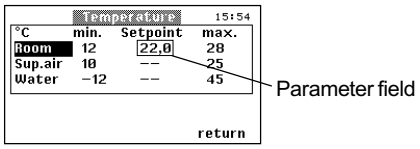
You select the menu contents by selecting the required option of the menu line shown with a dark background using the "selector button" and then confirm with "OK". The menus are shown in the display.

Opening dialogue window



You open a dialogue window by selecting an option with the "selector button" from the menu and confirm with "OK". The dialogue window now appears on the display.

Changing parameters

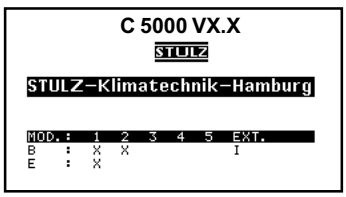


Select the parameter field in the dialogue window using the "selector button" and confirm with "OK". The parameter field is now provided with a frame. Change the value shown using the "selector button". When you confirm with "OK", the revised value is entered and the frame of the parameter field disappears. You can now change other parameters.

Description of menus, dialogue windows and parameter fields

When the A/C unit is switched on, the start up window appears on the display which is faded out after a short period. After this the standard window is shown from which you enter all sub menus and dialogue windows.

Start up window



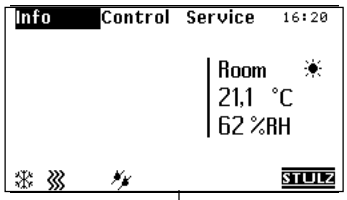
The start up window shows you the version number of the software as well as the manufacturer of the A/C unit. The configuration of modules 1-5 (MOD) is also displayed.

B = Basic I/O board
E = Expansion I/O board

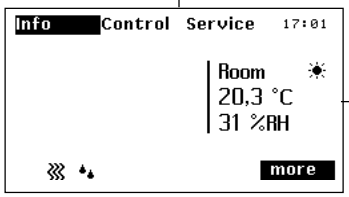
If you keep the "<" button pressed whilst starting, you can observe the start up window for a longer period.

Explanation of letters below the "EXT" text field:
I = Interface card available
A = ZLT board available
R = Interface card for actuating C4000 relay boards available
M = MIB board available

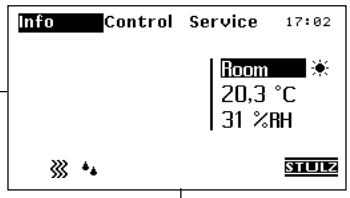
Standard window

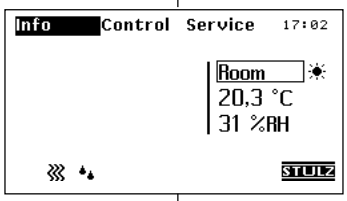


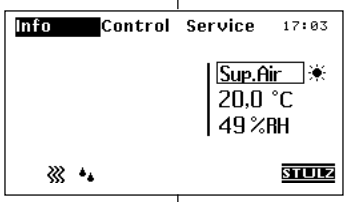
The standard window is continuously displayed when the A/C unit is operating. In this standard window you can adjust the time, changeover between room and supply air display and changeover from day to night operation. You can also enter the additional menus from this standard window.



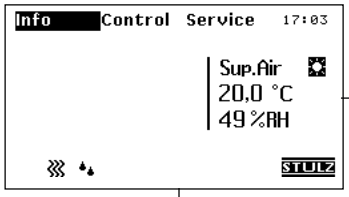
You enter the left dialogue window by pressing the "OK" button. When the "OK" button is pressed again, you enter the next page, to the display of the menu sub-items. If, by contrast you press the "<>" button, you enter the display of the right window. Assuming that you have a second temp./ humidity sensor connected, you can then change from the display of room air conditions to the display of supply air conditions in this window.
By pressing the "OK" button a frame appears around the field to be changed.



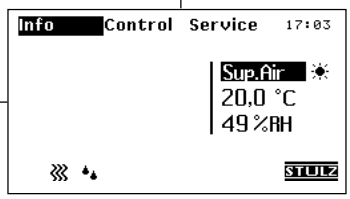


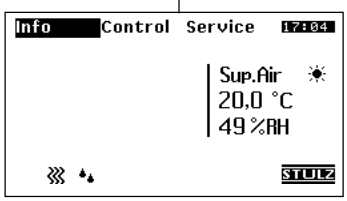


You change the display with "<>".

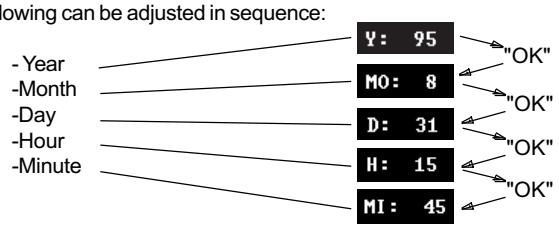


The change is adopted with "OK" and using the "<>" button you reach the next window in which you can change over from day to night operation. The button operation is based on the same sequence as just outlined. Day operation corres-ponds to operation at the initial setpoint temp. Night operation corresponds to operation at the second setpoint (see page P.13).



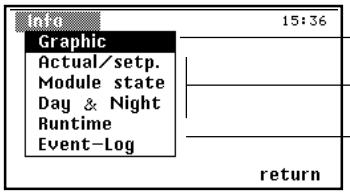


The final item which you can change in the standard window is the time as shown in the left window, which you can reach using the "<>" button.
The following can be adjusted in sequence:

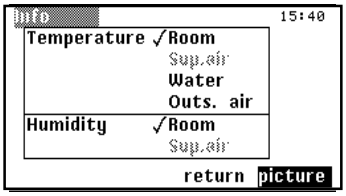


"Info" menu

Various data and operating states of the individual modules and components of the A/C unit are displayed in the "info" menu. Parameters cannot be changed in this function level.

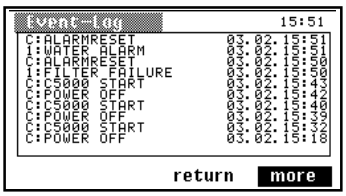


In this menu you obtain information about the room climate, about the A/C unit modules about the day/night operation and as well about the unit runtimes.



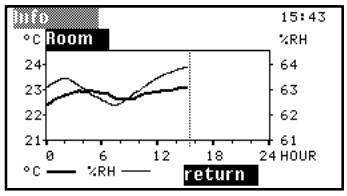
In this dialogue window you select the required information and call up the display. Not all combinations are possible. Only the values which are provided with sensors can be selected. Non assigned values are shown in grey.

Further information can be found on the following pages of this index.



All alarm signals of the A/C unit are listed in this dialogue window. The signals contain the following information:
Module, alarm report, day and time. When the unit was started and stopped is also displayed.
Up to 20 events can be displayed. The alarm memory is erased by keeping pressed the button combination of "RESET" and "OK" (until the standard window is visible) while switching on the voltage.

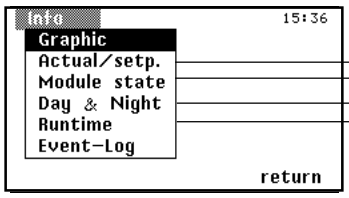
The temperature and air humidity in the last 24 hours are shown in this dialogue window. The vertical line identifies the current time. To the right of the line yesterday is shown and left of the line today is shown. The "change" option is only available if an option is selected in the previous dialogue window. The outside air limit values cannot be changed.

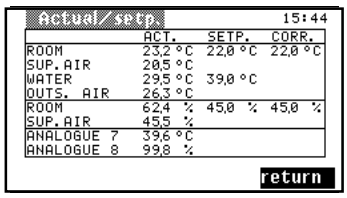


Password XXX

You can change the room temperature and air humidity in this dialogue window. The description of the dialogue window can be found in the "control/temperature" menu. The password can be found in the "control menu " chapter.

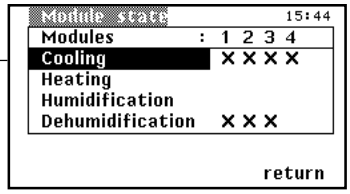
A "Info" menu continued

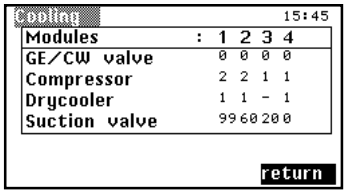




This dialogue window shows the actual and specified temperature/humidity. Furthermore the setpoints shifted by the controller (CORR.) are displayed. These setpoints are due to the week cycle program (see below) or by the sensor limitation control (see page 21). The shifted setpoints are priority setpoints.

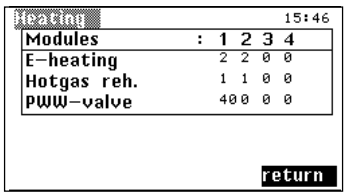
The operating state of the components of the refrigerant circuit of each individual module is displayed in this dialogue window.



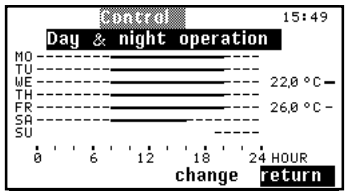


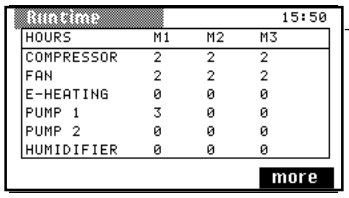
This dialogue window displays how many modules your A/C unit is comprised of. A cross shows which function of the module is currently active. An "S" indicates a stand-by module.

If the individual modules of your A/C unit are equipped with a heater, the operating state is displayed in this dialogue window.



The daily operating time and required room temperature is shown on a weekly cycle in this dialogue window. The two setpoints are also displayed in this dialogue window.

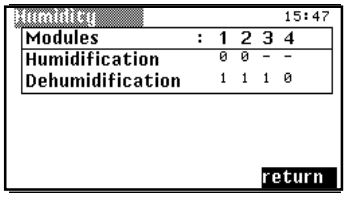




The runtimes of the listed components of the A/C unit are shown in hours in this dialogue window. Further modules (M3, 4) of the A/C unit are displayed by "continue". You reach the main menu with "return".

Password XXX

After entering the correct password, with "change" you have the facility of specifying the operating time or changing one of the setpoints. The description of the dialogue window can be found in the "control/day/night" menu.



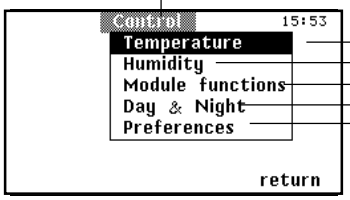
If individual modules of your A/C unit are equipped with a humidifier, the operating state of the humidifier is displayed in this dialogue field.
In addition the display indicates whether the dehumidification circuit is switched on or off.

"Control" menu

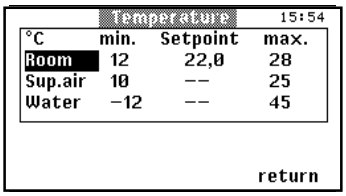
In the "control" menu you have the facility for *changing* various parameters and operating states of individual modules and components of the A/C unit.

Password XXX

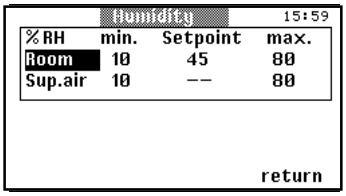
The password is entered using the selector buttons and the confirmation button. The password is: **"<" = left selector button, "OK" = button, ">" = right selector button,** the **first two buttons** must be pressed, **whilst** the double dot of the clock is visible.



You only enter the control mode after entering the correct password.

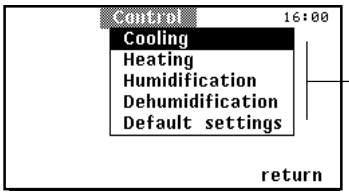


Limit values and setpoints for the required room temperature are to be entered in this dialogue window. The specified limits can be changed for the supply air temperature and water temperature.



The limit values and setpoints for the required room humidity are to be entered in this dialogue window. Specified limit values can be changed for the supply air humidity if an optional supply air sensor is installed.

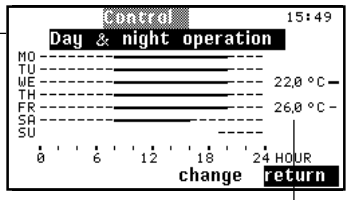
⚠ Changing the parameters in the "control/module functions" menu requires a high level of experience of dealing with refrigerant-conducting systems and must therefore only be carried out by an authorised specialist.



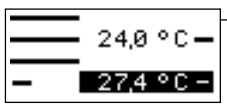
Further dialogue windows can be selected in this menu in which the limit parameters and setpoint parameters of the individual A/C unit components can be changed. Further information can be found on the following pages in this index.

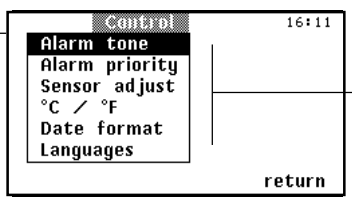
C

B The operating time and the setpoint of room temperature is displayed in this dialogue field. The A/C unit then works in a weekly cycle according to the set values.
After going through the days Mon to Sun, you enter the field where you can change the second setpoint.



If you select "change" you have the facility for establishing the operating time and the setpoint of room temperature.
- ▬ thick line: setpoint, day operation
- – – dotted: 2nd setpoint, night operation Line
  No line: A/C unit off, ◷ appears in the display

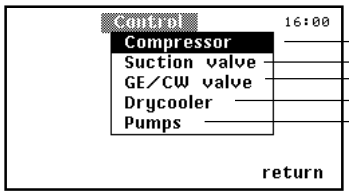


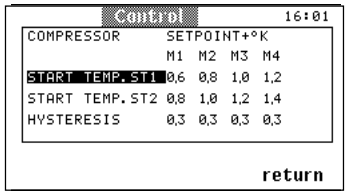


Further dialogue windows can be selected in this menu, in which the values shown can be changed. Further information can be found on the following pages in this index.

D

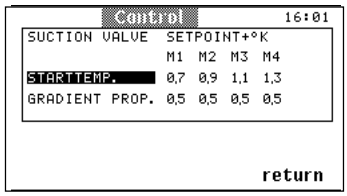
C Continuation of the "control/module function/**cooling**" dialogue window





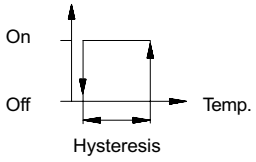
The **start temperature** for the first and second stage (option) can be adjusted for the **compressor** in this dialogue window. The hysteresis can be adjusted in Kelvin. The setpoint temperature is established in the "control/temperature" dialogue window.

All start values are entered as the difference from the setpoint in K

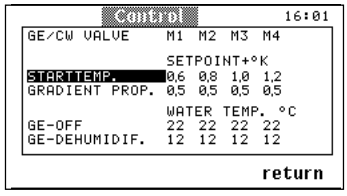


If your A/C unit is fitted with a **suction throttle** you can adjust the start temperature (suction throttle opens) and the gradient of the suction valve in this dialogue field.

Hysteresis: margin between the cut-in and cut-out point.

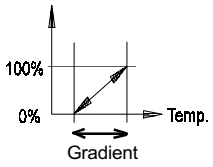


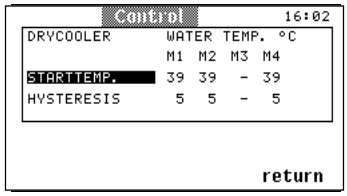
Using the example of the compressor



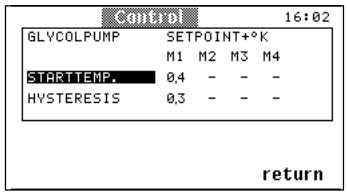
If your A/C unit is equipped with a **GE/CW control valve**, you can determine the start temperature and the proportional gradient of the GE/CW control valve. GE off closes the GE/CW valve when the entered temperature is exceeded. GE dehumidifying ends the dehumidifying when the entered temperature is not achieved, the GE/CW valve being completely closed. Also refer to P.28.

Gradient: Increase in the opening angle depending on temperature



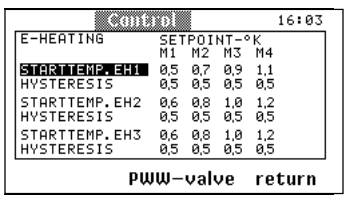


If your A/C unit is connected to a **dry cooler**, you can determine the cut-in temperature of the dry cooler and the hysteresis in this dialogue window. A detailed description of the dry cooler operation can be found on P.29.

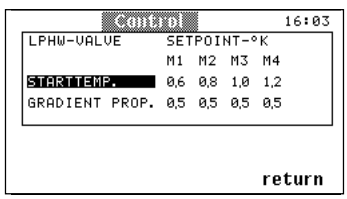


The optional **glycol pump** is only installed in the pump section on GE units. You determine the cut-in temperature and the hysteresis of the glycol pump in this dialogue window.

C Continuation of "control/module functions/**heating**" dialogue window

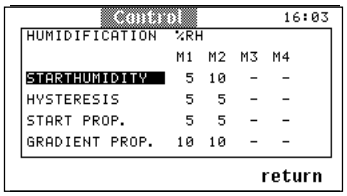


You can establish the start temperature for the optional electrical heaters installed in your A/C unit in this dialogue window.



If your A/C unit is equipped with a **LPHW heater**, you can control this via the proportional LPHW valve. You enter the opening temperature and the gradient of the LPHW valve in this dialogue window.

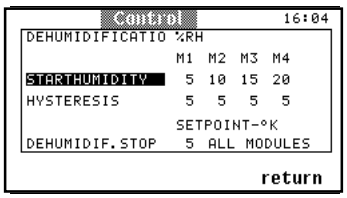
C Continuation of "control/module functions/**humidification**" dialogue window



If your A/C unit is equipped with an **optional humidifier**, you have the facility in this dialogue window for determining the start humidity, the hysteresis of the humidifier as well as the starting humidity and the gradient of the associated proportioning valve.

