KL-6001
KL-6001-6
KL-6001-12

USER MANUAL

FOR THE

KL-6001 CLIMATE COMPUTERS

STIENEN

V01.56.0

Shut down power before opening the climate computer!

This climate computer contains exposed live parts!

Only to be opened by authorized personnel!

WARNING

Although utmost care has been given to the quality of this equipment during the design and manufacturing stages, technical malfunctions can never be ruled out. ***The user should provide for an adequate alarm system and/or emergency provisions to prevent a technical failure of the equipment and peripheral facilities leading to danger to persons, animals or property.***

NOTE DOWN THE FOLLOWING IN CASE OF AN EMERGENCY

- **Possible causes**
- **Circumstances in which the emergency occurred**
- **Date and software version number**
- **Hardware and DIP-switch settings**

Please contact our Customer Service Department, if you have any questions. Be sure to have all necessary data at hand. To ensure a speedy solution to the malfunction and to avoid any misunderstandings, it is advisable to note down the cause and the circumstances in which the malfunction occurred before contacting us (www.stienenbe.com).

Contents **Page**

If the software version of a module and / or peripheral device does not comply with the requirements of the operating software, you must perform a software update of the module and / or peripheral device.

CLEANING HR-SENSOR, CO_2 SENSOR OR MEASURING FAN WITH A HIGH-PRESSURE SPAY GUN IS NOT ALLOWED

Remove the RH-sensor and CO_2 sensor from the room and store them somewhere safe before cleaning the room. Also screw the protection cap onto the plug of the extension cables to prevent water from penetrating into the plug. When connecting the sensor via a fixed socket outlet (FSO), push on the flap of the fixed socket outlet until you hear it click (lock).

INTRODUCTION

Modern pig farming requires an optimum climate in the houses to achieve good operating results. As a rule, this is achieved by using a mechanical ventilation system. Important aspects in this respect are the air supply to the animals and the creation of proper air circulation. The air distribution in the house is strongly influenced by the type of air supply system. Effective ventilation controls, as are integrated in the KL-6001 series climate computer, can achieve a good air quality at animal level with a low ventilation flow rate. It speaks for itself that good climate control contributes to the animals' well-being.

The KL-6001 series climate computer enables you to fulfil virtually all your climate control wishes. The climate computer has practically all the possible ventilation controls, which are featured in modern pig farming. The climate computer controls the climate in the house in such a way that the correction ratio between temperature and ventilation is always guaranteed. To ensure that the climate in the house develops along with the growth of your animals, the climate computer has growth curves. By taking the influence of the weather into account, the climate in the house can be corrected depending on the weather conditions.

In the event of a power failure, an excessive temperature variation or an excessive ventilation variation, the alarm will be activated.

Since every situation is different, in practice only the control functions applicable to your specific situation will be activated. This makes the operation of the climate computer very easy and transparent.

Ventilation controls

The climate computer has several types of fan control for you to choose from per room. They are:

- ☐ Fan control, with or without a measuring fan.
- ☐ Fan with air inlet flaps.
- ☐ Switching on a second fan.
- ☐ Fan with measuring fan and automatic control flap (AQC unit).
- ☐ Fan control using step control.
- ☐ Controlled fan group and step control.
- ☐ Air mixing fan

Temperature controls

There are a number of heating control functions per department.
These can be applied as desired:

- ☐ Room heating.
- ☐ Floor heating.
- ☐ Inlet heating.
- ☐ Nest heating.
- ☐ Cooling.
- ☐ Temperature monitoring

Beside that, you can also install a timer and a water counter.

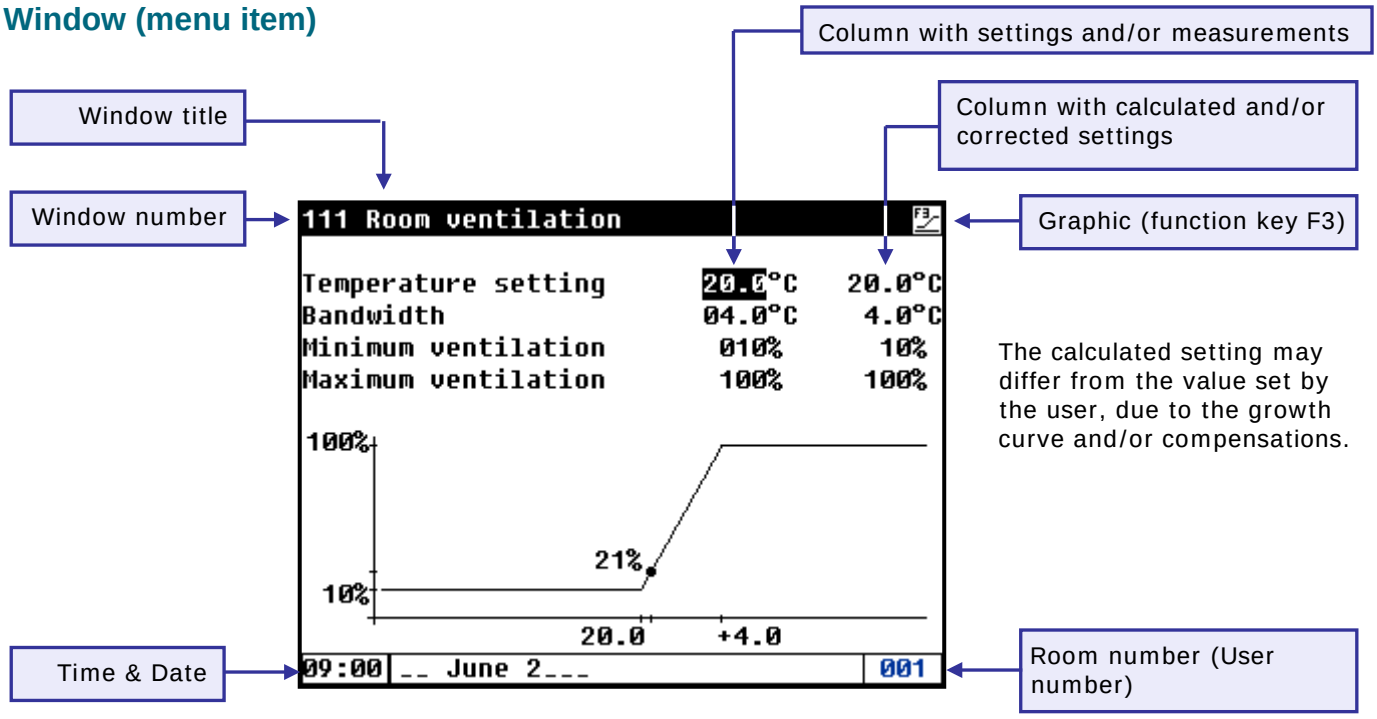
Central controls

Every climate computer has a number of central functions for ventilation and heating; these can be applied as desired:

- ☐ Central ventilation system by central fan control, with or without a measuring fan.
- ☐ Central ventilation system by step control.
- ☐ Central ventilation system by ECOVENT.
- ☐ Central heating control.
- ☐ Central air inlet flap.
- ☐ Temperature control.
- ☐ Heat exchanger
- ☐ Central cooling.
- ☐ Central timer.

The climate computer has a memory chip that saves all settings to ensure that the settings are retained even when the voltage is lost. You will only have to set the date and time again if the voltage has been down for a couple of days.

Window (menu item)



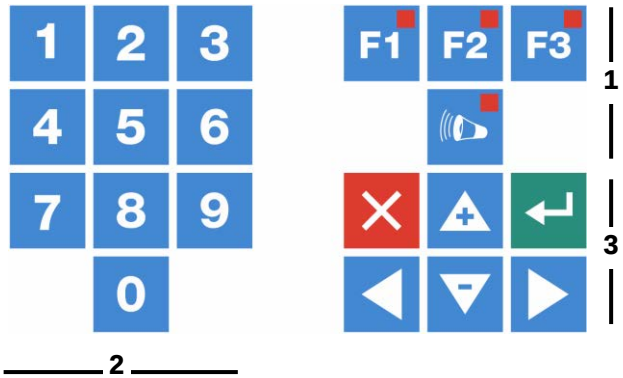
The calculated setting may differ from the value set by the user, due to the growth curve and/or compensations.

When the symbol is shown in the title bar and you press function key F3, the settings are displayed graphically with the dot (•) showing the calculated value. Press F3 again to switch off the graphic display.

Scroll-window

If a window contains more lines than the screen can display, the title bar will show the symbol. This symbol indicates that you can call up the remaining settings and/or measurements using the up and down cursor keys (▲ ▼).

Keyboard



The keyboard can be divided into three basic groups:

1. Function keys
2. Numerical keys
3. Navigation keys

Whenever a key is pressed, the display will be lit for a couple of seconds so that you can also see the settings and measurements in a dark animal house.

Caution: Only press the keys with the tip of your finger. Sharp objects such as a pen, pencil or screwdriver may damage the keys!

1 Function keys (help, graphic, alarm, previous / next room number etc.)

Function key F2 (room status)

Short key for room status window.

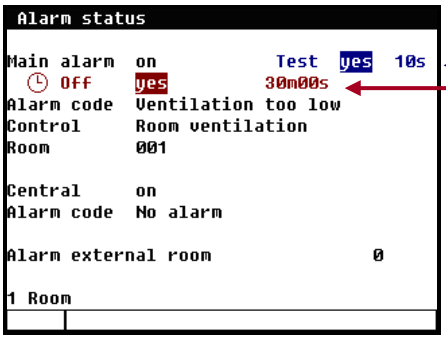
Function key F3 (graphic)

Use this function key to place a graph on a window. The “graph” function is active when the LED in the function key lights. You can switch off the “graph” function by pressing the function key again (the LED in the key is off then).

The values in a graph are linked to the window on the basis of which the graph was drawn up. The graph is updated automatically when you change the details in the window. Since the position of the graph is determined automatically, certain details in the window may no longer be visible.
If the details in the window are displayed in graph form, the symbol will be displayed in the top right corner of the menu line.

Alarm key

Short key for alarm screens.



Test *(alarm test)*: This enables you to test the operation of the alarm relay (siren). If you enter "yes" in the line **Test**, the alarm relay (siren) will be switched on for 10 seconds.

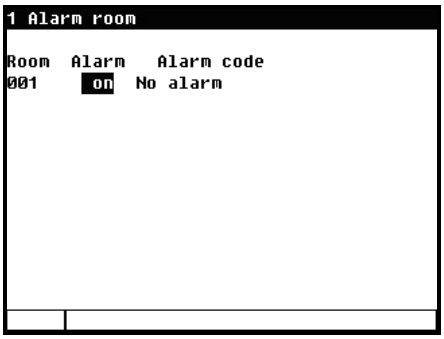
You can clear the alarm test time by setting "no" in the line **Test**.

Off **Off** ***(alarm temporary off)***: This enables you to temporarily switch off the alarm (siren). This does not apply to the hardware alarms. The main alarm is switched off for 30 minutes (the lamp will flashes irregularly). The main alarm is switched on automatically again after 30 minutes. The alarm relay will then de-energize again, causing an alarm, if the cause of the alarm has not been removed.

You can clear the temporary alarm deactivation time by setting "no" in the line **Off**.

If the alarm relay is de-energized (alarm delay time has lapsed) the cause of the alarm relay being de-energized will be displayed. In addition, you can switch the main alarm on and off. When the main alarm is off, the LED in the alarm key will flash to indicate that the main alarm is off. The LED in the alarm key lights if there is an alarm in one of the rooms and/or central controls. In addition to the cause of the alarm, the control and the room number where the fault occurred will be displayed. The terminal number to which the alarm relates is listed behind “Room” (in this example this is: sensor number 00K01 which is faulty).

Room



If you press numerical key 1 or if you select “1 Rooms” using the cursor and you then press the enter key, the adjacent window will be displayed.

You can switch the room alarm per room on or off in this window. In addition, it displays the current alarm code of the room.

Note **NEVER FORGET TO SWITCH AN ALARM "ON" AGAIN** after switching it off, e.g. to solve a problem, since this may have harmful effects on people, animals, equipment or goods.

Preferably use the Off *(alarm retard)* function to solve a problem.

KL-61 manual control

The room ventilation can be set manually by turning the control knob on the KL-61. **The current room status is changed to “Cleaning”** (see also page 8).

ATTENTION! The states MANUAL CONTROL, CLEANING, PRE-HEATING and NOT IN USE *influence the alarm operation* of the climate control; *ONLY USE THESE STATES IF THERE ARE NO ANIMALS IN THE ROOM*. We advise you to use the MANUAL CONTROL, CLEANING, PRE-HEATING and NOT IN USE states with due care.

Terminal number in-/outputs

The terminal number of an input/output consists of the module address, the type of input/output and a 2-digit serial number. The module address is between 00 and 31. The type of input/output is indicated by a letter in accordance with the table below. The index number must be between 01 and 99 (00 means that the input/output is not used).

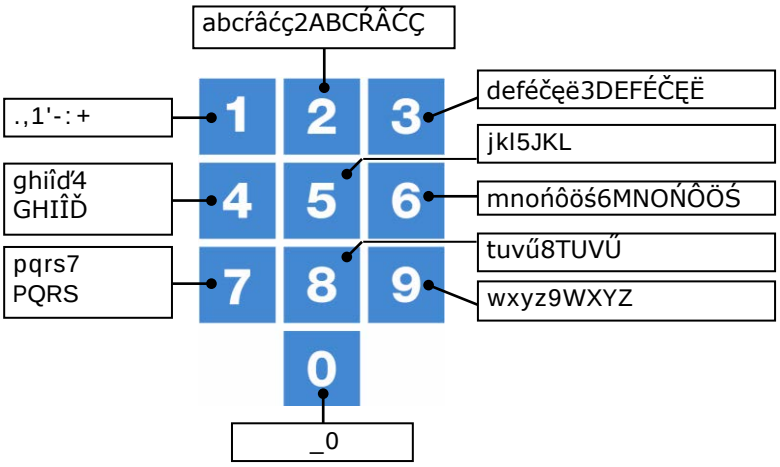
I/O type	Letter	Index	Explanation
0-10V output	**A**	1-99	Analogue output with a range of 0-10V or 10-0V.
Relay output	**B**	1-99	Relay contact output (***this does not include:*** solid state relay, alarm relay, digital outputs etc.)
Digital output	**C**	1-99	This includes solid state relays outputs, modulating outputs etc. (24..230Vac 500mA)
Open-/close control	**D**	1-99	Open-/close control with position feedback signal. This includes e.g. flaps with position feedback signal such as EGM-100P or ELM150 etc.
Manual control	**E**	1-99	Manual control module for cleaning one room.
30-230Vac output	**F**	1-99	Analogue output with a range of 30-230Vac or 230-30Vac.
2-10V output	**G**	1-99	Analogue output with a range of 2-10V with position feedback signal. This includes e.g. flaps with position feedback signal such as EGM-100CA/EGM-250CA
Air inlet flap	**H**	1-99	MCAflap; wind compensated air inlet flap.
Temperature sensor	**K**	1-99	This includes all types of temperature sensor fitted with 10K NTC resistor (N10B, BV10B etc.)
0-10V inputs	**L**	1-99	Analogue input with a measuring range of 0-10V. To connect components such as measuring sensors (RH, pressure etc.)
Digital input	**M**	1-99	This includes measuring fans, counter contacts etc.

The terminal number is preceded by the module address on the screen.

Temperature settings

With all controls, expect the room, the inlet, the nest, the floor temperature and the central controls, the temperature is relative to the room temperature if its setting is below 10.0°C. If a temperature equal to or higher than 10.0°C is set, this will be an absolute temperature setting.

2 Numerical keys



The numerical keys can be used to enter a screen number, a value or text.

Entering text

Numerical keys 2..9 can be used to change the name of a control group (left, right, front, rear etc.), a timer or a counter. The maximum text length is 15 characters (including spaces). The character you enter is shown in a little box. Press the numerical key repeatedly until the required character is shown. You can enter a punctuation mark by repeatedly pressing numerical key 1 until the required punctuation mark is shown. You can enter a space using the 0 key.

Press once for **a**, twice for **b** etc. You can move the cursor with the ▶ and ◀ keys. Where relevant, e.g. for menu options etc., the text will automatically start with an initial capital.

Add/remove breakpoint or period

- ❑ Press the [Enter] key (edit mode)
- ❑ Press and hold the [F1] function key and then press the:
- ❑ [+] key to add a breakpoint/period (provided that the maximum value for periods/breakpoints has not been reached)
- ❑ [-] key to remove a breakpoint/period (provided that there is at least one period/breakpoint)

The number of breakpoints/periods is adjusted automatically.

3 Navigation keys (menu, cursor, mode)

✕ (cancel)

This key cancels changes or menu option selections.
Press and hold this key to select the main menu.

◀ ▶ (move cursor)

Move cursor

Holding down the key: move cursor to the first/last setting on the screen.