All start values are entered as the difference from the setpoint in % rel. H.

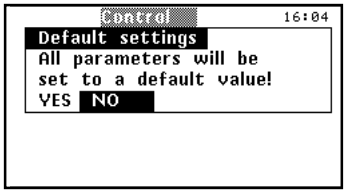
C Continuation of "control/module functions/**dehumidification**" dialogue window



You can define the start point of the **dehumidifying circuit** as well as the hysteresis in this dialogue window. If the humidity exceeds the entered value, the solenoid valve upstream of the evaporator closes and humidity is withdrawn from the air flowing through.

"Dehumid. stop" function.
If the temperature drops by the set temperature "5" below the setpoint when dehumidifying, dehumidification is interrupted with a hysteresis of 1 Kelvin.

C Continuation of "control/module functions/**default settings**" dialogue window

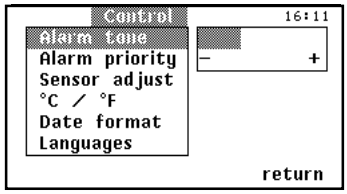


If you confirm this dialogue window with "yes" all the parameters of the control of the A/C unit are set to the **basic settings** established at the factory. The basic settings can be found on P.39/40.

The same effect is achieved by switching off the voltage, and keeping simul-taneously pressed the ON/OFF button and the RESET button (until the standard window is visible), while switching on again the voltage.

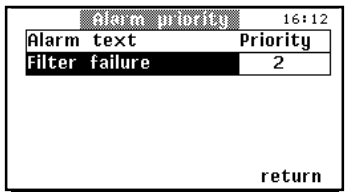
D Continuation "control/preference"

Continuation of the "control/preference/ **alarm tone**" menu



You can adjust the volume of the alarm tone in this dialogue window.

Continuation of the "control/preference/ **alarm priority**" menu



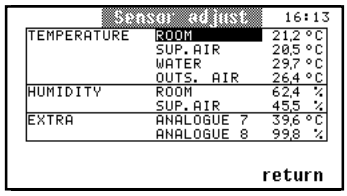
You can assign the alarm signals to the alarm relay in this dialogue window. External alarm signal systems can be connected to the alarm relay. Depending on the number of existing I/O boards, 1-10 alarm relays are available under priority (one alarm relay per I/O module). "0" means no assignment. Alarm relay 1 can not be deconfigured. It corresponds to a collective alarm and is also set, if e.g. alarm relay 2 is set by an alarm message.

If a ZLT-board is fitted some additional alarm relays are available (see page 31).

Alarm relay assignment

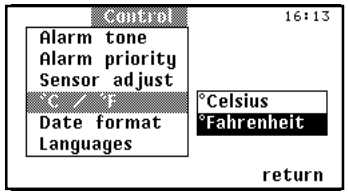
Module	1	2	3	4	5
Basic I/O board	1	3	5	7	9
Expansion I/O board	2	4	6	8	10

Continuation of the "control/preference/ **sensor compensation**" menu



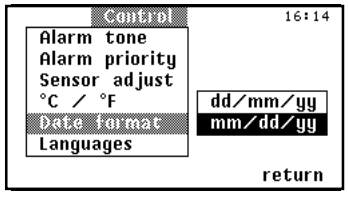
You can have the actual values of the sensors displayed in this dialogue window and compared with the values of external measuring devices. The measured values displayed can be calibrated here.

Continuation of the "control/preference/**°C/ °F**" menu



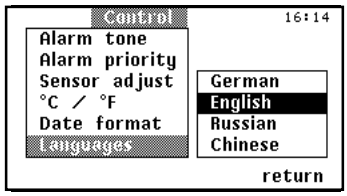
The temperature display of all dialogue windows can be changed over to °C or °F in this dialogue window.

Continuation of the "control/preference/ **date format**" menu



The date display can be changed over to dd/mm/yy or mm/dd/yy in this dialogue window.

Continuation of the "control/preference/ **languages**" menu



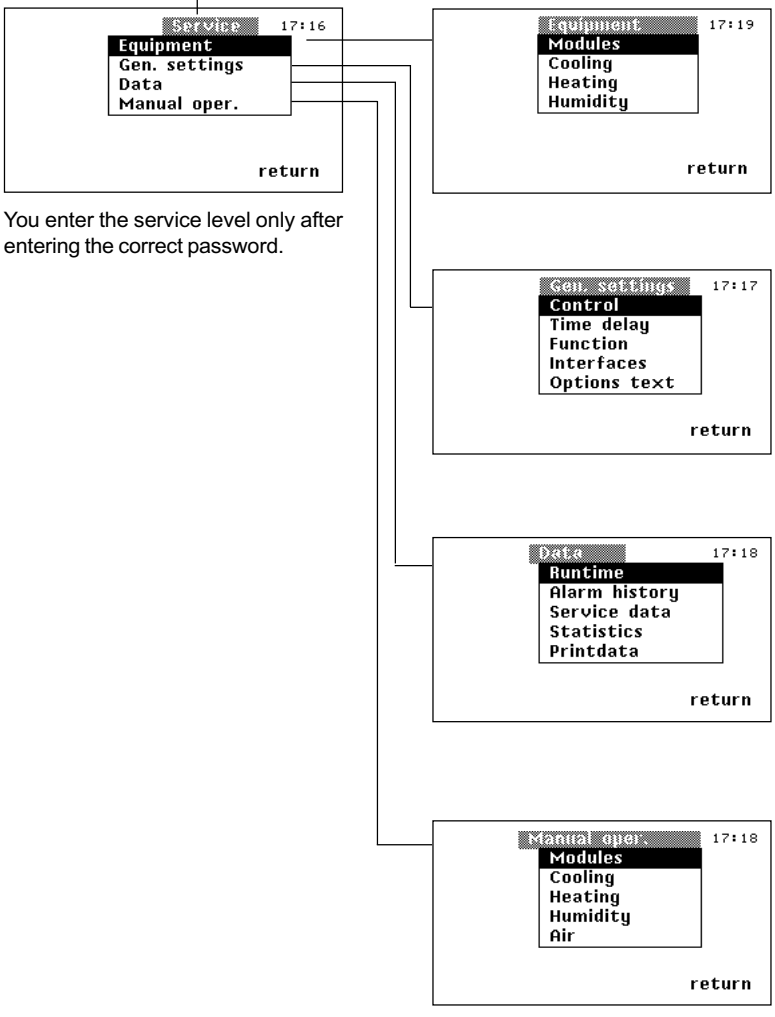
You can select the language in which the commentaries are displayed in the dialogue windows in this dialogue window. The illustration only shows a selection of possible languages.

"Service" menu

In the "Service" menu you have the facility for *changing* the configuration of the A/C unit. Furthermore you can change the settings in respect of types of control and other parameters as well as scan further data and operate the A/C unit in the manual operation level, without having to use the controller as a control unit.
Alarm signals do not appear in the service level on the dialogue window but only by means of an acoustic signal and the alarm LED. If you want to know which alarm has occurred, you must return to the main menu.
Whilst you are in the "Service" level, the control of the A/C unit is continued. Only in manual operation is the module, which you control in hand operation, taken out of the control by the controller.

Password XXX

The password is entered with the selector buttons and the confirmation button. The password is **">" = right selector button, "OK" = button, "<" =** left selector button, the **first two buttons** having to be pressed **while** the double dot of the clock is visible.



You enter the service level only after entering the correct password.

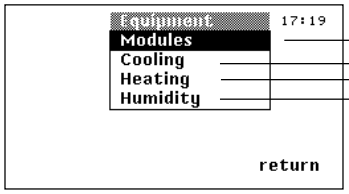
The equipment of the A/C unit is divided up into four areas. In this dialogue window you select the area in which you wish to configure the unit. Further information can be found on pages 18 and 19. A

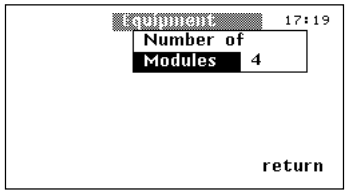
You select the area in which you wish to make further adjustments in this dialogue window. The sub-item "Function" is important during supervisor operation, for the configuration of stand-by modules and for internal sequencing. Further information can be found on pages 20-22. B

Predominantly sub-items in which you can scan data are in this menu. You should call up the sub-item "Service data" after service is complete. You need the sub-item "Print data" to select the values which are to be printed and to start printing. Further information can be found on page 23. C

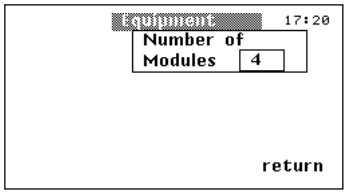
Control is possible in manual operation in this menu. However, only those components which are configured in the "Service/ equipment" menu or are actually fitted (e.g. the louver) can be put into operation. Refer to pages 24/25. D

A Continuation of the "Service/ equipment" dialogue window

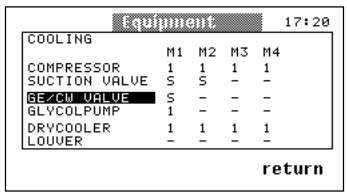




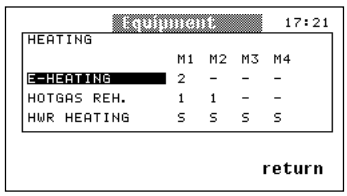
You enter the number of the modules which are to be controlled in this dialogue window. If you enter more modules than are actually present, the "Transmission error" alarm appears. If you press the "OK" button in the upper dialogue window, the dialogue window appears which is illustrated on the right.



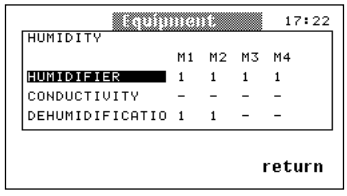
The value from 1 to 5 can be changed using the "<>" button. You return again to the left dialogue window using the "OK" button. At the same time the new value has been adopted.



Here you specify which module is equipped with a **suction valve**, with a GE valve, with a glycol pump, with a dry cooler and with a louver. With the **compressor** you can choose between "-" (no compressor = **CW**-version see page 49) "1" and "2" for the 2-stage compressor. The suction valve is actuated analogously, the control is (S) constant. The procedure for the entry is explained on the next page. A

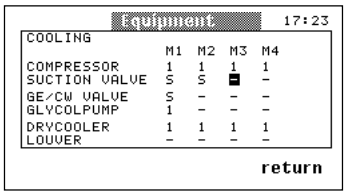


Here you specify which module is equipped with an **electrical heater**, with a hot gas heater and with a LPHW heater. With the electrical heater you can also choose the "2" for the 2-stage electrical heater. The valve for the LPHW heater is actuated analogously, the control is (S) constant. The procedure for the entry is the same as for the "Service/equipment/cooling" menu, refer to next page.

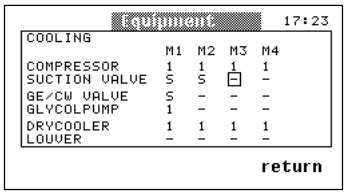


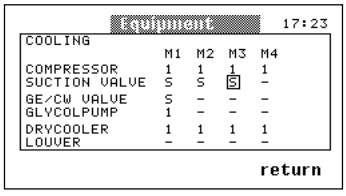
Here you specify which module is equipped with a **humidifier** (steam humidifier or ultrasonic), with a conductivity measuring instrument (for ultrasonic only) and with a dehumidifying valve. With the humidifier you can choose between constant control (S) and 2-point control (1) depending on the actual equipment of your unit. The procedure for the entry is the same as for the "Service/equipment/cooling" menu, refer to next page.

A Changing values using the example of the "Service/equipment/**cooling**" dialogue window.

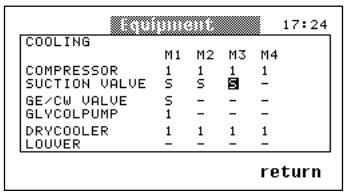


After you have pressed the "OK" button, the adjacent dialogue window appears. You can now make a choice between the modules using the "<>" button. If you press the "OK" button again, the dialogue window below appears.

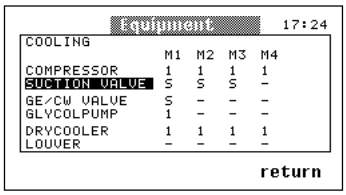




You can now change the value in the box by operating the "<>" button. With the compressor you choose between "1" = single-stage compressor and "2" = two-stage compressor. In the case of the other components you only choose between "1" or "S" and "-". "1" stands for components which are actuated digitally and "S" for constant, i.e. components, which are actuated proportionally. Only the suction throttle valve and the GE valve are actuated proportionally in this dialogue window.



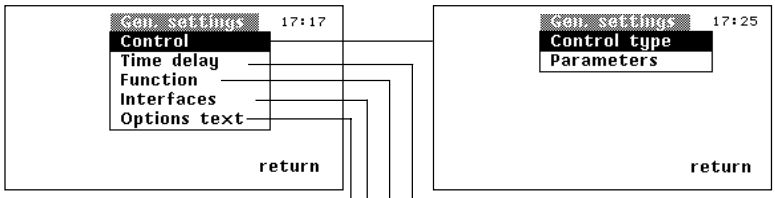
With "OK" you confirm the entry and can return to the dialogue window below using the "<>" button in order to configure any other components.



The applicable values for the equipment of the modules have the following significance :

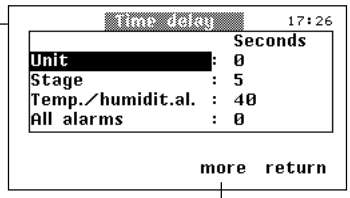
- **-** : not fitted
- **1** : 1st stage switched on
- **2** : 2nd stage switched on
- **S** : components are controlled proportionally

B Continuation of the "Service/ setting" dialogue window

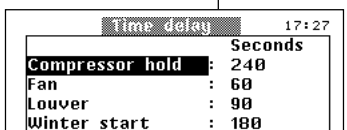


You can select the type of control, which are described in detail on the following page, in this dialogue window. The parameters field can only be selected if you have selected one of the two types of control below.

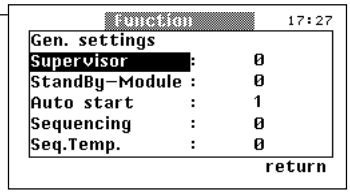
B



Here you can adjust the **time delays**, with which certain components are switched on or alarms are displayed. This prevents all equipment being switched on at the same time resulting in a mains overload.
The **switch-on delay** of the system can be adjusted in 10 second stages between 0 and 2550 seconds (approx. 42 minutes).
With several units installed, different switching-on delays are recommended so that you avoid a mains overload after a power failure if all units restart automatically.
The switch-on delay of a control stage (e.g. heating, humidifying, cooling) can be varied between 2 and 255 seconds within a module.
The **alarm signals** for all exceeded temperature and humidity limit values can be delayed by 0 to 2550 seconds in 10 second stages. This is appropriate in rooms under extreme conditions such, that after a power failure, if the unit starts automatically, a series of alarm signals does not immediately result.
Likewise a time delay of 0 to 255 seconds can be set for all alarms.
The **compressor delay**, which is used to increase the service life of the compressor, by delaying the restart by the set value, can be adjusted between 1 and 255 seconds.
The **fan after-running** can be varied between 1 and 255 seconds and applies to all modules.

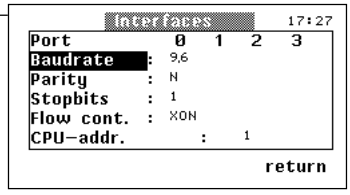


In this window you set whether the controller is to work as a **supervisor** (0 = controller operation, 1 = supervisor operation). Also refer to P.26.
You select which module is to be operated as a **stand-by** module (0 - 4, 0 = there is no stand-by mode). Also refer to P.33/34.
If you have set the **Autostart** function on "1", the unit is started automatically after a power failure. If the unit was switched off before the power failure (local, remote, PC or time switch), it also remains switched off after the power is restored. The **sequencing time** can be set between 0 and 255 hours, the sequencing temperature between 0 and 10 Kelvin. Also refer to P.30.

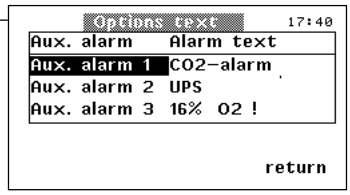


The **"louver" start delay** applies to the fan in the first module, if the unit is fitted with louvers. These are opened simultaneously after the system starts (except the louver of the stand-by module), and then the first fan runs with the set time delay (10 - 2550 seconds).
The low pressure switch is bridged for the **winter start**. The time of bridging can be adjusted between 0 and 255 seconds. There will be no "low pressure fault" alarm within this time.

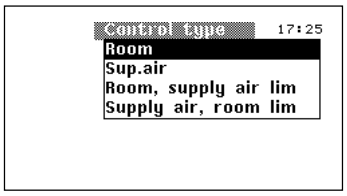
The Baud rate can be set between 0.3 and 19.2 k Baud. Refer to the printer/computer connection P.58 for further settings.
The **CPU address** can be varied between 1 and 255 and gives the unit (controller) a name in the data exchange with other systems (sequencing box, telecomptrol).



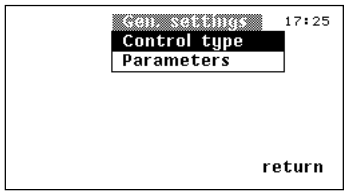
In this window you enter custom texts for the auxiliary alarms. With "OK" the cursor goes letter for letter through the text, the letters are changed using "<>". All upper and lower case letters can be used as well as numbers and some special symbols.



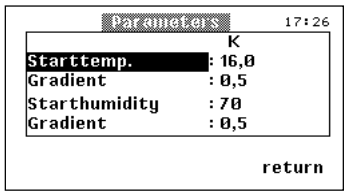
B Changing values using the example of the "Service/control/**type of control**" dialogue window.



After you have pressed the "OK" button, the adjacent dialogue window appears. Using the "<>" button you can now choose between the types of control. The display of the actual values changes corresponding to the above adjusted type of control (Room / Sup.Air). With OK you conclude the entry and return again to the right-hand dialogue window.