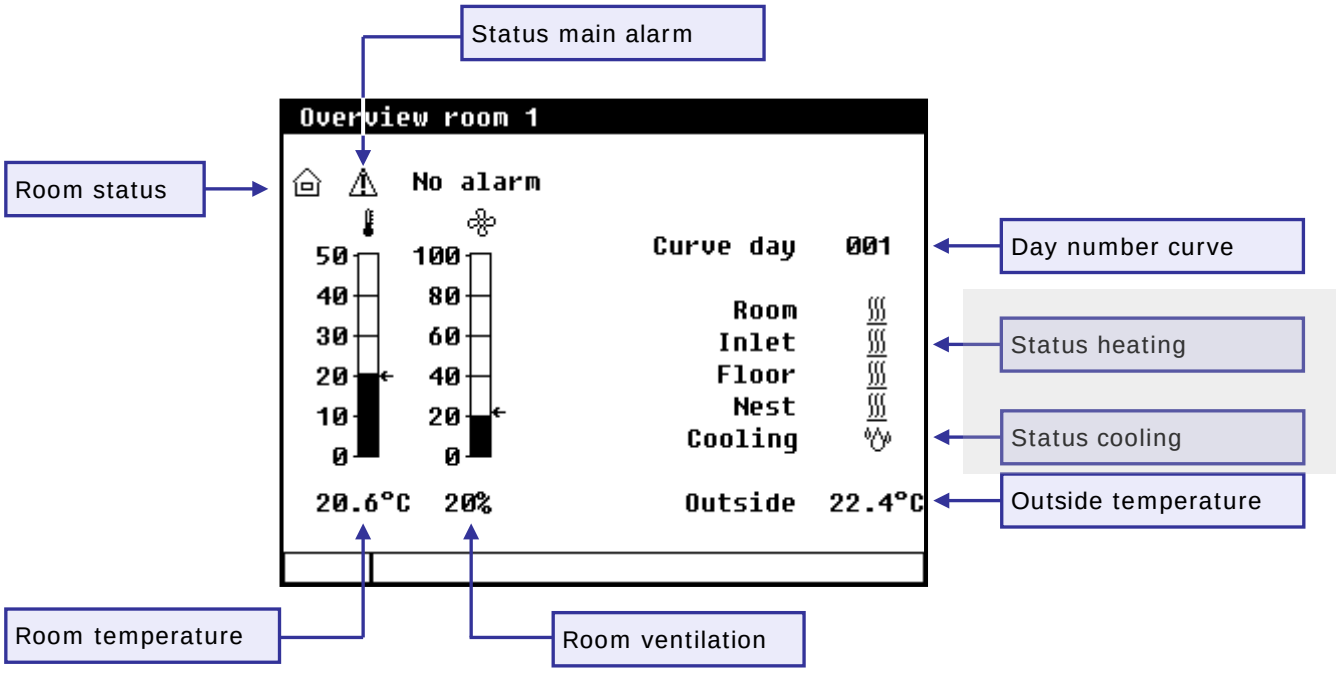
Move cursor or change value

↵ (confirm)

Menu option selection
Start change
Confirm change

- ❑ The cursor is displayed as a black rectangle, e.g. 19.5°C.
- ❑ While a change is being made, the cursor is displayed as a black border, e.g. 19.5°C.
- ❑ A changed setting is stored in the EEPROM after 30 seconds.

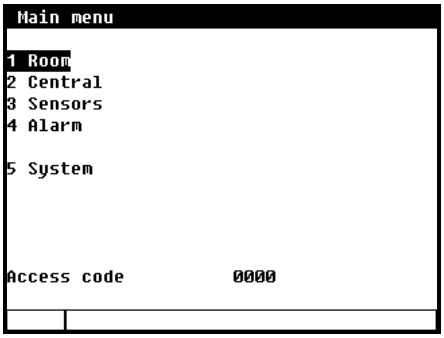
OVERVIEW



Room	Symbol	Description
Status		Column with room numbers (user numbers)
		Room not in use
		Pre-heating room
		Cleaning room
		Measuring fan room x is switch-off (room is part of central ventilation system)
Alarm		Status main alarm (alarm relay is on)
		Main alarm is switch off
		Alarm in room (alarm delay time is not yet elapse)
	[NO]	No alarm
Heating		Heat request in room
	[NO]	No heat request in room or heating not installed
		Room heating is switch off by user
Cooling		Soaking active
		Cooling on
	[NO]	Cooling off

◄ calculated set point

MAIN MENU



Access code

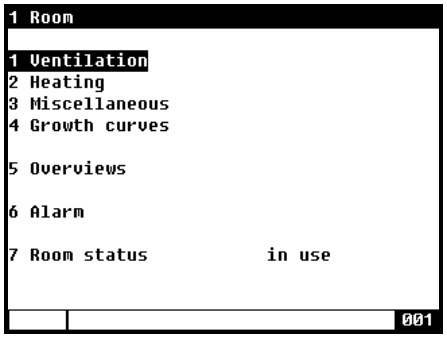
You can use an access code to protect your computer against unauthorised access. If you want to prevent non-authorised users from changing settings on your climate computer, you can have an access code set. An access code consists of a combination of 4 figures. You can have an maximum of 6 access codes set by your installer.

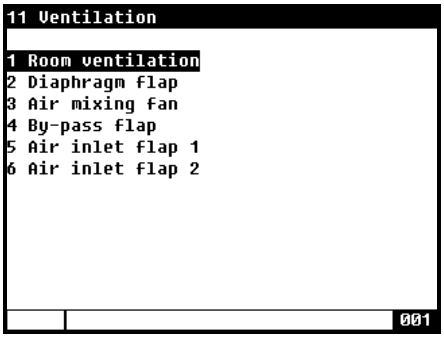
You can have a separate access code set for the status screen (see page 30).

If you use access codes, it is advisable to write the code down and store it somewhere safe. If you forget the access code, you can no longer change any settings. As soon as one access code is active, you can only change the setting by entering the correct access code. The access code remains active until you select the “Overview” window. After selecting this window you will have to enter the access code again to be able to change a setting.

1 ROOM

Ventilation

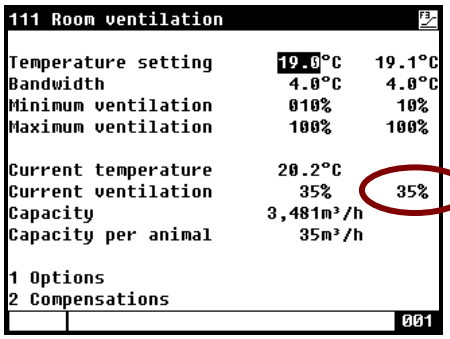




An AQC flap is also referred to a diaphragm flap with a measuring fan. If an AQC flap has been installed in the room, the “Diaphragm flap” menu option will be blocked for the room in question (“----------“).

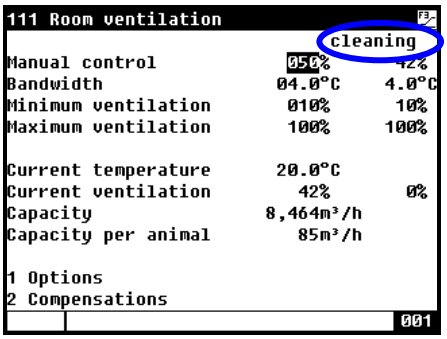
Room ventilation

The main thing to prevent is that too much cold air is drawn in abruptly. That is why the room temperature and the bandwidth have to be set high enough to enable the control to minimise the effects of outside temperature variations on the room.



Compensations can cause the calculated value to differ from the value setting.

If a measuring fan has been installed, the ventilation measured is displayed here.

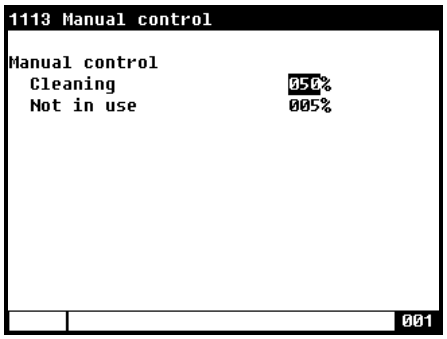


Room temperature

The temperature, at which the room ventilation system controls, is also referred to as the room temperature. The required room temperature depends on several factors.

Manual control

At “*cleaning*” or “*not in use*” state you can enter the desired ventilation behind “Manual control” (set value and calculated value are equal). If the room has determined that the KL-61 is on manual operation, the current status of the room is set to "cleaning" and the potentiometer position of the KL-61 is taken over as the calculated manual operation (set value and calculated value are not equal).



You can also set the ventilation percentages for *cleaning* and *not in use* in screen “1113 Manual control” in advance. The corresponding settings are applied as soon as the *cleaning* or *not in use* conditions become applicable to the room.

ATTENTION! The MANUAL CONTROL (CLEANING states) *influence the alarm operation* of the climate control; *ONLY USE THIS STATE IF THERE ARE NO ANIMALS IN THE ROOM.*

Bandwidth

The bandwidth determines the 'sensitivity' of the fan. A short bandwidth will cause the fan to react to a rise in temperature very quickly. A bandwidth of 4 to 7 °C, depending on the outside temperature, is to be advised (also see 'Automatic bandwidth compensation' on page 53).