You can select the parameters field and then obtain the lower dialogue window below for the "Room, supply air limited" and "Supply air, room-limited" types of control.

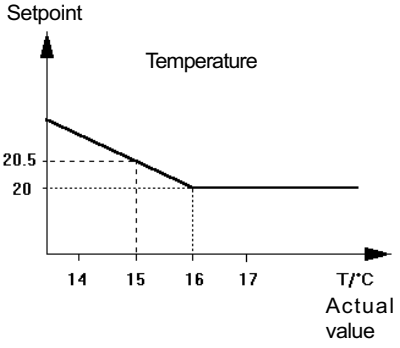


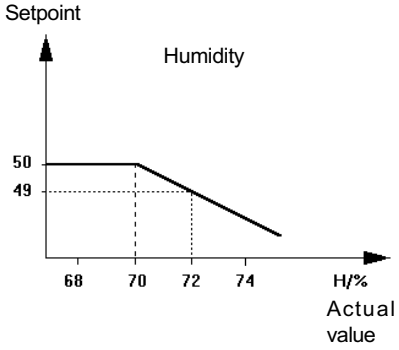
The start temperature can be varied between 0 and 40 K in 0.1 K stages. The gradient can be varied between 0 and 2 in stages of 0.1.
The start humidity can be varied between 0 and 90% in 1% stages.

The **room air control** is the standard control. The temperature/humidity sensor is placed in the return air intake and the C5000 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.

With the **room control with supply air limitation** the control takes place via the T/H sensor in the return air intake and via a second T/H sensor in the supply air. Primarily the control takes place as for room air control, only if the measured supply air temperature exceeds a certain temperature which is described with "Start temperature" in the "*Service/adjustment/control/parameters*" menu item, does an increase in setpoint occur. The extent of the setpoint increase is determined by a factor which you enter, as a gradient, in the "*Service/adjustment/control/parameters*" menu. The relationship, according to which this happens, is made clear by the graph opposite. A steep gradient drastically corrects the failure to meet the supply air temperature, but has the risk that the control circuit starts to hunt.
With humidity control the setpoint shift takes place in the opposite direction. If the adjusted starting humidity is exceeded by the measured supply air humidity, the setpoint is reduced. You can also enter a gradient factor for this. The relationship is shown in the graph opposite.



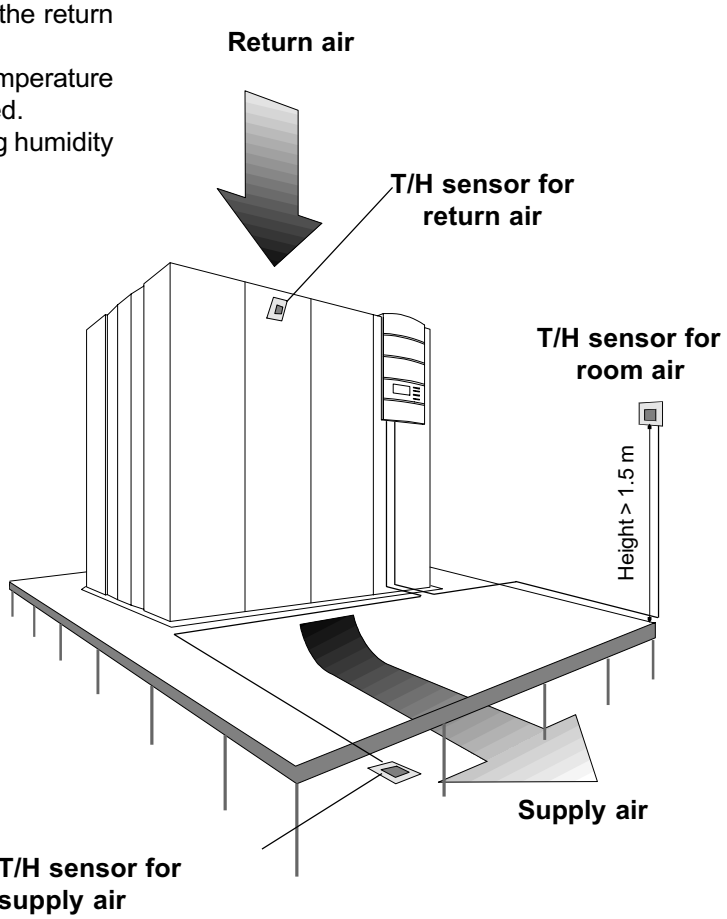


New setpoint = old setpoint + gradient • (start value - actual value)

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

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

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.

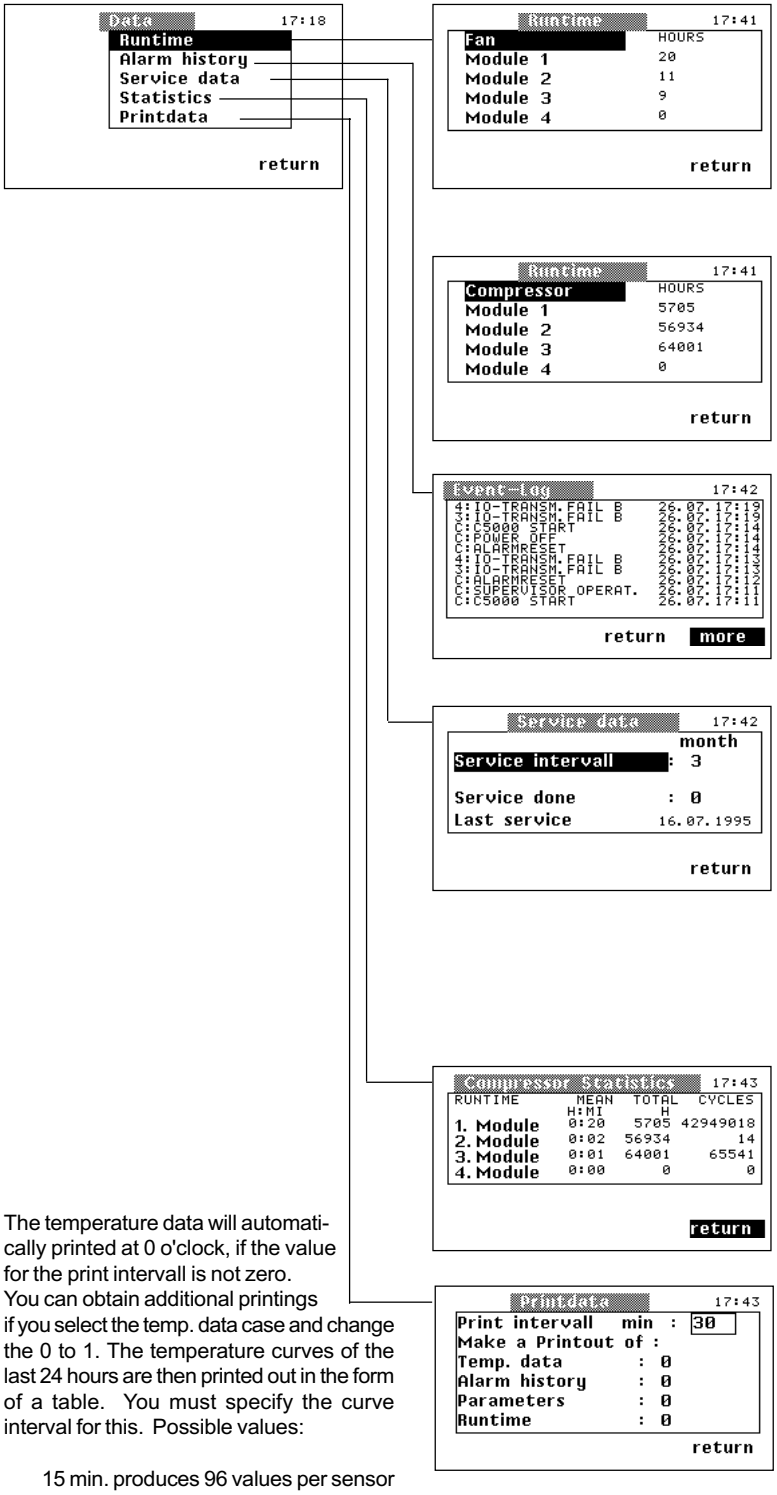


The limit values of all four input variables are monitored for room air control with supply air limitation and for supply air control with room air limitation.

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

The sensor should be positioned depending on the space available, thermal load distribution and selected type of control.

C Continuation of the "Service/data" dialogue window



You can read off the operating hours per module for the components shown below in the "**Runtime**" menu:

- Fan
- Compressor
- Electrical heater
- Pump 1
- Pump 2
- Humidifier

Using the "Ok" button you change to the numerical field, and can select a module with the "<>" button and reset the counter status to 0 by "OK". If you do not wish to change anything, you exit the numerical field using the "<>" button.

The last 80 alarms which occurred are listed in the menu item "**Alarm history**". The number in front of the colon specifies the defective module. "C" stands for controller. A summary of all potential signals can be found on Page 37/38. The alarm memory is erased by keeping pressed the button combination of "RESET" and "OK" (until the standard window is visible) while switching on the voltage.

The "**Service data**" menu item represents a control device. If the service interval entered is exceeded, the message "Service" appears on the controller.
You can vary the service interval between 0 and 12 months. You by-pass the service message by entering zero. After the unit has been serviced, set the 0 in the "Service carried out" row to 1 and the current date appears in the row under it.

The compressor statistics show the runtime of the compressor for each module, the number of cut-ins (cycles) and the mean runtime which can be calculated as follows:

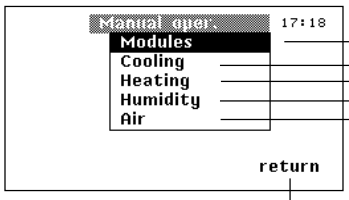
$$\frac{\text{Old mean value + new runtime}}{2}$$

In the "**Print data**" window you can mark with a cross which data you wish to print out, by setting the "0" to "1". Printing is initiated by this operation and the "1" changes back to "0" again. A print order must be triggered separately for each data area (temp. data, alarm history etc).
From version 1.40 all printings contain the **CPU address**.

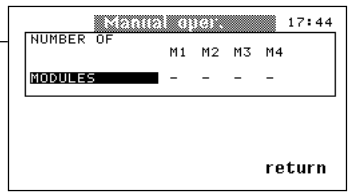
The temperature data will automatically printed at 0 o'clock, if the value for the print intervall is not zero.
You can obtain additional printings if you select the temp. data case and change the 0 to 1. The temperature curves of the last 24 hours are then printed out in the form of a table. You must specify the curve interval for this. Possible values:

15 min. produces 96 values per sensor
30 min. produces 48 values per sensor
60 min. produces 24 values per sensor

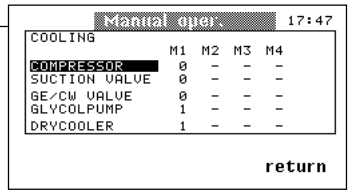
D Continuation of the "Service/manual operation" dialogue window



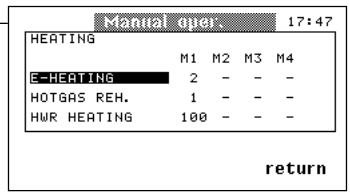
When exiting the manual operating level manual operation is ended automatically.



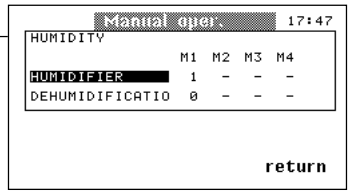
Operation in this menu item is explained in more detail on the next page. D



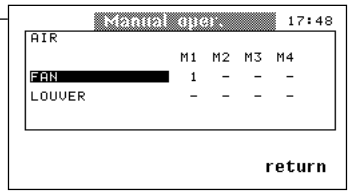
You can start the compressor, the glycol pump, the dry cooler and the function of the suction valve and the GE valve in this dialogue window.
The symbols in the table have the same meaning as for the configuration of the unit in the "Service/equipment" menu.



You can start the function of the electrical heater, the hot gas heater and the LPHW heater in this dialogue window. The symbols in the table have the same meaning as for the configuration of the unit in the "Service/equipment" menu.



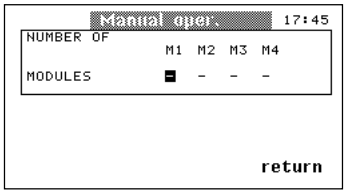
You can start the humidifier and the function of the dehumidifying valve in this dialogue window. The compressor can also be put into operation with the "Dehumidification" function.
The symbols in the table have the same meaning as for the configuration of the unit in the "Service/equipment" menu.



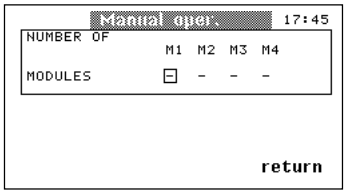
You can start the fan and open or close the louver in this dialogue window.
- = open, 1 = closed. The symbols in the table have the same meaning as for the configuration of the unit in the "Service/equipment" menu.

If the fan is switched off, all the other components are locked electrically and cannot be started.

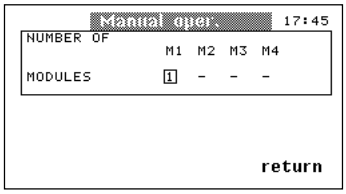
D Changing values using the example of the "Service/manual operation/ **modules**" dialogue window

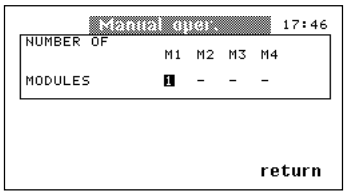


After you have pressed the "OK" button, the adjacent dialogue window appears. You can now choose between the modules using the "<>" button. If you press the "OK" button again, the dialogue window below appears.

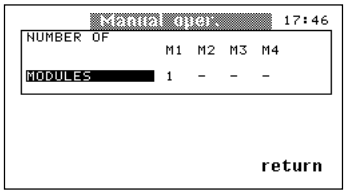


You can now change the value in the box by pressing the "<>" button.





You confirm the entry with "OK" and you can now go back to the dialogue window below using the "<>" button in order to switch individual components. Module 1 now operates in manual operation and is excluded from the control by the controller.



On components which are controlled analogously, such as:

- LPHW heater
- Humidifying

(2-point control also possible)

- Suction throttle valve
- GE/CW valve

percentage indication appears in the display which specifies the degree of opening of the valves in the case of the above mentioned valves. The number specifies the degree of opening of the LPHW valve for the LPHW heater. The number represents a percentage output indication for humidifying.

The applicable values for the equipment of the modules have the following significance:

- **-** : not fitted or off
- 0 : fitted but off
- **1** : 1st stage switched on
- **2** : 2nd stage switched on
- **0-99** : 0-99% output

If the module is switched off again in manual operation, all adjustments in the cooling, heating etc. menus are reset to zero and the controller takes over the control again.

Function description

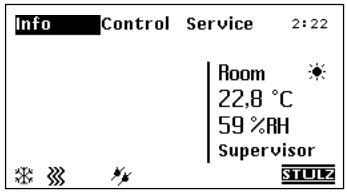
Supervisor operation

The supervisor takes over the control of the system if the controller reports a broken sensor or no data transmission to the I/O board has been registered for at least 15 seconds. Previously all the adjusted parameters of the first controller are automatically transferred to the supervisor except for the following:

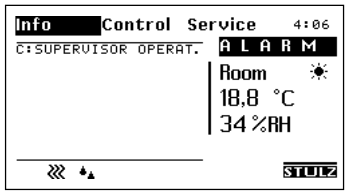
- Time
- CPU address (only required for remote monitoring)
- Loudness of alarm tone
- Parameters of serial interfaces
- Sensor calibration values

In addition to the current parameters the controller transmits the START/STOP condition to the supervisor.

In normal operation of the first controller the supervisor shows the following display.



If the first controller fails or there is a broken sensor on the first controller, the supervisor takes over the control and displays the following signal. In addition there is an alarm tone which can be acknowledged using the reset button.

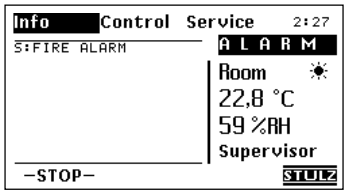


If the fault is eliminated and the first controller is required to take over the control, the supervisor must be de-energised. The unit must be switched off briefly for this purpose. After replacing a controller, which is to act as a supervisor, proceed as follows:

1. Disconnect the controller, which controls in the normal case, from the mains (disconnect 24 V at terminal 1). If the controller and the supervisor are installed in different modules, it is sufficient to switch off the module, in which the controller is located, at the master switch.
2. Switch on unit.
3. Configure supervisor as supervisor (refer to P.20).
4. Disconnect supervisor from the supply voltage (refer to item 1).
5. Connect controller (connect voltage or switch on the module concerned).
6. Connect supervisor (refer to item 5).

From the version 1.40 the following changes affect on the supervisor operation:

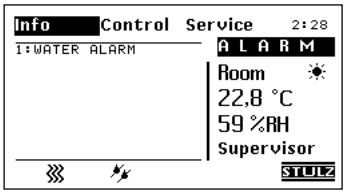
1. The message "Supervisor" is also visible in stop mode.



2. The local time of the supervisor is adjusted with the controller time when the supervisor is switched on and when the controller time is changed.

3. Status messages (menu INFO) will be transformed to the supervisor when they have been changed. They are displayed by means of symbols as on the controller.

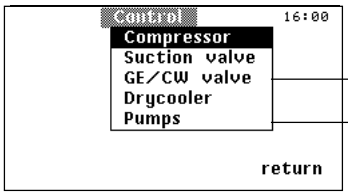
4. Alarm messages are transmitted to the supervisor. The reset of the alarms has to be done with the reset-button on the controller and supervisor.
An alarm reset on the controller is transmitted to the supervisor. An alarm reset on the supervisor is not transmitted to the controller.