Minimum and maximum ventilation

If compensation depending on the fill ratio has been installed, the minimum and/or maximum ventilation will be adjusted to the number of animals in the room.

Current temperature

This line displays the current room temperature.

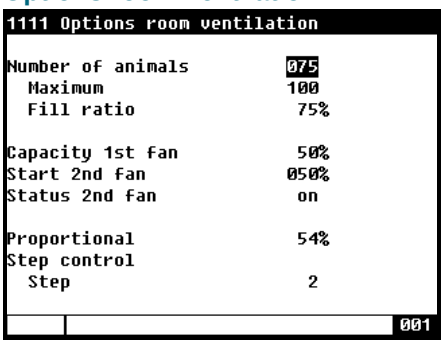
Current ventilation

If room ventilation is controlled using a measuring fan, the measured and calculated ventilation values will be shown in this line. If the room does not have a measuring fan or if the measuring fan is defective, **the calculated ventilation** will be equal to the “measured” ventilation (with step control the ventilation level is adjusted every 30 seconds instead of immediately).

Capacity

The calculated ventilation is expressed here in m^3/h. The following line will display the calculated ventilation capacity per animal in m^3/h if the fill ratio option has been activated.

Options room ventilation



Number of animals

To be able to express the ventilation capacity per animal in m3/h, the climate computer needs to know how many animals there currently are in the room. Enter the current number here.

Maximum

The maximum number of animals for which the ventilation capacity should be sufficient under normal conditions must be entered here.

Fill ratio

As a rule, less ventilation will be required in a room,
which is not completely filled with animals. E.g. if the room is filled for only three quarters, the minimum and maximum ventilation values might be lowered by 25% to still allow optimum ventilation. The fill ratio is calculated on the basis of the maximum number of animals and the current number of animals in the room.

Every now and then, the animals may have to stay in the room longer than initially planned. In such cases you can lower the maximum number of animals for which the room was designed, causing the fill ratio to rise to above 100%. This will result in the minimum and maximum ventilation being increased without you having to adjust other settings.

Capacity 1st fan / Start 2nd fan

If you use a 2nd fan circuit, “Capacity 1st fan” will list the exhaust capacity of the 1st fan relative to the total exhaust capacity of the 1st and 2nd fans. The capacity of the 1st fan is calculated on the basis of the capacities your electrician have entered for each fan group. You should set the percentage at which the 2nd fan group is to be switched on behind “Start 2nd fan”. Also see 2nd fan group on page 42.

Example: Capacity 1st fan $4400 m^3/h$ capacity 2nd fan $5600 m^3/h$

$$\textbf{Capacity 1st fan} = \frac{4400}{4400 + 5600} \times 100\% = 44\%$$

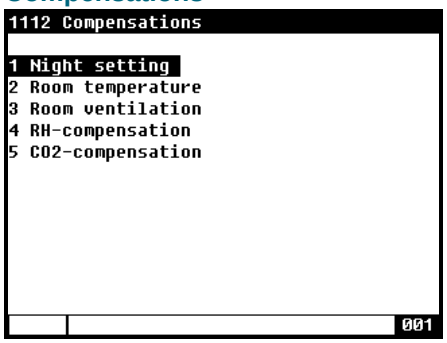
Proportional

The current ventilation of the controlled ventilation group is shown on this line.

Step control

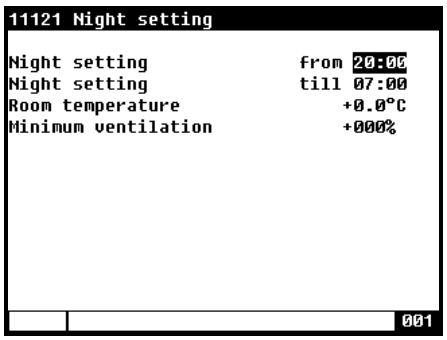
The current step number is shown if a step control is installed.

Compensations



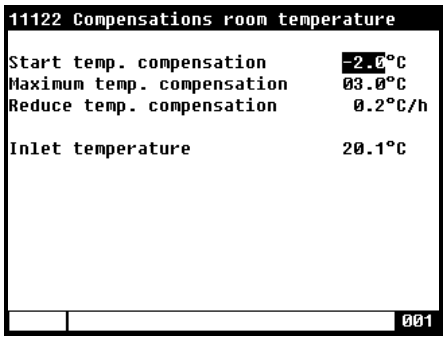
Night settings

You can use the night settings to create natural temperature behaviour between day and night by reducing the temperature setting by a couple of degrees during the night.



In addition to the period when the night setting has to be active, you can also set the number of degrees by which the room temperature has to be increased/decreased during this period. Since the ventilation is linked to the room temperature, the ventilation will also be adjusted during the night-time You can also increase or decrease the minimum ventilation by an extra percentage during the night-time.

Compensation room temperature



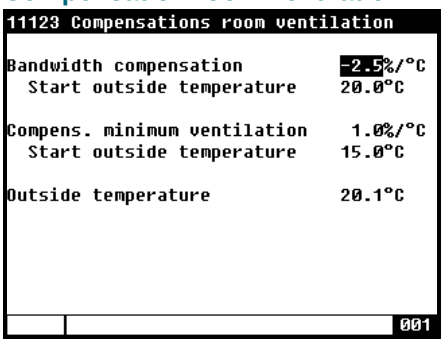
← The temperature may consist of

- ❑ The room temperature;
- ❑ Or the outside temperature;
- ❑ or a separate temperature sensor can be used to measure the inlet temperature

Ask your installer which one he did selected.

The purpose of this compensation is to prevent rapid temperature decreases in a room. The “Maximum temperature compensation” is used to limit the room temperature corrected by the climate computer. Temperature compensation can also be based on the inlet or outside temperature instead of on the room temperature. For further details, see “Room temperature compensation” on page 52.

Compensation room ventilation



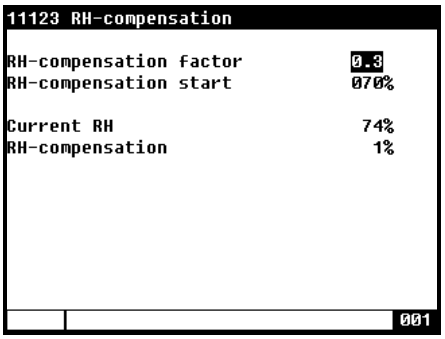
Bandwidth compensation

This setting is used to adjust the bandwidth to the current outside temperature if the outside temperature exceeds the value setting. See page 53 for further details.

Compensation minimum ventilation

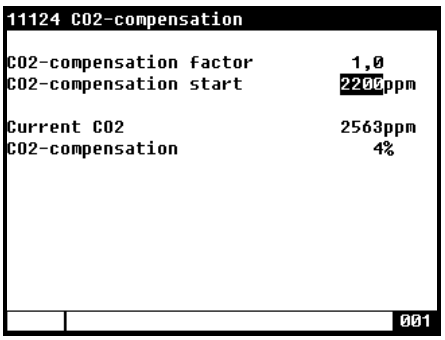
The percentage at which the minimum ventilation should be corrected per °C of change in outside temperature is set behind the “Compens. minimum ventilation” (the compensation of the minimum ventilation is a relative compensation). See page 53 for further details.

RH-compensation



Enter the relative humidity percentage from which the ventilation is to be influenced behind “RH compensation start”. The factor indicates the degree of influence. If the factor is 0, the RH does not influence the ventilation; if the factor is 9.9 the RH will exert its maximum influence on the ventilation, see page 54.

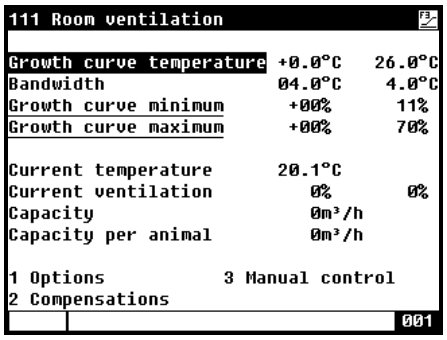
CO2-compensation

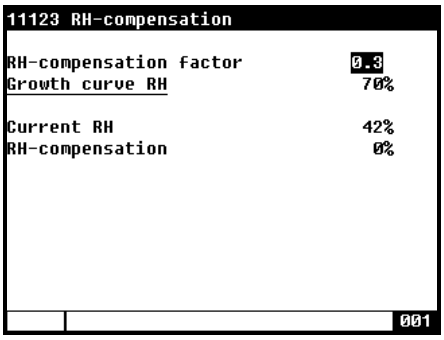


Enter the CO2 concentration from which the ventilation is to be influenced behind “CO2 compensation start”. The factor indicates the degree of influence. If the factor is 0, the CO2 does not influence the ventilation; if the factor is 9.9 the CO2 will exert its maximum influence on the ventilation, see page 54.

Room ventilation using growth curves

A daily temperature and ventilation adjustment to the animal age is a time consuming process, especially if you have a number of rooms with animals. Automatically adjustment of the temperature and ventilation to the animal age is the solution. To make this possible, we make use of growth curves where temperature and ventilation are controlled automatically using an age-dependent curve.



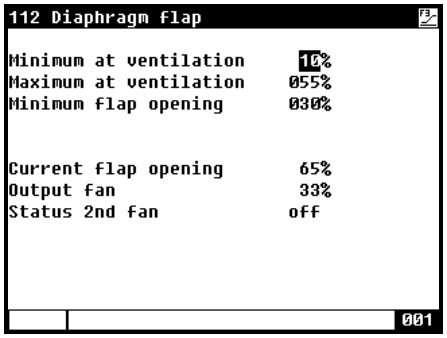


Climate settings, which are calculated in accordance with a curve, are preceded by the text “Growth curve”.
To avoid having to continuously adjust the curve settings to the animals' behaviour, you can increase or decrease the calculated curve settings.

Growth curve temperature: this enables you to increase or decrease the calculated room temperature.
Growth curve minimum: this enables you to increase or decrease the minimum ventilation.
Growth curve maximum: this enables you to increase or decrease the maximum ventilation.

If the cursor is placed on **Growth curve temperature**, **Growth curve minimum**, **Growth curve maximum** or **Growth curve RH** and you push the confirmation key the curve for the settings concerned will be displayed. You may change the curve settings or switch off the curve. Press the cancel key to return to the previous window. If you have switched off the curve, the text 'growth curve' will be replaced by the standard text and you can no longer access the relevant curve settings from this window (the curve is off).

Diaphragm flap



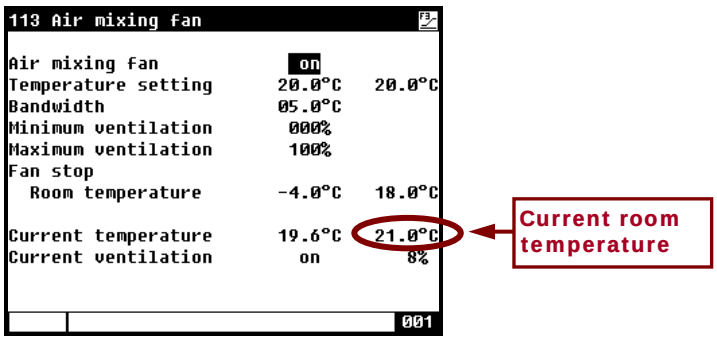
The diaphragm flap controls on the basis of the calculated room ventilation, also see page 43. The maximum flap opening is 100%; this cannot be adjusted.

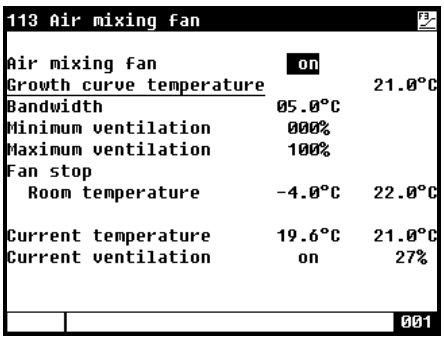
If a 2nd fan circuit has been installed, the status of the 2nd fan will also be shown in the window. In this case, the status of the 2nd fan will determine the diaphragm flap opening

Status 2nd fan **off** If the status of the 2nd fan is off, the flap opening will be calculated on the basis of the current ventilation of the 1st fan (fan output) and the flap closed at, flap open at and minimum flap opening settings.

on If the status of the 2nd fan is on, the diaphragm flap will be fully open (100%).

Air mixing fan





Temperature

If a temperature of +10.0ºC or higher is set, the air mixing fan will control on the basis of the temperature setting. The setting is an absolute temperature setting then. If a temperature of less than 10.0ºC is set, the air mixing fan will control on the basis of the room temperature setting. The setting is relative to the room temperature setting then. While “pre-heating” the room the text “Temperature setting” is replaced by “Manual control” and you can run the “air mixing fan” in manual mode.

Manual control

If the status is “pre-heating” you can switch on the air mixing fan and set the ventilation percentage of the air mixing fan during pre-heating in the “Manual control” line. This will evenly distribute the hot air through the room.

Attention! *During the "pre-heating" state the alarm of the air mixing fan is* ***switched off****.*

ATTENTION! The MANUAL CONTROL (PRE-HEATING states) ***influence the alarm operation*** **of the climate control;** ***only use this state if there are no animals in the room.***

Bandwidth

The bandwidth determines the 'sensitivity' of the fan. A short bandwidth will cause the fan to react to a rise in temperature very quickly. This is not good for the climate in the house, since it will result in too many ventilation variations.

Minimum and maximum ventilation

If compensation depending on the fill ratio has been installed, the minimum and/or maximum ventilation will be adjusted to the number of animals in the room.

Fan stop

If fan stop is activated, the fan will stop when the room temperature measured falls below the calculated stop temperature (calculated room temperature - adjusted stop temperature setting + hysteresis). The air mixing fan will switch on again when the room temperature rises above the “stop temperature”.

Current temperature

This line displays the current control temperature.

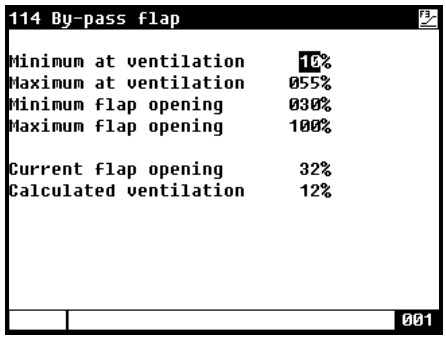
Current ventilation

This line displays the current status, on / off, of the air mixing fan. The current ventilation of the air mixing fan is also shown in this line. If -0% is calculated for the current ventilation, the drive signal generated will be 0V instead of the minimum voltage setting (fan stop).

Growth curve

If the cursor is placed on **Growth curve temperature** and you push the confirmation key the curve for the settings concerned will be displayed. You may change the curve settings or switch off the curve. Press the cancel key to return to the previous window. If you have switched off the curve, the text 'growth curve' will be replaced by the standard text and you can no longer access the relevant curve settings from this window (the curve is off).

By-pass flap



The by-pass flap makes it possible to supply extra outside air to the room, specifically during the summer months.

The by-pass flap controls on the basis of the room ventilation, also see page 43.

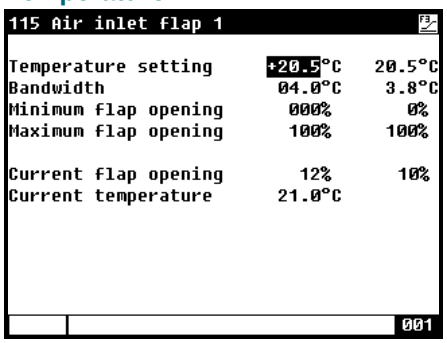
Minimum at ventilation	If the room ventilation falls to below this value, the by-pass flap opening will be minimal.
Maximum at ventilation	If the room ventilation rises to above this value, the by-pass flap will be opened as far as possible.

In the area between these minimum and maximum values, the flap will be controlled from minimum to maximum flap opening, depending on the room ventilation

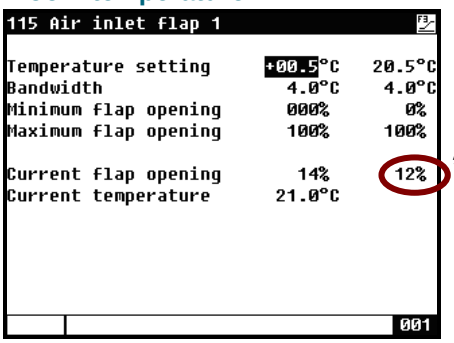
Air inlet flap 1 / 2

Controlled by:

Temperature



Room temperature



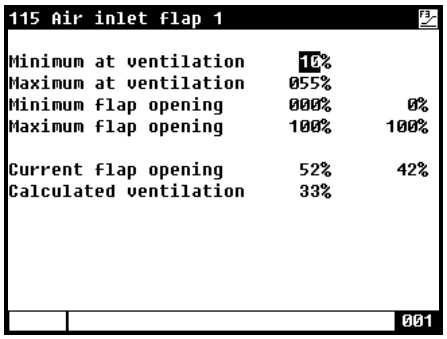
* The corrected flap opening is displayed after the current flap opening if the option “output characteristic” is active.

If a temperature of +10.0ºC or higher is set, the air inlet flap will control on the basis of the temperature setting, also see page 43. The setting is an absolute temperature setting then. If a temperature of less than 10.0ºC is set, the air inlet flap will control on the basis of the room temperature setting, also see page 43. The setting is relative to the room temperature setting then.