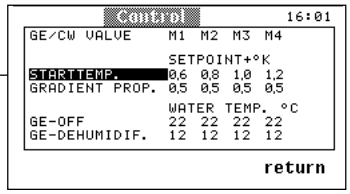


As an indication for the source of fault an "S" for the supervisor was added.
A fire alarm appearing on the supervisor is transmitted to the controller.

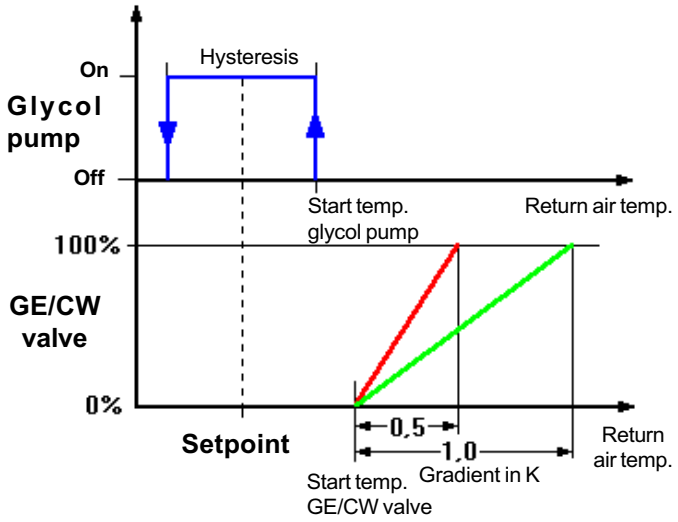
GE operation

Various adjustments can be made during GE operation, which concern the two components of the GE unit: The GE valve and the pump (s) (if fitted). You have to call up the "Control/ module function/cooling" menu window for this purpose.

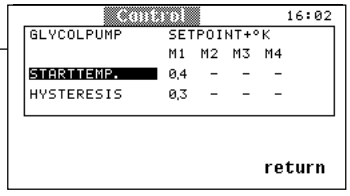




You can enter the start temperature in the form of a positive difference to the setpoint of air temperature in this window.
With the aid of the gradient you determine to what extent a setpoint deviation is to be counteracted. The smaller the gradient the more the GE/CW valve is opened at a particular temperature difference to the start temperature. The term "gradient" is used here in the sense of a "proportional band".



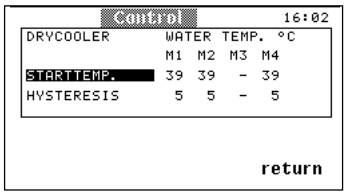
Enter the water temperature, in the "GE off" field, from which GE operation is no longer required, because the water is too hot and may even contribute to the air heating up.
The GE/CW valve is fully open for dehumidifying in GE operation. In the "GE dehumidification" field you enter the water temperature below which dehumidifying is completed, in which the GE/CW valve is fully closed.



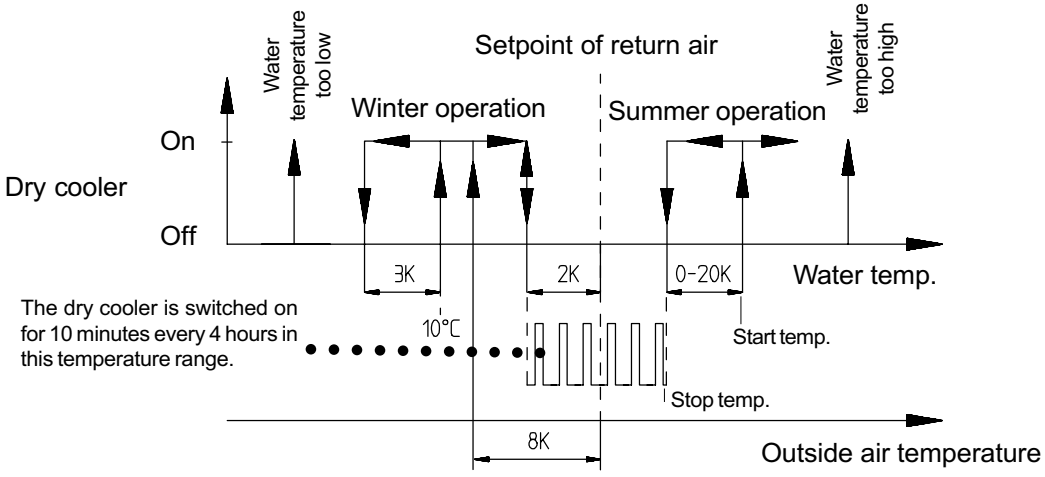
If you have selected a GE piping system with one or two pumps for the A/C unit equipment, you can enter the start temperature of the pump(s) in the form of a positive temperature difference to the setpoint in an additional window. A pump switch-over occurs after 20 operating hours, provided 2 pumps are configured (Refer to P.17 "*Service/equipment/ cooling*" menu). If only one pump is configured, no changeover takes place.

Dry cooler operation

Dry cooler operation depends on water temperature, the temperature setpoint of the return air and in the case of the "external sensor" option also on the outside air temperature.
A distinction is made between two methods of operation, these being summer operation and winter operation.
With summer operation the start temperature for the dry cooler is entered in the "Control/ module function/cooling/dry cooler" menu and the hysteresis can be varied between 0 and 20 K.



If the water temperature drops sufficiently due to a falling outside temperature so that it is lower than the stop temperature for the dry cooler, this is only switched on for 10 minutes every 4 hours. If the water temperature in this time reaches a temperature of 2 Kelvin below the setpoint for the return air temperature, a changeover is made to winter operation. The start temperature for the dry cooler in this case is 10°C and the hysteresis is 3 Kelvin.



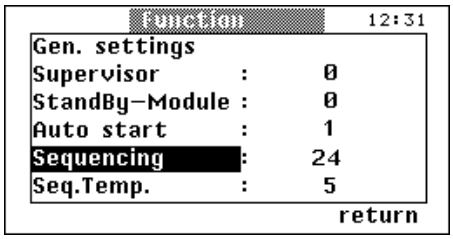
A second alternative that the controller changes over into dry cooler winter operation arises for the "External sensor" option if the outside air temperature is 8 Kelvin below the setpoint for the return air temperature.

Note: A GE/CW-valve must be configured to have the dry coolers correctly started at a water temperature > 10°C in winter operation.

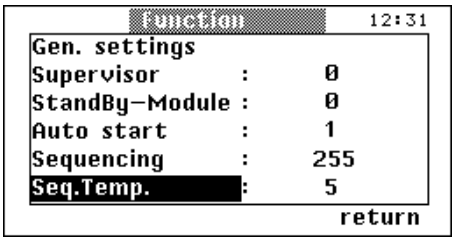
Internal sequencing for two units

Additional outputs and inputs are required to realise the sequencing function. An additional IO board is used in order to retain the existing outputs. In addition the ZLT/SEQ board offers the facility of assigning BMS* signals to the free outputs. The assignment of the outputs can be configured in the C5000 using software.
The sequencing function is configured in the service level of the C5000:

Unit 1:

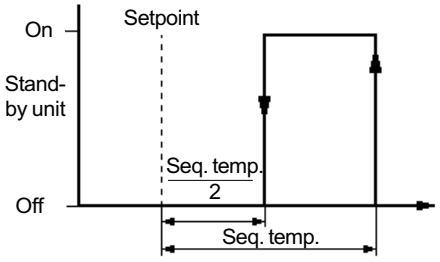


Unit 2:

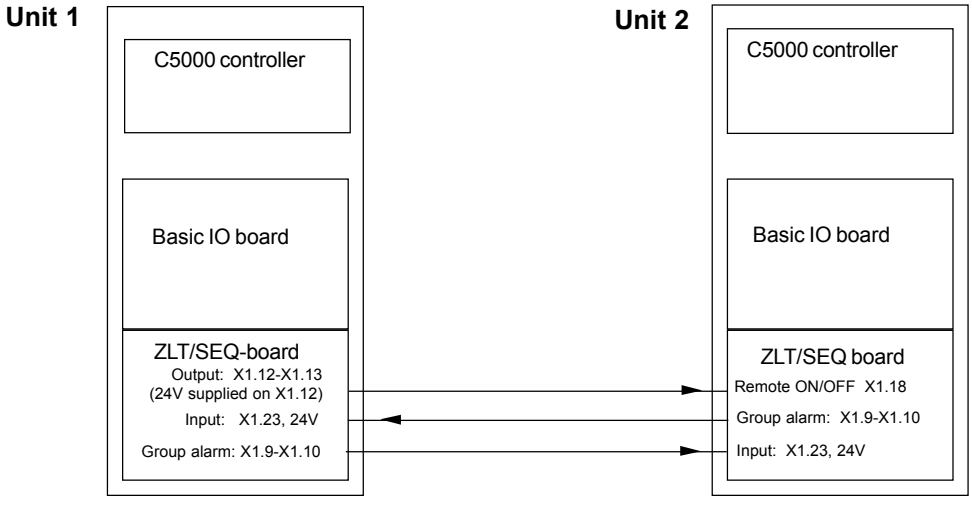


The sequencing time is set between 1 and 254 hours in Unit 1. Unit 2 must be set to 255 hours. A changeover always takes place on the hour. Value zero causes the deactivation of the sequencing function.

If the value seq. temp. (connection of load) is more than zero, the stand-by unit switches on, if the actual temperature is more than the instantaneous setpoint + seq. temp. value (in °K). When the setpoint temperature + seq. temp./2 is reached the stand-by unit switches off again. In the event of a fault the defective unit switches off and the other unit takes over. If there is a fault in both units, both units switch on in order to ensure the room is cooled if there are slight faults (e.g. humidifier defective). The connection of both units can be seen from the following sketch.



In order to test the sequencing function there is the facility of setting the clock of the controller to 59 minutes. The first changeover then takes place on the hour.

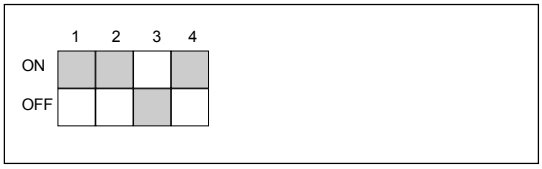


* BMS - Building Management System

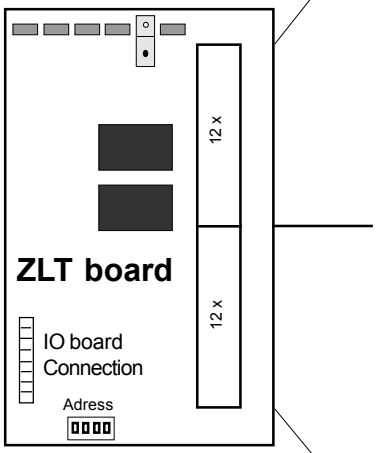
ZLT/SEQ board

The ZLT IO board provides the facility of supplying up to 7 BMS* signals (individual fault signals). The assignment of some outputs can be configured in the C5000 according to customer requirements (in menue **Control / preferences / alarm priority**). In this menu the additional alarm relays 11 - 16 are available. As a result the alarm outputs existing in the C4000 system can also be made available in the C5000 system.

The ZLT board is based on the existing hardware and only differs from the normal IO boards by the position of the address switch.



The two analogue outputs of the ZLT IO board
can be used to transmit the actual values for humidity and temperature to a BMS. Here the voltage of 0 V - 10 V corresponds to the temperature range of 0°C - 100°C and the humidity range 0% - 100% relative humidity.

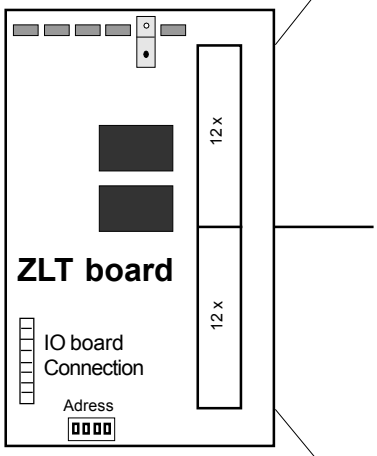


X1.1	GND
X1.2	Compressor fault (HP/LP) Module 1 (fixed)
X1.3	Compressor fault (HP/LP) Module 2 (fixed)
X1.4	Compressor fault (HP/LP) Module 3 (fixed)
X1.5	Alarm 11 (can be configured)
X1.6	Alarm 12 (can be configured)
X1.7	GND
X1.8	Alarm 13 (R) for sequencing: Copy of alarm relay 1
X1.9	Alarm 13 (A) for sequencing: Copy of alarm relay 1 (can be configured)
X1.10	Alarm 13 (B) for sequencing: Copy of alarm relay 1
X1.11	Alarm 14 (R) for sequencing: Unit#1 - > remote IO Unit#2
X1.12	Alarm 14 (A) for sequencing: Unit#1 - > remote IO Uni#2 (can be configured)
X1.13	Alarm 14 (B) for sequencing: Unit#1 - > remote IO Unit#2
X1.14	GND
X1.15	Actual temperature 0 V - 10 V = 0°C - 100°C
X1.16	GND
X1.17	Actual humidity 0 V - 10 V = 0% - 100% rH
X1.18	Remote ON/OFF remote (24 V = OFF)
X1.19	- FREE -
X1.20	- FREE -
X1.21	- FREE -
X1.22	- FREE -
X1.23	For sequencing: Group alarm from other unit
X1.24	- FREE -

Both relays X1.8 - X1.10 and X1.11 - X1.13 are assigned exclusively for sequencing when using the sequencing function and are not available as an alarm output.

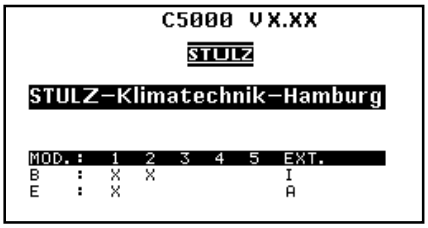
* BMS - Building Management System

From version 1.40 the assignment of the outputs X1.3 to x1.6 depends of the number of configured compressors. This number corresponds generally to the number of modules (exception CW-units). So the above mentionned outputs are only available as compressor fault outputs, if the corresponding compressors are configured. Otherwise they are available as freely assignable alarms.



X1.1	GND
X1.2	Compressor fault (HP/LP) Module 1 (fixed)
X1.3	Compressor fault (HP/LP) Module 2 / Alarm 15 (can be configured)
X1.4	Compressor fault (HP/LP) Module 3 / Alarm 16 (can be configured)
X1.5	Compressor fault (HP/LP) Module 4 / Alarm 11 (can be configured)
X1.6	Compressor fault (HP/LP) Module 5 / Alarm 12 (can be configured)
X1.7	GND
X1.8	Alarm 13 (R) for sequencing: Copy of alarm relay 1
X1.9	Alarm 13 (A) for sequencing: Copy of alarm relay 1 (can be configured)
X1.10	Alarm 13 (B) for sequencing: Copy of alarm relay 1
X1.11	Alarm 14 (R) for sequencing: Unit#1 - > remote IO Unit#2
X1.12	Alarm 14 (A) for sequencing: Unit#1 - > remote IO Uni#2 (can be configured)
X1.13	Alarm 14 (B) for sequencing: Unit#1 - > remote IO Unit#2
X1.14	GND
X1.15	Actual temperature 0 V - 10 V = 0°C - 100°C
X1.16	GND
X1.17	Actual humidity 0 V - 10 V = 0% - 100% rH
X1.18	Remote ON/OFF remote (24 V = OFF)
X1.19	- FREE -
X1.20	- FREE -
X1.21	- FREE -
X1.22	- FREE -
X1.23	For sequencing: Group alarm from other unit
X1.24	- FREE -

An 'A' in the lowest line is shown in the switch-on display of the C5000 if a ZLT board is fitted to the system.



Stand-by operation

Only one module can be configured as a stand-by module in a unit. The stand-by module is not started when the unit is started. If the stand-by module is equipped with louvers, these remain closed when the unit starts.
The stand-by module runs with its own parameters and is only started by one of the following alternatives:

1. False start
2. Alarm start
3. Sequencing
4. Manual start

It is possible to switch off the stand-by module by entering a "0" at the "Stand-by module" item in the "Service/Gen. settings/Function" menu. In this case the module which failed previously starts again.

1. False start (highest priority)

The stand-by module is started if one of the following conditions occur in a module

- Air flow failure
- Compressor HP fault
- Compressor LP fault
- Heater fault
- Humidifier defective
- Ultrasonic defective

The defective module is switched off and the louvers (if fitted) are closed.

2. Alarm start (average priority)

The stand-by module is switched on at 1.5 Kelvin or 3% rel. humidity before reaching the limit values of the main type of control. The hysteresis is 1.0 Kelvin and 3% rel. humidity.

3. Sequencing (lowest priority)

Redesignating the stand-by module within a unit, is carried out once a week.
The stand-by module exchanges with modules which are identically equipped in sequence through the unit. The same equipment relates to:

- Cooling (compressor)
- Heating (electrical heater 1+2, refrigerant heater)
- Humidifying
- Dehumidifying

The parameters between the old and the new stand-by module are replaced in the process.

If the stand-by module is already started (due to false start, alarm start or manual start), the sequencing between the modules is suspended for this time. The weekly redesignation time shifts accordingly.

The weekly redesignation time can be reduced to 5 minutes for test purposes.

1. Switch off the voltage.
2. Keep simultaneously pressed the > button and the RESET button.
3. Switch on the voltage.
4. Release the buttons when the standard window is visible.

Switching off and on the voltage sets the redesignation time back to 1 week.

4. Manual start

The stand-by module can be started and stopped manually. This occurs in the "Service/ manual operation" menu. Refer to Pages 24/25.

Sensor broken

Valid value range of sensors (values measured by the sensor without readjustment)

Return air temperature	2...50 °C
Return air humidity	2...100 % rel. humidity
Supply air temperature	2...50 °C
Supply air humidity	2...100 % rel. humidity
Water temperature	-47...+50 °C

If one of the measured values is outside the specified range, the sensor is recorded as defective.
If only part of the sensor (temperature or humidity) fails, the operative part continues to be used for the control. The defective part is ignored and no longer contributes to the control.