Make sure that the air inlet flap is sufficiently large. If the fans are running at a high speed, the volume of air allowed into the room should be at least equal to the volume being extracted from the room. If the air inlet is insufficient, the amount of air being replenished is not as much as the climate computer might lead you to think. In addition, if the air inlet openings are too small, high air speeds will be generated with the relevant consequences. A clear indication of an insufficient air inlet relative to the fan capacity is a room door "sucking itself closed"; there is too much under pressure in the room

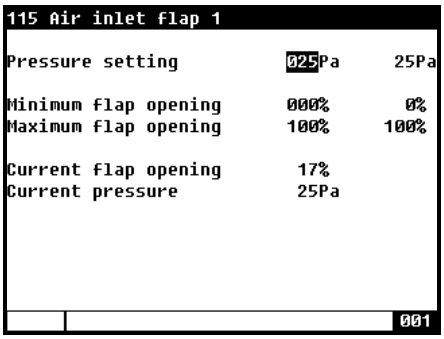
Controlled by:

Room ventilation



The air inlet flap controls on the basis of the calculated room ventilation, also see page 43.

Pressure



The air inlet flap controls on the basis of the differential pressure.

As soon as the room temperature (ventilation) exceeds the calculated setting, the air inlet flap will open on the basis of the temperature, according to the bandwidth setting.

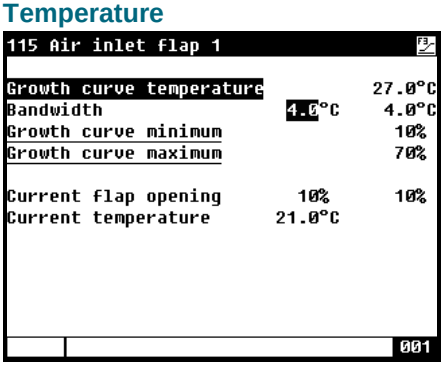
Example

Room temperature setting	18,0ºC	The air inlet flap remains in the preset minimum opening of 15% until the room temperature exceeds 21°C (18°C + 3.0°C). The air inlet flap will be completely open when the department temperature is 25°C (18°C + 3°C + 4°C).
Air inlet flap temperature setting	+3.0ºC	
Bandwidth	4.0ºC	
Minimum flap opening	15%	
Maximum flap opening	100%	

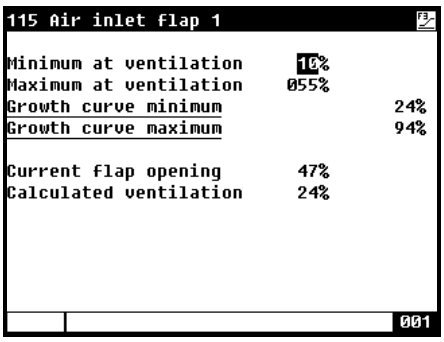
Air inlet flap 1 / 2 using growth curve

Controlled by:

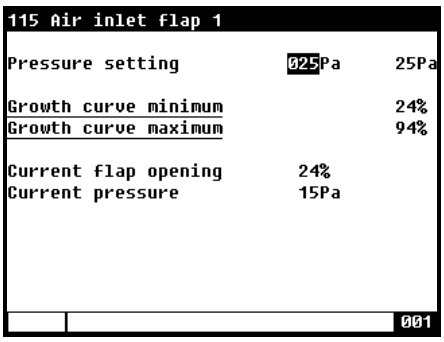
Temperature



Room ventilation



Pressure

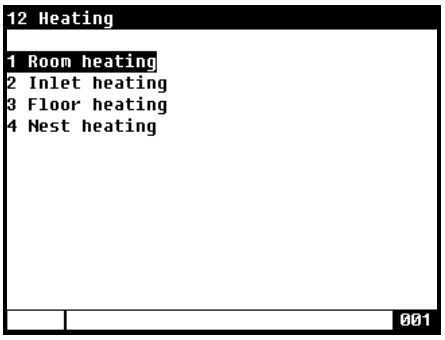


Settings, which are calculated in accordance with a curve, are preceded by the text “Growth curve”.

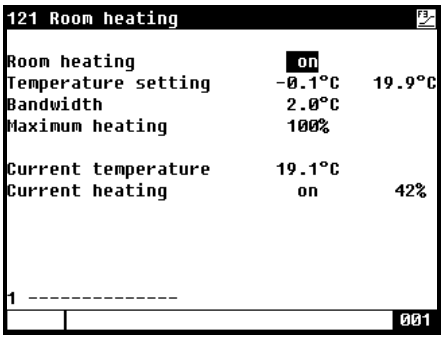
In case of an air inlet flap controlling on the basis of temperature, only the curve settings tell whether the air inlet flap is controlling on the basis of the room temperature (curve setting less than 10.0ºC) or on the basis of absolute curve settings (curve setting is 10.0ºC or higher then).

If the cursor is on **Growth curve temperature** , **Growth curve minimum** or **Growth curve maximum** and you push the confirmation key the curve for the settings concerned will be displayed. You may change the curve settings or switch off the curve. Press the cancel key to return to the previous window. If you have switched off the curve, the text 'growth curve' will be replaced by the standard text and you can no longer access the relevant curve settings from this window (the curve is off).

Heating



Room heating



If there is unnecessarily much ventilation in an animal house, unnecessarily much additional heating will be required as well. Ensure that the minimum ventilation setting is not too high and that the difference between the room temperature and the temperature at which the heating is switched on is sufficiently large.

Temperature setting

The temperature at which the room heating controls is relative to the room temperature, see page 8. You can set the difference in temperature to the room temperature in this line.

Bandwidth

The bandwidth determines the 'sensitivity' of the heating. The heating is controlled from minimum to maximum within the bandwidth. A short bandwidth will cause the heating to react to a fall or a rise in temperature very quickly. This is not good for the climate in the house, since it will result in too many temperature variations.

Maximum heating

You can use the "Maximum heating" setting to limit the maximum level of the controlled heating to a maximum percentage.

Current temperature

A maximum of 4 temperature sensors can be assigned to the heating control. The current temperature is the average of these temperature sensors. If a sensor is defective it will be left out of the average calculation and the heating will continue to control on the basis of the remaining temperature sensors.

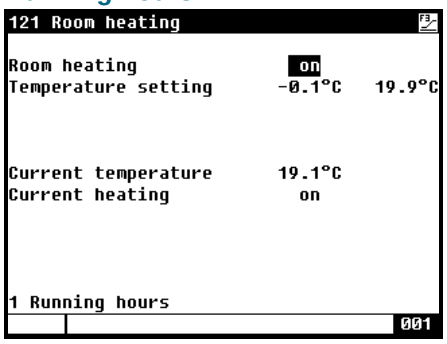
Current heating

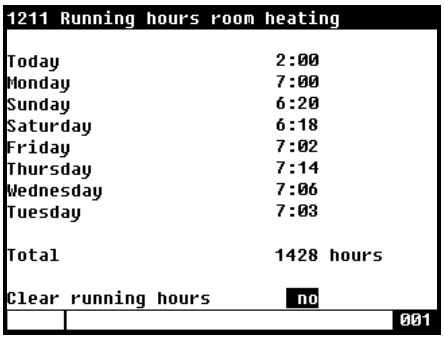
This line shows the current heating status, On or Off. This line shows also the calculated current status/heating capacity of the controlled heating. If -0% is calculated for the current heating, the drive signal generated will be 0V instead of the minimum voltage setting. This line is only shown with 0-10V controlled heating.

Growth curve

If the cursor is on **Growth curve temperature** and you push the confirmation key the curve for the room heating will be displayed. You may change the curve settings or switch off the curve. Press the cancel key to return to the previous window. If you have switched off the curve, the text 'growth curve' will be replaced by the standard text and you can no longer access the curve from this window (the curve is off).

Running hours

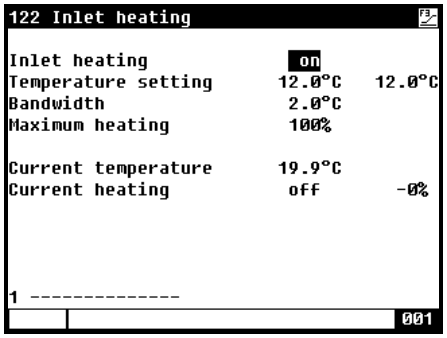


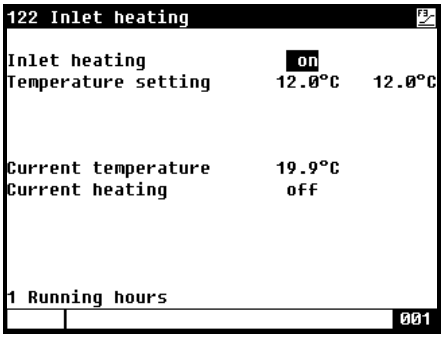


At an on/off controlled (not modulating) heating it is possible to get an overview of the running hours (time heating on). Beside the hours of today the running hours of the past 7 days and the total number of hours is shown.