If sensors for return air **and** supply air are fitted, the defective sensor is switched off and the appropriate type of control for the operative sensor is selected. If, for example, the return air sensor fails during return air control with supply air limitation, changeover is made to supply air control.

In this case, the new set values are the supply air set values, which can be adjusted previously by switching over to supply air control (*ServiceControl**Control type*).**

If a water sensor fails, the pumps and the dry cooler are switched on permanently, if cooling or dehumidification is required.

Signals

General definition

A signal always appears on the display if the entered limit values are exceeded or if any components of the A/C unit do not work satisfactorily. A distinction is made between four types of signals.

Limit value alarms	Always occur if the entered limit values of the control of the A/C unit are not achieved or are exceeded. Limit value alarms are also evaluated in stop-mode.
Unit faults	Always occur if components of the A/C unit are defective or do not work satisfactorily. If a component is not configured, the corresponding alarm is passive. Example: If no electrical heater in the 2nd module is configured, the alarm input "electrical heater fault" in the 2nd module has no function. The alarms "fire alarm" and "water alarm" are also evaluated in stop-mode. Other alarms are only evaluated in start-mode.
Internal faults	Occur when there is a controller or peripheral components which are defective or do not work satisfactorily.
Information texts	Occur if redundant circuits are developed or service intervals have expired.

An alarm is displayed by a text output on the display of the controller, an audible signal and by the alarm lamp (LED) lighting-up. If you operate the "Reset" button, the alarm tone stops. Operating the "Reset" button again cancels the alarm. However the alarm occurs again if the cause of the fault has not been eliminated. After an alarm signal the cause of the fault must be eliminated in accordance with the "Fault/cause elimination" chapter in the unit-specific operating instructions.

If an alarm input is provided with +24V, no alarm is displayed. In a lack of voltage (cable rupture also) the alarm is displayed.

Possible signals on the display

Display	Delay	Cause
Limit value alarms		
Room temp. too high	Adjustable between 0 - 2550s	Act. val. greater than limit val.
Room temp. too low		Act. val. less than limit val.
Supply air temp. too high		Act. val. greater than limit val.
Supply air temp. too low		Act. val. less than limit val.
Water temp. too high		Act. val. greater than limit val.
Water temp. too low		Act. val. less than limit val.
Room humidity too high		Act. val. greater than limit val.
Room humidity too low		Act. val. less than limit val.
Supply air hum. too high		Act. val. greater than limit val.
Supply air hum. too low		Act. val. less than limit val.
Unit faults		
Air flow failure	D (15s after US)	Fan failure/V-belt defective
Compressor LP fault	0-255s after CS	Insufficient refrigerant
Compressor HP fault	3s + V	Compressor defective
Electrical heater fault	3s + V	Heater has over-heated
Humidity defective	3s + V	Steam humidifier defective
Filter fault	D (15s after US)	Filter contaminated
Supervisor alarm	D	Actual value > or < limit value
Conductivity failure	30 min. + D	Conductivity > 5µ S
Ultrasonic fault	30 min. + D	Conductivity > 20µ S
Pump 1 fault	3s + D	Glycol pump (GE) defective
Pump 2 fault	3s + D	Glycol pump (GE) defective
Dry cooler fault	3s + D	Dry cooler defective
Water alarm	D (10s after US)	Water in raised floor
Auxiliary alarm 1	D (10s after US)	(Freely assignable)
Auxiliary alarm 2	D (10s after US)	(Freely assignable)
Auxiliary alarm 3	D (10s after US)	(Freely assignable)

D : Adjustable delay 0-255s (*Service/adjustment/delay* menu)
US : Unit start
CS : Compressor start

Display	Delay	Cause
Fire alarm	0s	Fire/Fire alarm system
RT sensor broken	5s	Room temp. sensor cable broken
RF sensor broken		Room humidity sensor cable broken
ZT sensor broken		Supply air temp. sensor cable broken
ZF sensor broken		Supply air humidity sensor cable broken
WT sensor broken		Water temp. sensor cable broken
AT sensor broken		Outside temp. sensor cable broken
E1 sensor broken		External sensor 1 cable broken
E2 sensor broken		External sensor 2 cable broken
Internal faults		
I/O transmission fault B	0s	Connection or basic I/O board defective
I/O transmission fault E	0s	Connection or expansion I/O board defective
CAN bus fault	0s	Controller defective/cable connection or transmission faulty
Information texts		
Service due	8 o'clock*	Service interval expired
Supervisor	0s	Controller works as supervisor
Supervisor failure	0s	Supervisor defective
Supervisor operation	30s	Controller defective
Stand-by module active	0s	Main module defective/limit value exceeded
UPS	0s	Uninterrupted power supply

* The information/alarm is delayed until 8 o'clock the next day.

Default settings of the controller at the factory

Temperature	Min	Setpoint	Max °C	Menu
Room	5	24.0	35	Control/temperature
Supply air	5	---	35	
Water	-20	---	45	

Humidity	Min	Setpoint	Max % r.H.	
Room	5	45	90	Control/humidity
Supply air	5	---	90	

	Setpoint + Kelvin M1	M2	M3	M4	
Compressor					Control/module function/
Start temperature					cooling/compressor
lst stage	0.7	1.1	1.5	1.9	
Start temperature					
2nd stage	0.9	1.3	1.7	2.1	
Hysteresis	0.7	0.7	0.7	0.7	
Suction valve (option)					Control/module function/
Start temperature	0.0	0.4	0.8	1.2	cooling/suction valve
Gradient, proportional	0.5	0.5	0.5	0.5	
GE/CW valve (option)					Control/module function/
Start temperature	0.1	0.5	0.9	1.3	cooling/GE/CW valve
Gradient, proportional	0.6	0.6	0.6	0.6	
GE off	23	23	23	23	
GE dehumidification	7	7	7	7	
Glycol pump (option)					Control/module function/
Start temperature	0.3	0.3	0.3	0.3	cooling/pumping
Hysteresis	0.3	0.3	0.3	0.3	
	Water temperature				
Drycooler					Control/module function/
Start temperature	34	35	36	37	cooling/drycooler
Hysteresis	2	2	2	2	

	Setpoint - Kelvin				
Electrical heater (option)	M1	M2	M3	M4	Control/module function/
Start temperature EH1	1.5	2.0	2.5	3.0	heating
Hysteresis EH1	0.5	0.5	0.5	0.5	
Start temperature EH2	2.0	2.5	3.0	3.5	
Hysteresis EH2	0.5	0.5	0.5	0.5	
Start temperature HZ3	1.0	1.5	2.0	2.5	
Hysteresis HZ3	0.5	0.5	0.5	0.5	
LPHW valve (option)					Control/module function/
Start temperature	1.5	2.0	2.5	3.0	heating/LPHW valve
Gradient, proportional	0.5	0.5	0.5	0.5	

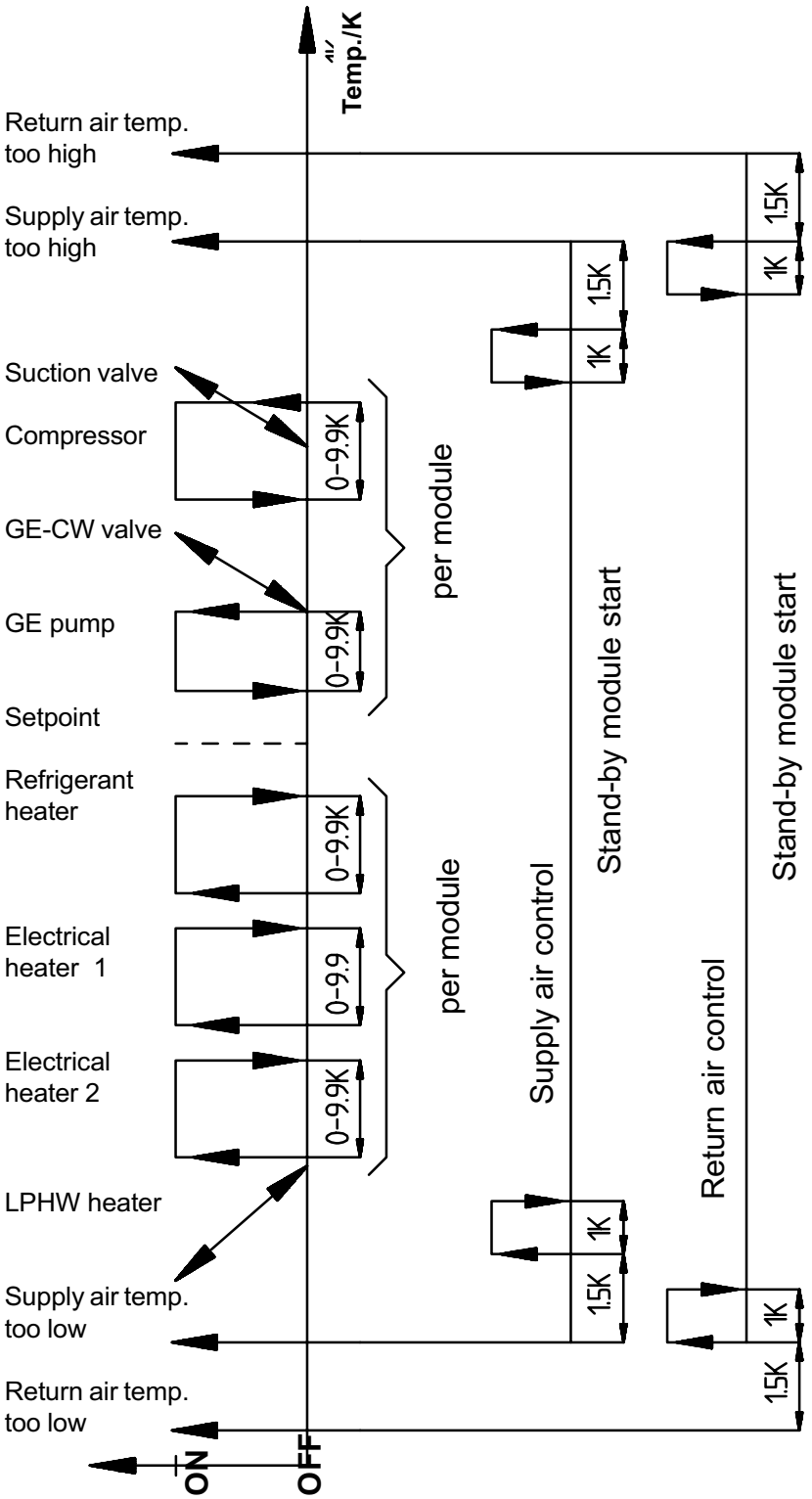
	Setpoint - % rel. humidity				
Humidification (option)					Control/module function/
Start humidity	5	10	10	10	humidification
Hysteresis	5	5	5	5	
Use, proportional	0	0	0	0	
Gradient, proportional	10	10	10	10	
	Setpoint + % rel. humidity				
Dehumidification (option)					Control/module function/
Start temperature	10	15	20	20	dehumidification
Hysteresis	10	10	10	10	
	Setpoint - Kelvin				
Dehumidifying stop	5	5	5	5	

Settings	
Type of control	Room
Delay	sec.
System	0
Stage	5
Temp./humidity alarm	40
All alarms	0
Compressor interval	240
Fan	60
Louver	90
Winter start	180

Function	
Supervisor	0
Stand-by module	0
Autostart	1
Sequencing	0
Seq. temp.	0
Interfaces	
Baud rate	9,6
Parity	N
Stop bit	1
Data flow	XON
CPU address	1