If you changed the setting “Clear running hours” to “yes”, the running hours of the room heating of the selected room number will be cleared.

Inlet heating



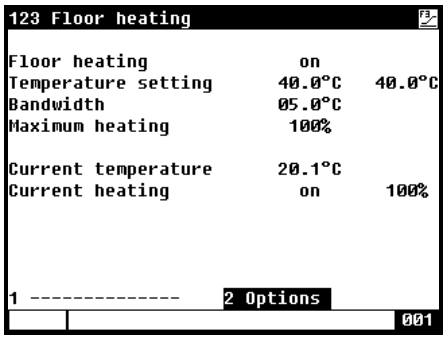


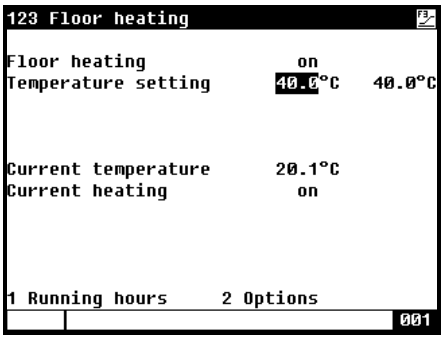
Setting the inlet heating is identical to setting the room heating.

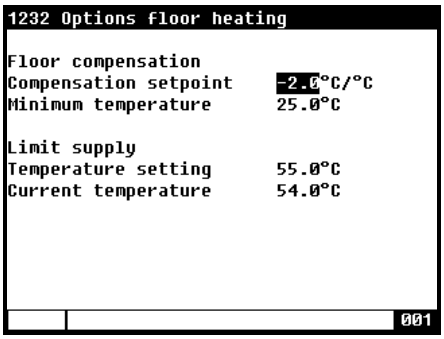
Running hours

See room heating, page 16.

Floor heating







Setting the floor heating is identical to setting the room heating.

Compensation set point

If the room temperature is higher than the floor temperature setting, the temperature setting will be lowered. The compensation factor indicates the decrease per degree by which the room temperature increases. This compensation was introduced to prevent the floor heating from heating the room, which would result in increased room ventilation and energy being lost.

Minimum temperature

You can set the absolute minimum floor heating temperature behind the "Minimum temperature". If the calculated floor temperature threatens to fall below this minimum, the calculated value will be made equal to the minimum floor temperature setting.

Example 1

Room temperature setting	20.0°C	Measured room temperature is 23.0°C or 3.0°C higher than the room temperature setting. The floor heating is now compensated by 3.0°C x 2.0°C = 6.0°C. **The calculated floor temperature then becomes: 40.0°C – 6.0°C = 34.0°C.**
Measured department temperature	23.0°C	
Floor heating temperature setting	40.0°C	
Minimum floor temperature	30.0°C	
Compensation factor	2.0°C	

Example 2

Room temperature setting	18.0°C	The measured room temperature is 20°C or 2°C higher than the room temperature setting. Actually, the floor heating should be compensated by 2.0°C x 4.0°C = 8.0°, but the calculated floor temperature would then fall below the minimum floor temperature (35.0°C – 8.0°C = 27.0°C). The calculated value is in this case made equal to the minimum floor temperature, being 30.0°C.
Measured department temperature	20.0°C	
Floor heating temperature setting	35.0°C	
Minimum floor temperature	30.0°C	
Compensation factor	4.0°C	

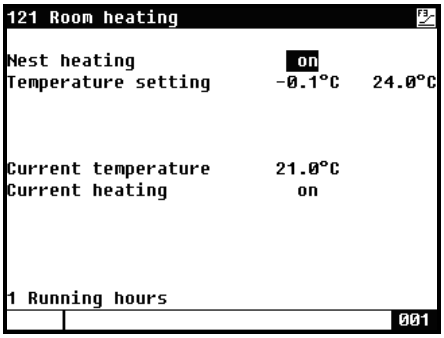
Limit supply (floor heating = floor)

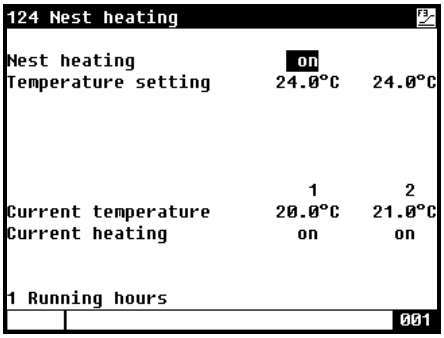
The calculated water temperature becomes equal to the highest water temperature requested by the room. The calculated water temperature is limited by the maximum that has been set. However, the calculated water temperature **never becomes less** than the **minimum temperature** setting.

Running hours : see room heating, page 16

Nest heating

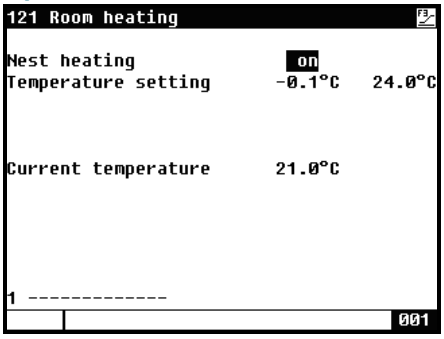
On/Off

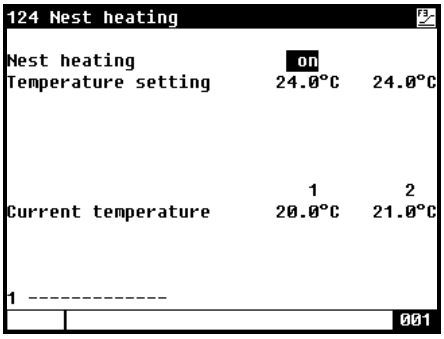




2-zone heating

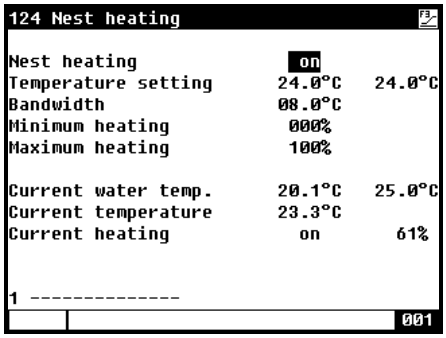
Open/close

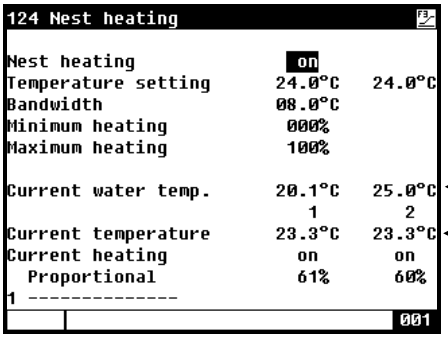




2-zone heating

Controlled (infrared) heating





If the nest heating is an infrared heating, the current and the calculated water temperature are shown on the screen.

The nest temperature is calculated using the room temperature and the supply water temperature.

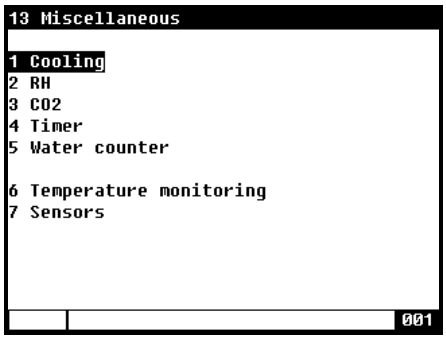
2-zone heating

Setting the nest heating is identical to setting the room heating.