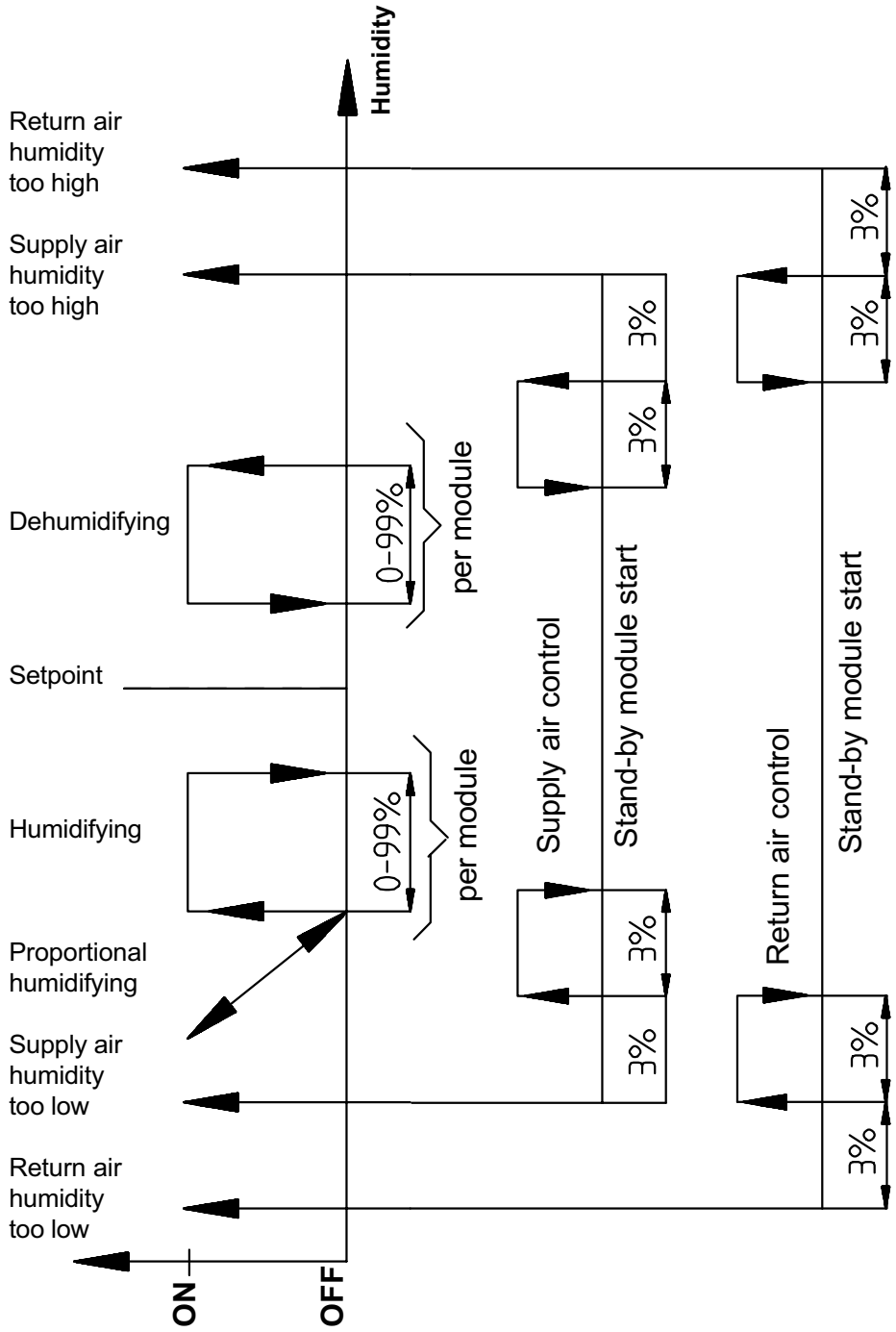
Control diagram

Temperature control



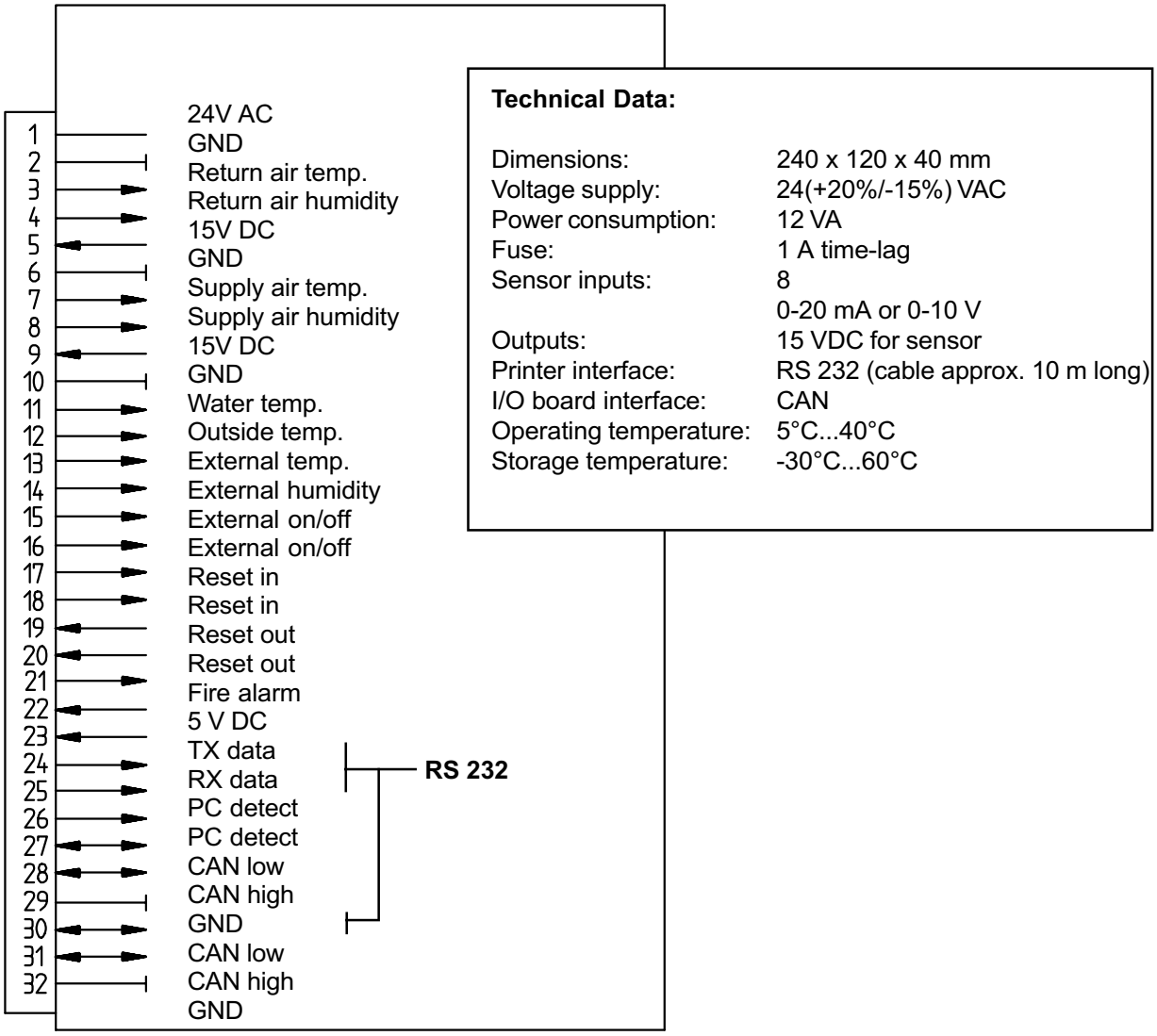
Control diagram

Humidity control



Controller

Connection assignment and technical data

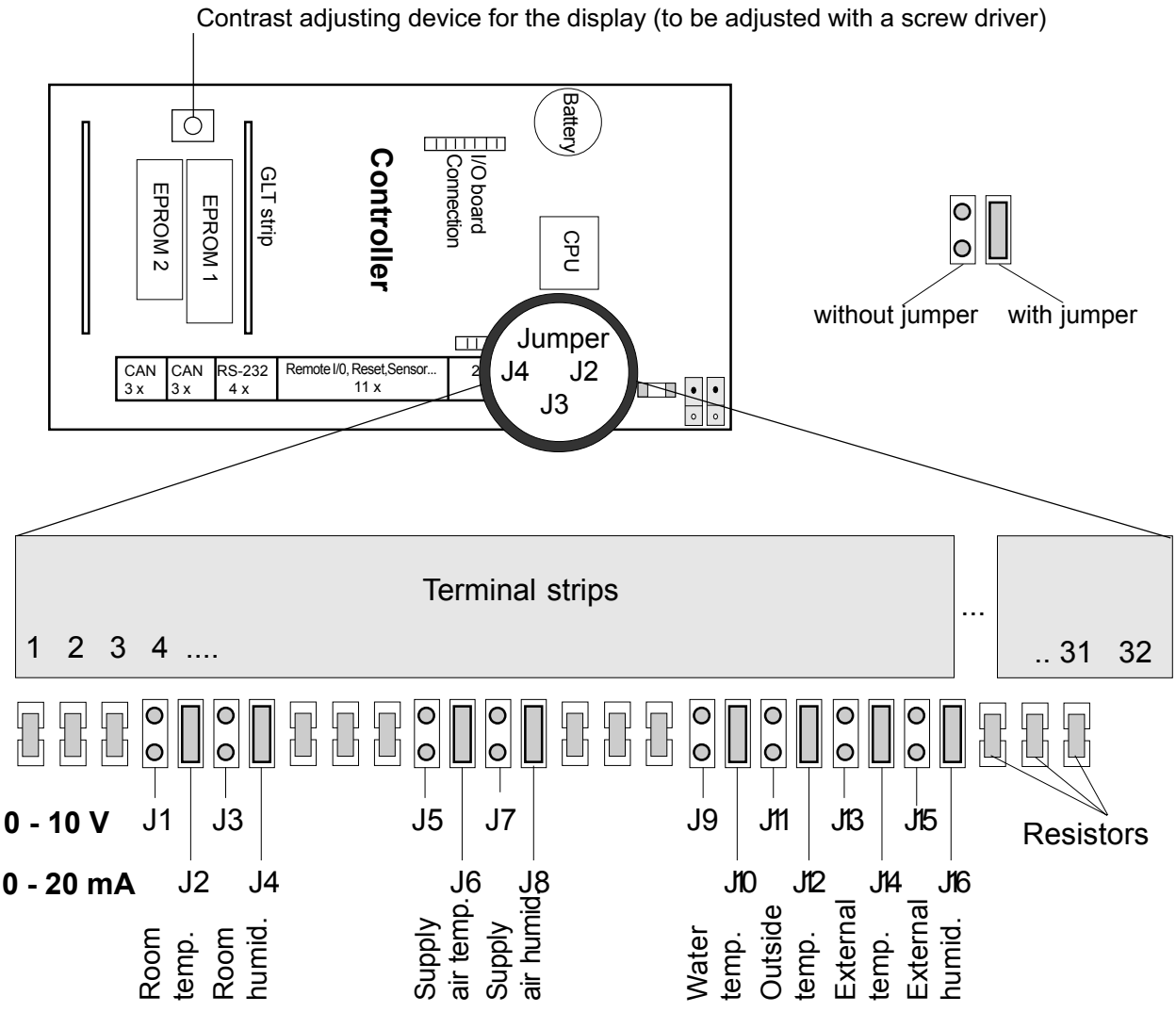


Adjustments on the controller board

a) Jumper positions for various sensor signals on the C5000

b) Contrast adjustment of the LCD-display

(All jumpers are set to a sensor signal of 0 - 20 mA at the factory)

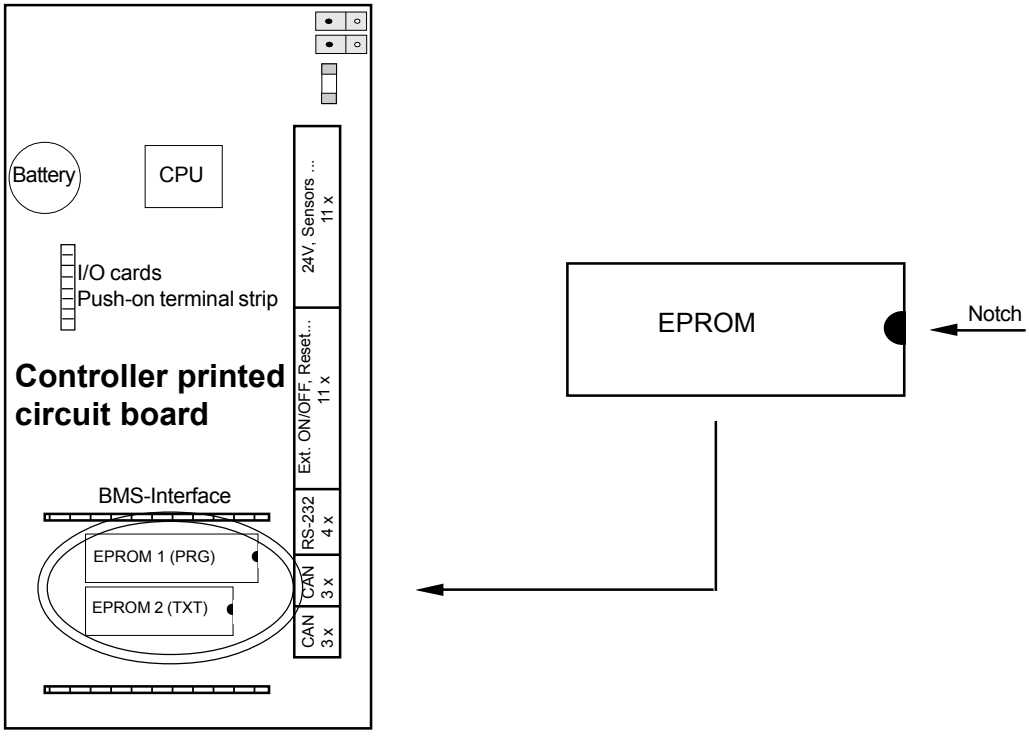


Replacing the EPROM set on the C5000 controller

The unit must be switched off at the master switch before you start the work. It is wise to note or print out the parameters set as all parameters must be re-entered after changing the EPROMs.

Use a small screwdriver to carefully prise the EPROMs out of the sockets on both sides until the EPROMs can be removed by hand.

Before installing the new EPROMs it may be necessary to bend the "small legs" on both EPROMs somewhat closer together on a smooth surface, so that the EPROMs can be more easily installed in the socket. When you install the new EPROMs ensure that the small notch on the EPROM is on the same side as shown in the following drawing.



After the EPROMs have been replaced, the master switch can be switched on again. When switching on, ensure that the new version number as well as the connected I/O cards are correctly displayed.

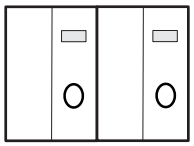
In the next step all parameters, if they deviate from the default settings, must be readjusted. The default language is English. If you require another language, you can change this in the "*Control\Preferences\Languages*" menu.

Installation of new software while keeping the parameters

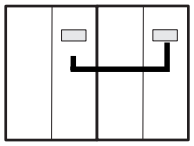
The installation of new software without loosing the parameters is only possible with the presence of a supervisor. The following description is based on a 2-module-unit with the controller in the first module and the supervisor in the second module.

Mod.2 Mod.1

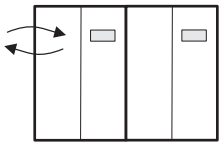
1. Switch off all modules at the main switch (if existant) or disconnect the 24V voltage from the controllers.



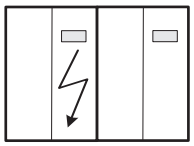
2. Disconnect the cable between the controller and the supervisor (pin 17 to 20 on the C5000).



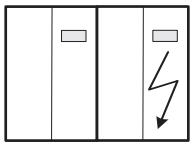
3. Exchange the supervisor-software.



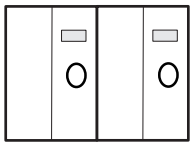
4. Switch on only the module with the supervisor (mod. 2). The new software is reset from the supervisor mode back to controller mode.
Set the supervisor function to "1" in the menu **Service / Gen. settings / Function**.



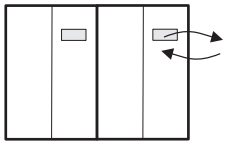
5. Switch on the module with the controller too (mod. 1). The parameters will now be transmitted from the controller to the supervisor. After a short "beep" the transmission is accomplished.



6. Switch off all modules.

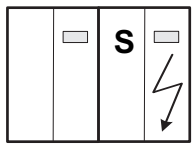


7. Exchange the controller-software.

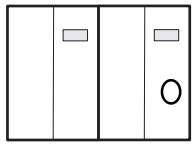


Mod.2 Mod.1

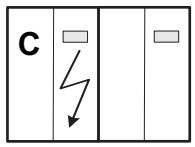
8. Switch on module 1 only. Set the supervisor function to "1" in the menu **Service / Gen. settings / Function**.
The C5000 in module 1 is now in supervisor operation mode too.



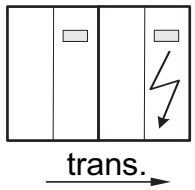
9. Switch off module 1.



10. Switch on module 2 only. Set the supervisor function to "0" in menu **Service / Gen. settings / Function**.
The C5000 in module 2 is now in controller operation mode.

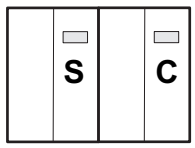


11. Switch on module 1 too. The parameters will now be transmitted from the controller (now module 2) to the supervisor (now module 1). After a short "beep" the transmission is accomplished.

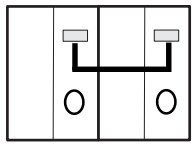


12. To restore the original constellation
- set the supervisor function to "0" in module 1
- set the supervisor function to "1" in module 2

in the menu **Service / Gen. settings / Function**.



13. Switch off all modules and replace the cable between the controller and the supervisor (pin 17 to 20 on the C5000). The changes will take effect after switching on all modules.



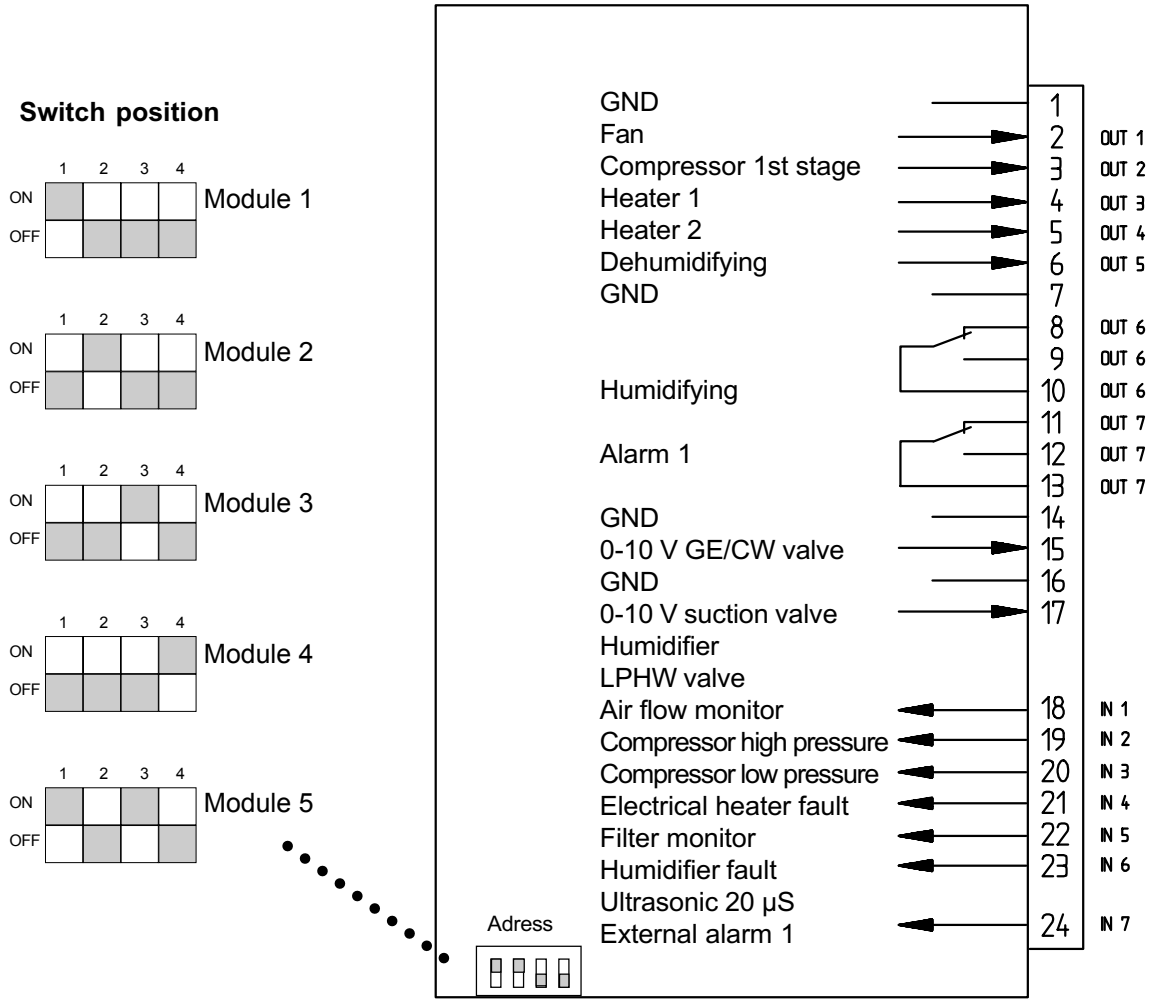
Legend:

switch on the voltage.

O switch off the voltage.

Standard I/O board (A,G,GE-version)

Connection assignment and technical data

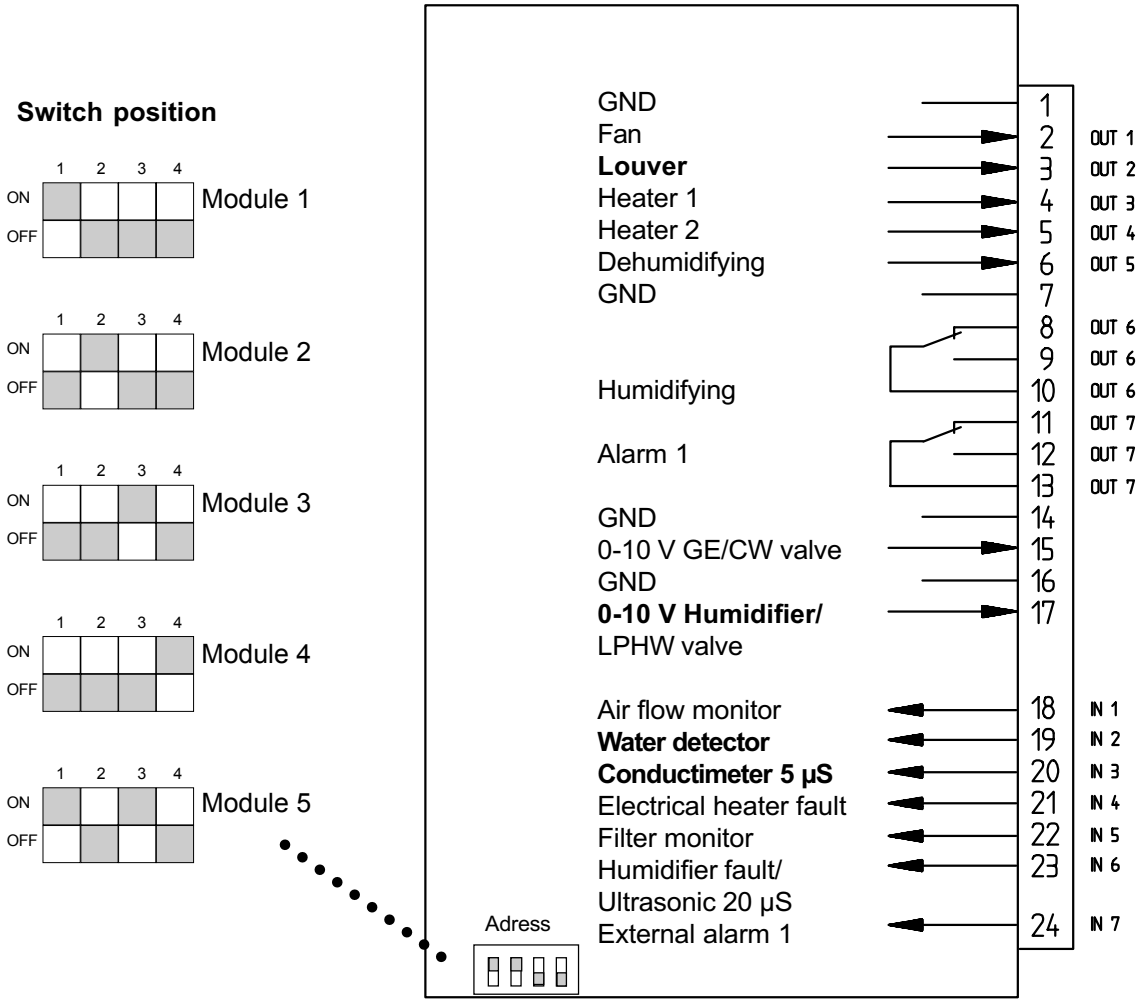


Technical data:

Dimensions:	145 x 100 x 30 mm
Voltage supply:	5 VDC / 15 VDC
Power consumption:	4 VA
Alarm inputs:	7 (24 VAC/DC) 24V = no alarm
Outputs:	2 analogue 0-10 VDC load rating: 20 mA 2 digital max. 10 A at max. 125 VAC 5 digital 24 VAC max. 6 A
I/O board interface:	CAN
Adjustable addresses:	1 to 5 (16 possible)
Operating temperature:	5°C - 40°C
Storage temperature:	-30°C - +60°C

Standard I/O board (CW-Version)

Connection assignment and technical data

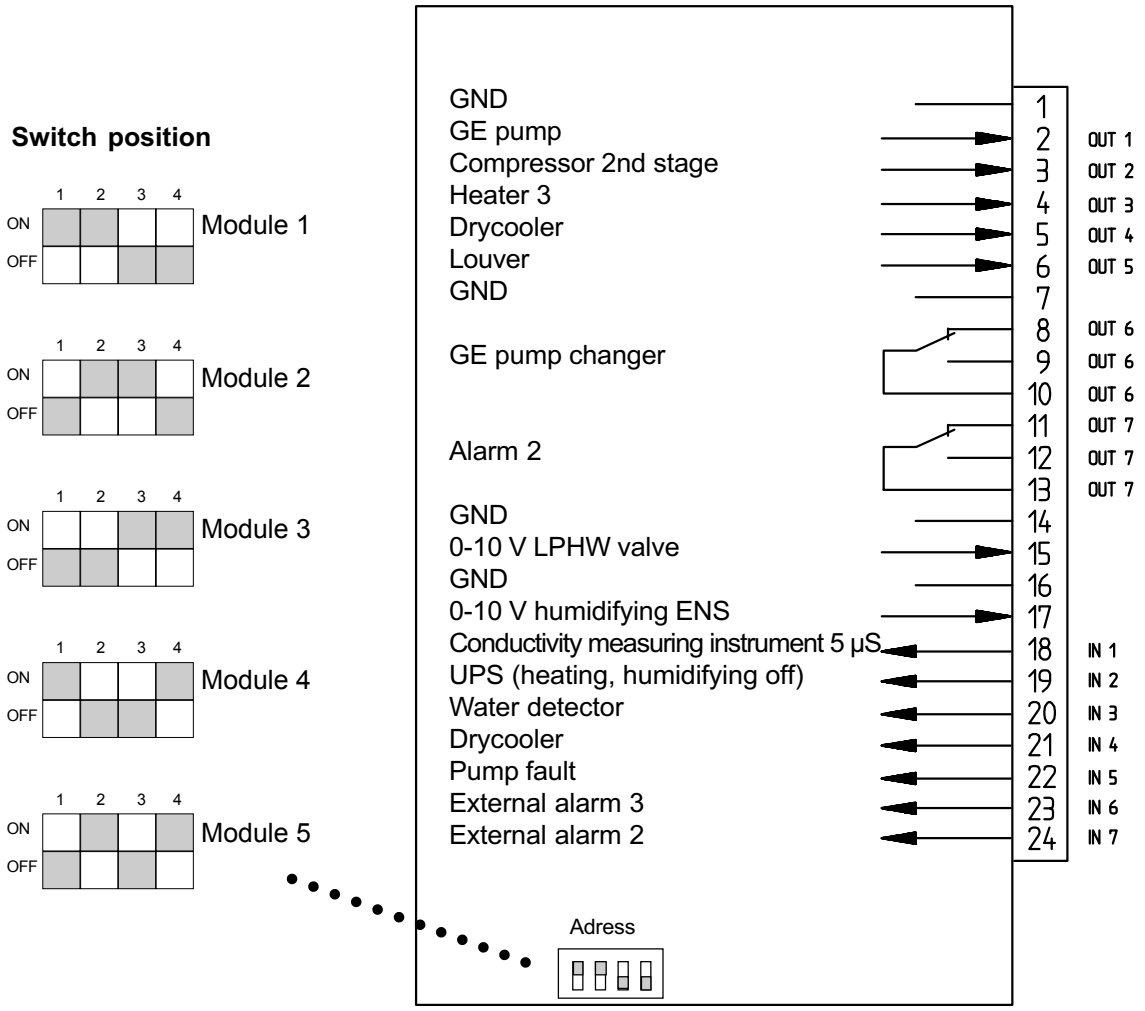


Technical data:

Dimensions:	145 x 100 x 30 mm
Voltage supply:	5 VDC / 15 VDC
Power consumption:	4 VA
Alarm inputs:	7 (24 VAC/DC) 24V = no alarm
Outputs:	2 analogue 0-10 VDC load rating: 20 mA 2 digital max. 10 A at max. 125 VAC 5 digital 24 VAC max. 6 A
I/O board interface:	CAN
Adjustable addresses:	1 to 5 (16 possible)
Operating temperature:	5°C - 40°C
Storage temperature:	-30°C - +60°C

Expansion I/O board

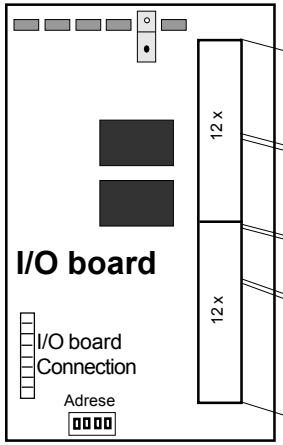
Connection assignment and technical data



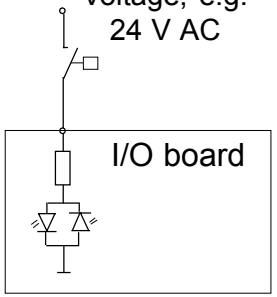
Technical Data:

Dimensions:	145 x 100 x 30 mm
Voltage supply:	5 VDC / 15 VDC
Power consumption:	4 VA
Alarm inputs:	7 (24 VAC/DC) 24V = no alarm
Outputs:	2 analogue 0-10 VDC load rating: 20 mA 2 digital max. 10 A at max. 125 VAC 5 digital 24 VAC max. 6 A
I/O board interface:	CAN
Adjustable addresses:	1 to 5 (16 possible)
Operating temperature:	5°C - 40°C
Storage temperature:	-30°C - +60°C

Connection of contactors, valves and sensors on the I/O board



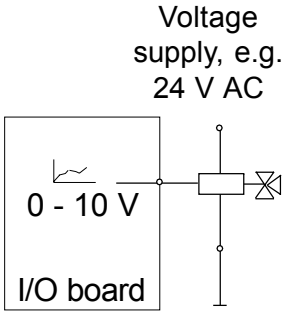
Digt. inputs



Optically decoupled inputs for 24 V AC and DC

Higher voltages possible with series resistor

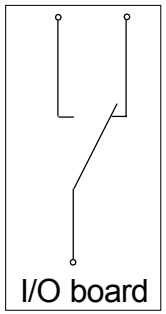
Analogue outputs



The analogue outputs supply a 0 - 10 V DC signal as a control voltage for the valves etc.

No power output

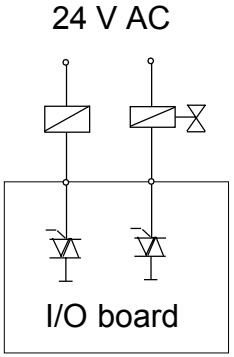
Digt. outputs



Floating contacts for arbitrary use.

Switching capacity:
Max. 10 A
at max. 125 V AC

Digt. outputs



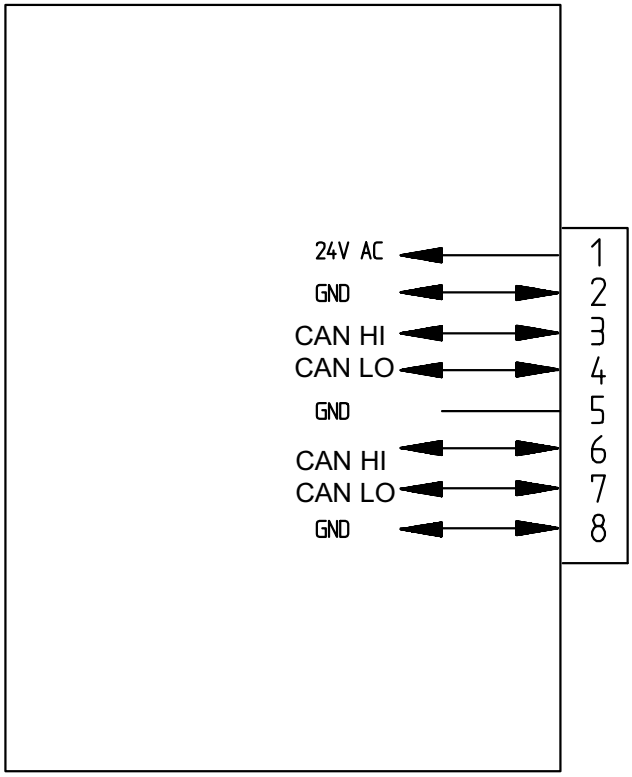
Switch Triac outputs to GND or 0 V.

DC voltages can-not be switched

24V AC max. 6 A

Supply printed circuit board

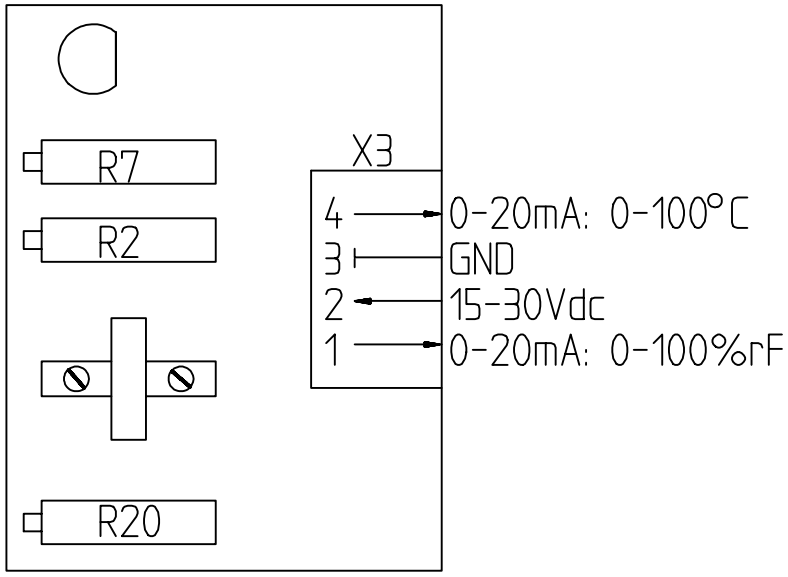
Connection assignment and technical data



Technical data:

Dimensions:	145 x 90 x 30 mm
Voltage supply:	24 (+20%/-15%) VAC
Power consumption:	power consumption 0.5 VA
Outputs:	5 VDC / 15 VDC with max. total output 15 W
Fuse:	1 A time-lag
I/O board interface:	CAN
Operating temperature:	5°C - 40°C
Storage temperature:	-30°C - +60°C

Temperature/humidity sensors



Notes on sensor calibration

1. Temperature (R7)
The fine adjustment takes place in the "*Control/preference/sensor calibration*" menu.
If the difference between the display and the reference thermometer is more than 5 Kelvin, it must be rebalanced at R7.

2. Humidity (R2)
The fine adjustment takes place in the "*Control/preference/sensor calibration*" menu.
If the difference between the display and the reference hygrometer is more than 10% rel. humidity, it must be rebalanced at R2.

3. Humidity (R20)
Calibration is only required if the display is correct at approx. 50% rel. humidity and a larger difference occurs at approx. 70% rel. humidity.

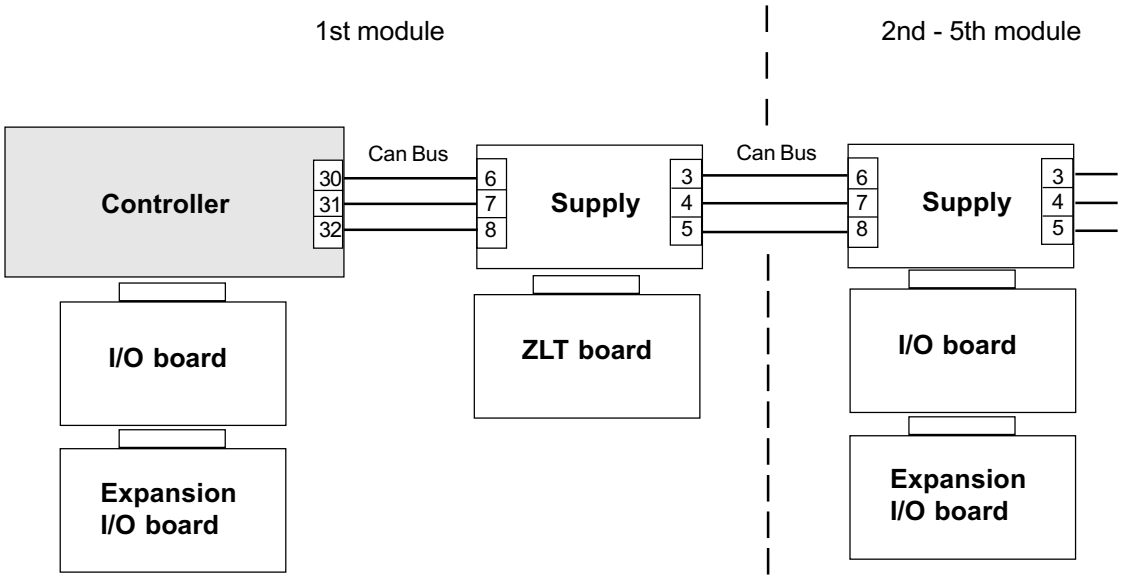
Readjustment of the resistors only on consultation with the factory (tel. ..49 40 / 5585 - 285).

System configuration

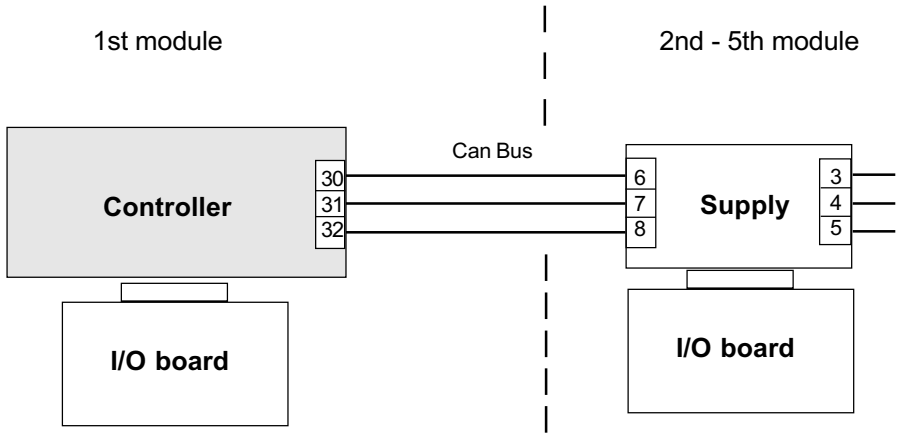
Wiring diagram of C5000 with I/O boards

With separate installation of modules the **maximum permitted cable length** between the controller and the last I/O-board is **30 m**. For this a special data cable must be used.

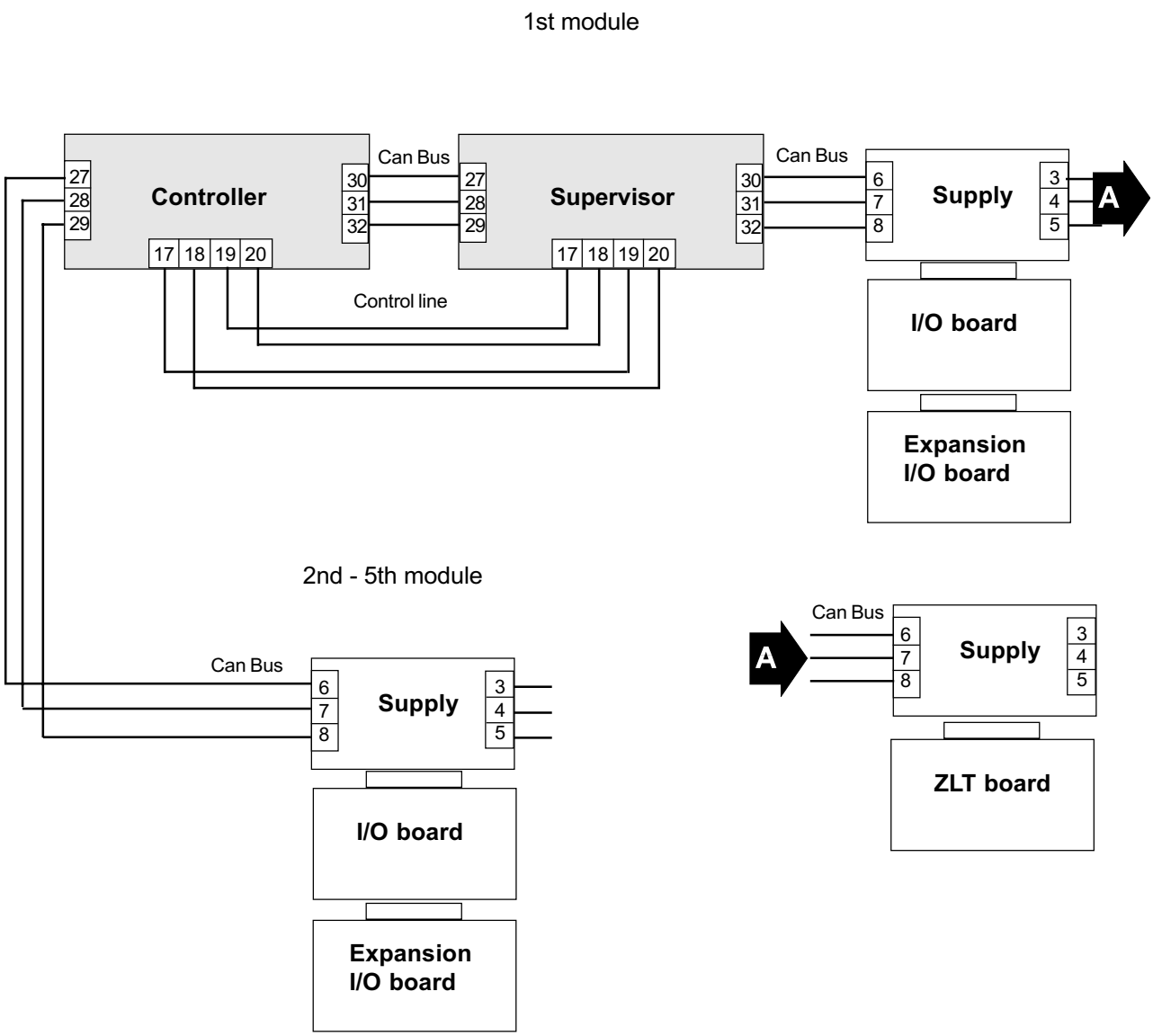
A. Maximum equipment



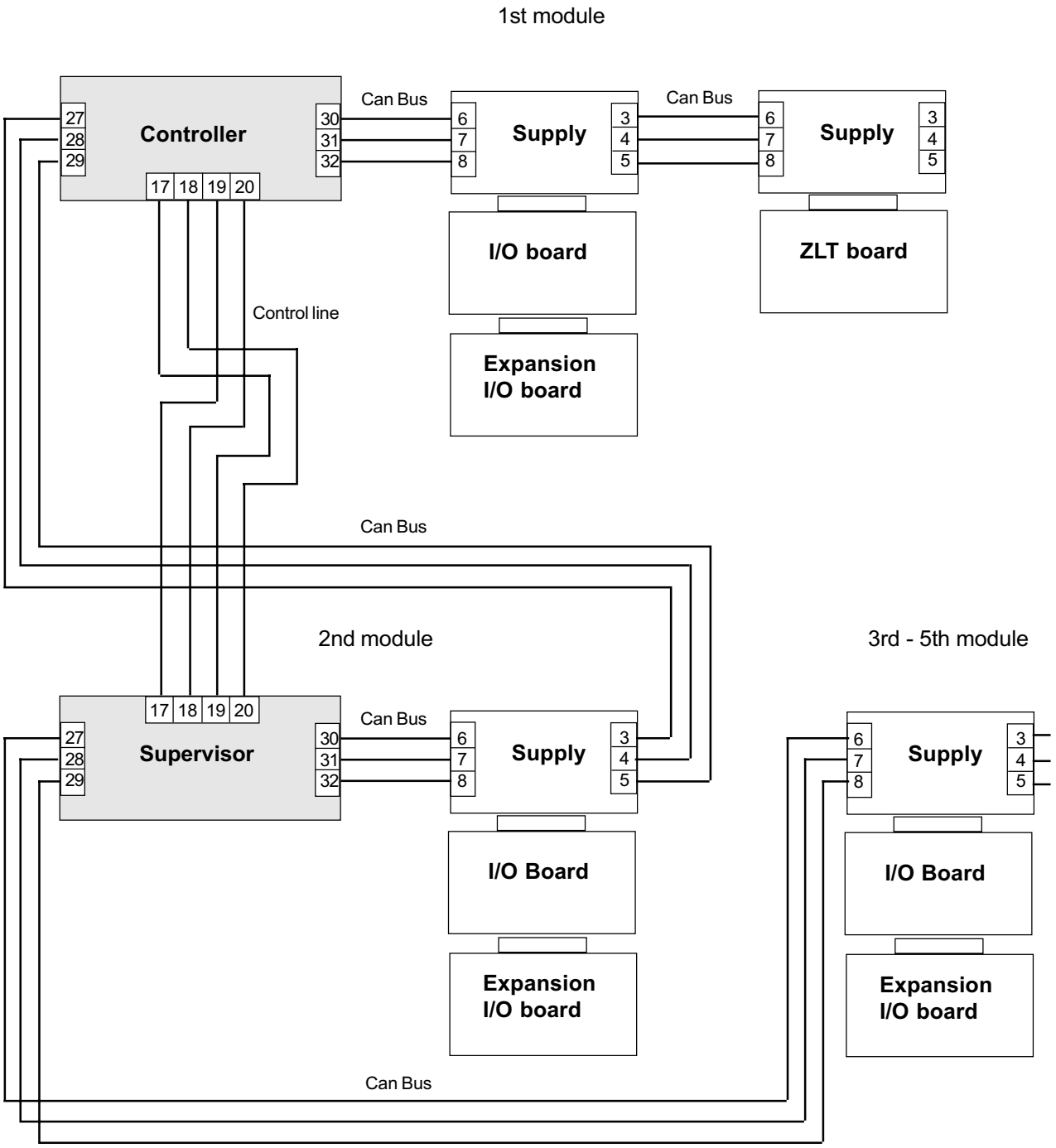
B. Minimum equipment



Wiring diagram of C5000 with supervisor in first module



Wiring diagram of C5000 with supervisor in second module

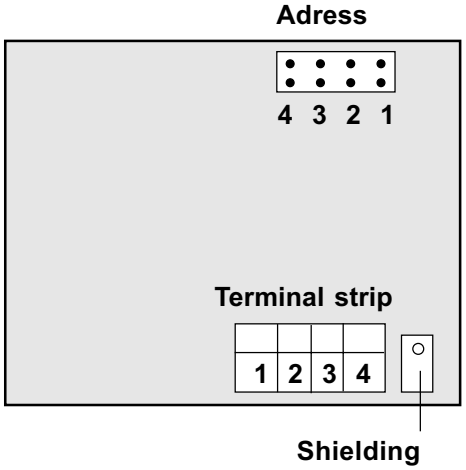


Description of interface cards

Card for C4000 relay board actuation

The C5000 max. interface card makes a further RS 485 interface available in the C5000 system. These interfaces are required in order to connect the relay boards of the C4000 system to the C5000 CPU and/or in order to incorporate the C5000 in the STULZ monitoring system or another building services management system.

The interface card is connected and screwed onto the system bus interface of the C5000 CPU. No other connection is required. Due to the mechanical design it is possible to put a second interface card on the first card, if, for example, apart from the connection of the C5000 to the relay boards of a C4000 system a further connection to a STULZ monitoring system is to take place.



Adress
The function (address) of the card is adjusted with a jumper.

Adress	Function
1	Interface for monitoring system or another building services management system
2	Interface for C4000 relay boards
3	reserved
4	reserved

Terminal strip
The data line is connected to this terminal strip.

Connection	Meaning
1	5 VDC (operating voltage of the interface card)
2	RS 485 dataline HIGH
3	RS 485 dataline LOW
4	0 V (ground of interface card)

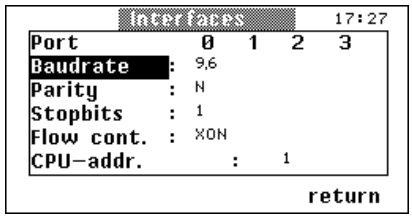
Shielding
The shielding of the dataline is connected to this 6.3 mm flat connector. This connection has no connection to the ground of the interface card. The ground potential must be brought in from outside.

Printer connection

A requirement for a printer connection is a serial RS 232 interface on the printer. The printer is connected to the terminals 23, 24 and to a ground (e.g. terminal 29) of the controller printed circuit board. Further adjustments can be made in the "Interfaces" dialogue window, corresponding to the technical data on the printer. Adjustments under Port 0 are substantial here.

The following adjustments are possible:

Baud rate (in k Baud)	Parity	Stop bit	Data flow
0.3	N	0	XON
0.6	E	1	XOFF
1.2	O		
2.4			
4.8		N: none	
7.2		E: even	
9.6		O: odd	
19.2			



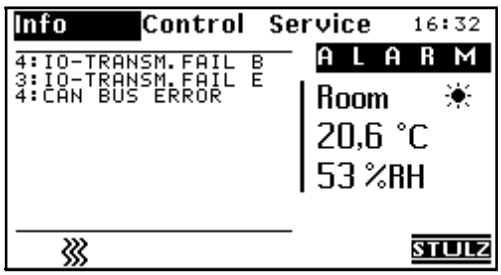
The "XON" setting must always be selected for the connection of a printer. All other settings must agree with the settings on the printer. If you use the STULZ printer cable, the assignment is as follows:

Printer	Printer cable with 25-pin plug	C5000
3 RX	white	23 TX
2 TX	brown	24 RX
7 GND	green	10 or 29 GND

Computer connection

You can also print the data to a file and have it displayed on a screen. To do this you must connect a PC at terminals 23, 24 and GND (e.g. 29) instead of a printer and provide terminals 25 and 26 on the controller printed circuit board with a bridge. In the menu window shown above the "XOFF" setting is selected for the type of data flow automatically if terminals 25 and 26 are bridged. As in the case of the printer, a serial RS 232 interface is also required on your PC.

Troubleshooting

Signal in display	Cause / elimination
	
1-5 : I/O transmission fault B	The data transmission with the basic I/O board is no longer operative. The number before the colon shows in which module the fault has occurred.
1-5 : I/O transmission fault E	Data transmission with the expansion I/O board is no longer operative. The number before the colon shows in which module the fault has occurred. **1.** First check whether the configuration of the A/C unit agrees with the actual equipment. *(Service/ equipment/modules menu)* **2.** Check the set addresses on the I/O board (refer to P.48-50). **3.** Check the cable connections in accordance with the appropriate wiring diagram (refer to P.54-56). **4.** If the fault still occurs after these checks and is continuous from a particular module onwards, presumably the cable connection between the last operative module and the first defective module is defective. Otherwise the I/O board is defective and must be replaced.
CAN bus fault	The controller is defective or the cable connection/ transmission to other supply printed circuit boards is faulty.

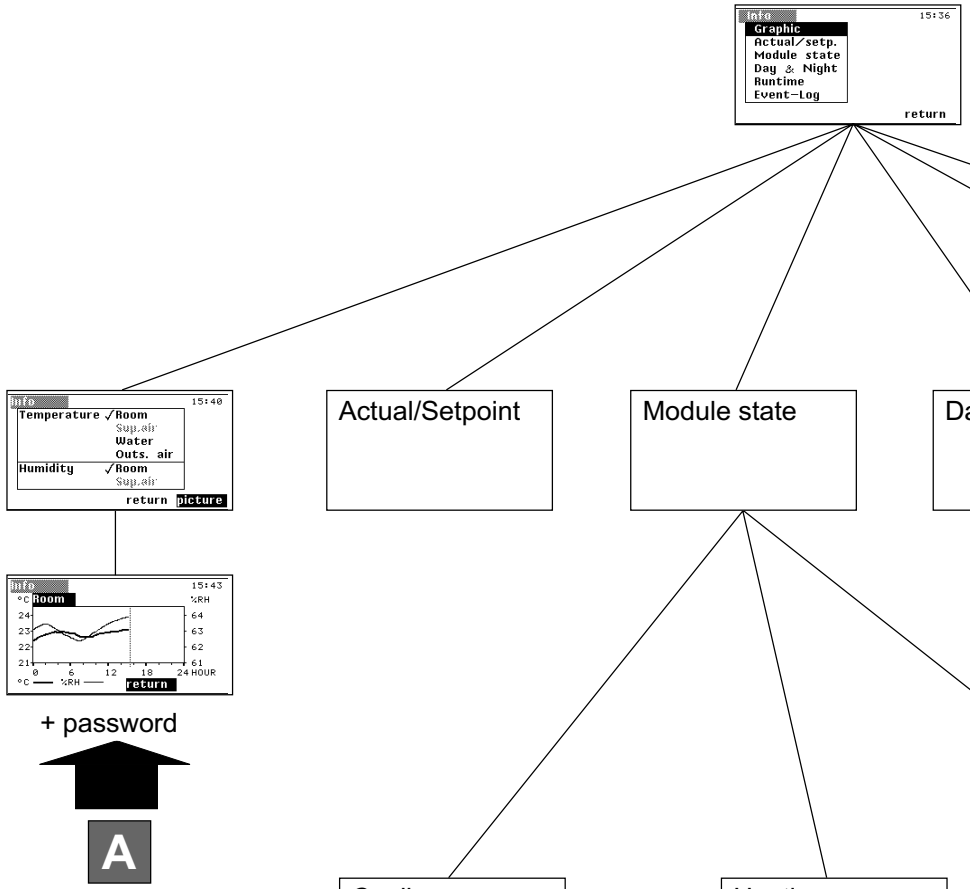
Checking the TRIACS

The TRIAC outputs are 0-switching, which means, that the appliance is at 24 V.

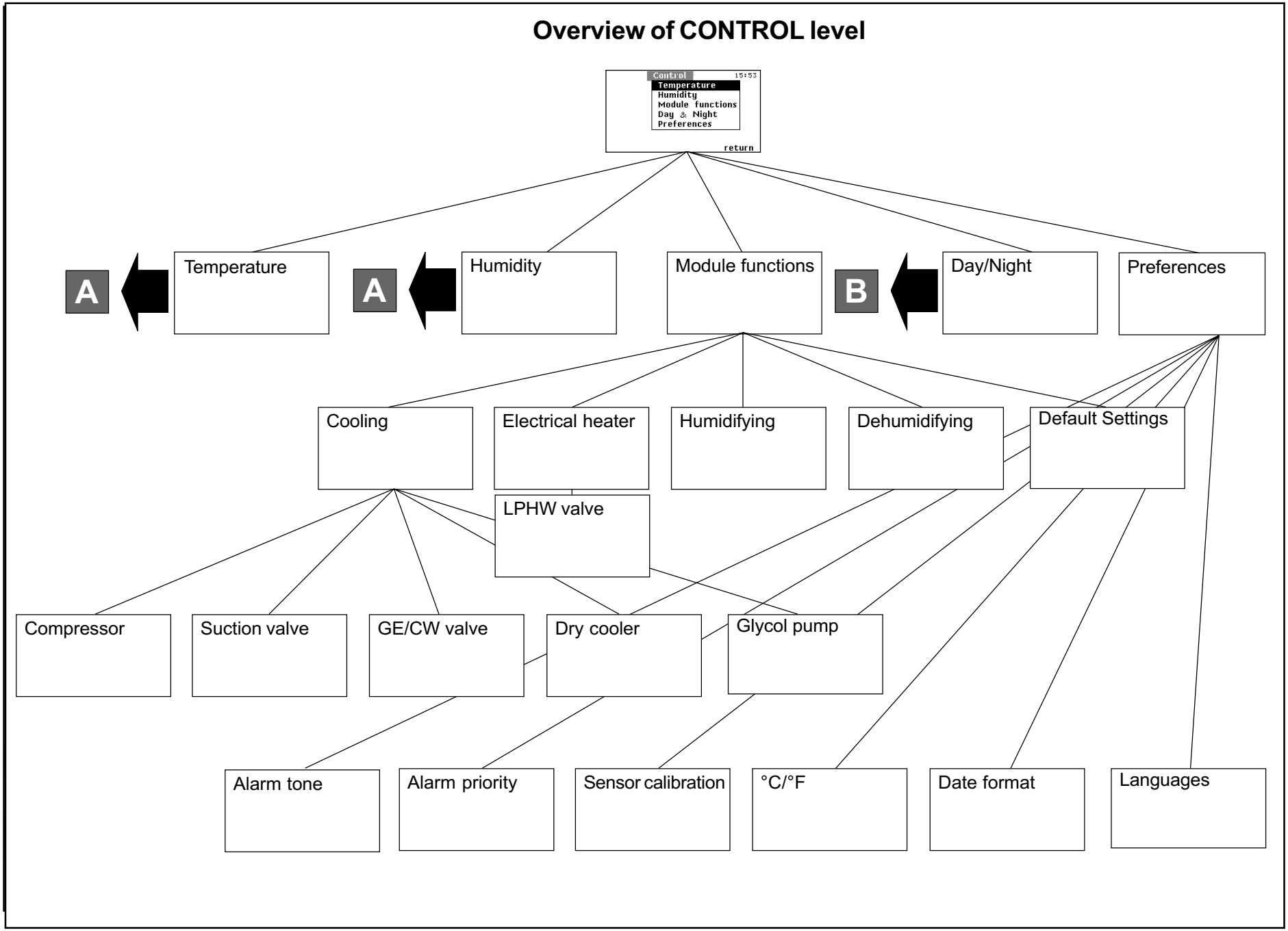
The function of a TRIAC must not be checked with an electronic continuity tester or Ohm meter. Measurements using such devices would give incorrect results, because a TRIAC requires a load for reliable functioning. Continuity testers with a bulb (approx. 2 W) are suitable for function checking.

The outputs are only designed for 24 VAC. Direct voltages cannot be switched.

Overview of INFO level



Overview of CONTROL level



Overview of SERVICE level