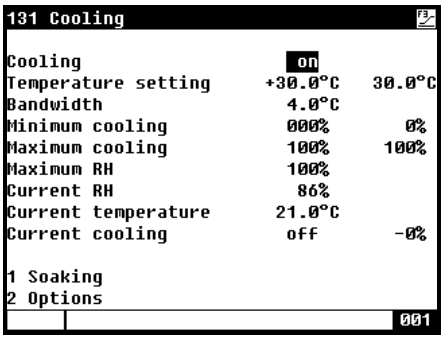
Running hours

: see room heating, page 16

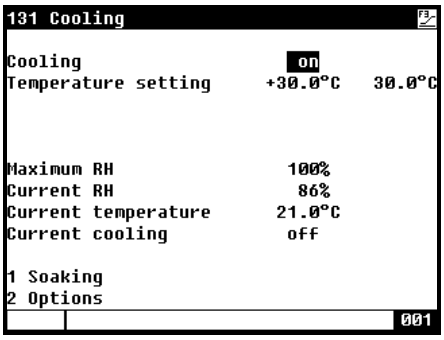
Miscellaneous



Cooling (0-10V/modulating)



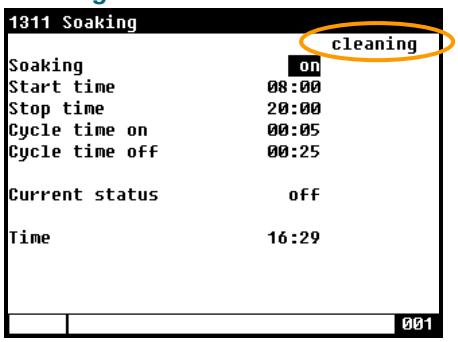
Cooling (on/off)



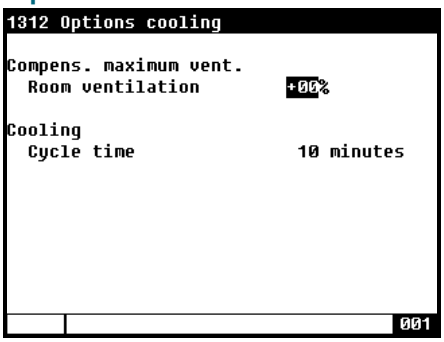
Setting the cooling is identical to setting the room heating. To prevent the humidity in the room from becoming too high due to cooling, the RH can switch off the cooling. If the relative humidity rises to above the preset value + hysteresis, the cooling will be switched off. If the RH falls to below the preset value afterwards, the cooling will be switched on again. The default hysteresis setting is 2%.

You can use the “Soaking” function when the room is out of operation or “cleaning” is active. The cooling system will then be run at full capacity (100%) for the “Period ON” time. As soon as the room status changes, “Soaking” will be switched “OFF” to prevent the soaking starting immediately after you put the room “out of operation”.

Soaking



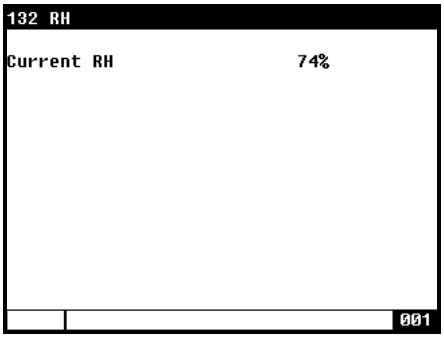
Options

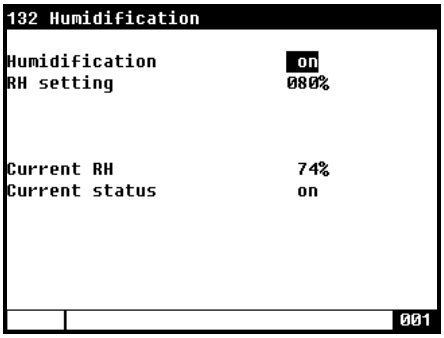


Compensation maximum ventilation

If the current cooling is “on” (switched on), you can have the maximum room ventilation lowered by the percentage set for “Compens. maximum vent.” to increase the cooling effect. When using a modulating cooling system, you can also set the cycle time (see also page 51).

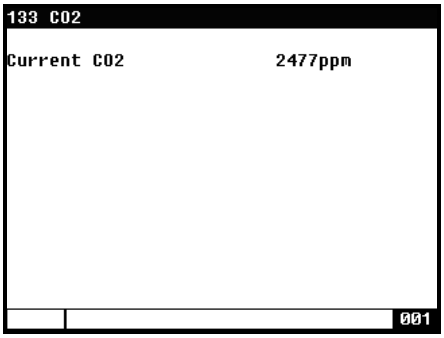
RH / Humidification





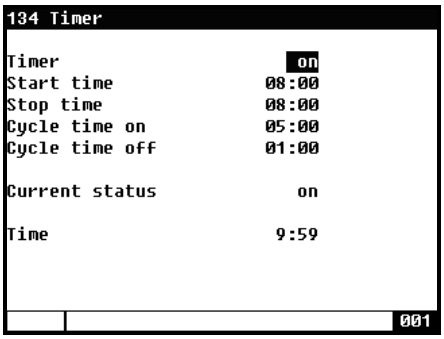
This window enables you to switch on the humidification control and to set the relative humidity percentage below which the control has to be active.

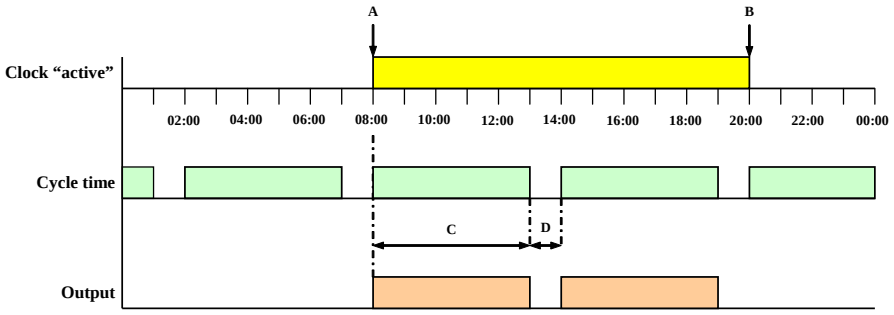
CO2



The CO2 sensor is used to indicate how much CO2 there is in the house. You can set minimum and maximum CO2 alarm limits for the alarms. An alarm is generated as soon as the CO2 value exceeds the alarm limits.

Timer





A	Start time	Starting time of the cycles (periods).
B	Stop time	Stopping time of the cycles. If a recurring switch action is to take place during 24 hours, a time can be set at position b which is 1 minute earlier than time a. Never enter the same time (difference would then be 0). Example 24-hour cycle "on"08:00" off "07:59.
C	Cycle time "on"	Period during which the process should be switched on.
D	Cycle time "off"	Period during which the process should be switched off.

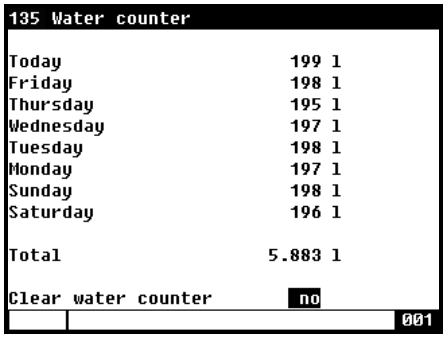
Note: The starting time of the 1st cycle always coincides with the starting time (A)

The clock is activated at 07:00 hrs. (A). After having operated for 2 hours (C), the contact is switched off for 1 hour (D). Then the contact is switched on again for 2 hours (C) and after that it is switched off again for 1 hour (D) (recurring cycle). At 16:00 hrs. (B) the switch clock is switched off again, to become active again the next day at 07:00 hrs. (A). The process is always switched off after the total time (B-A) has elapsed; even if time C has not yet elapsed.

If 00:00 is entered at C and D (Cycle Time), the switch clock operates as a 'normal' switch clock, i.e. at time A the clock switches the process 'on' and at time B it switches it 'off' again.

When switching over from winter to summer time or vice versa make sure that all clocks have been adjusted. If the climate computer forms part of a communication loop, you only have to check the time on the main terminal.

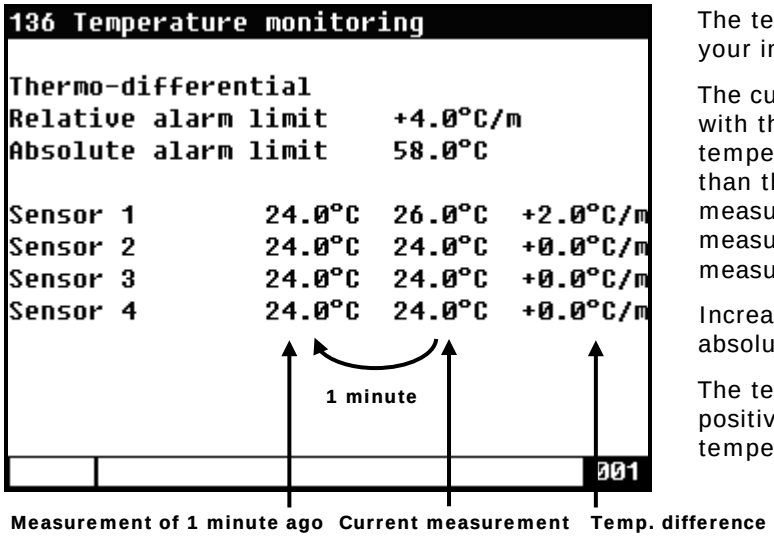
Water counter



If a water counter is installed in the room it is possible to get an overview of the water amount. Beside the amount of today the amount of the past 7 days and the total amount is shown.

If you changed the setting “Clear water counter” to “yes”, the counter readings of the selected room number will be cleared..

Temperature monitoring



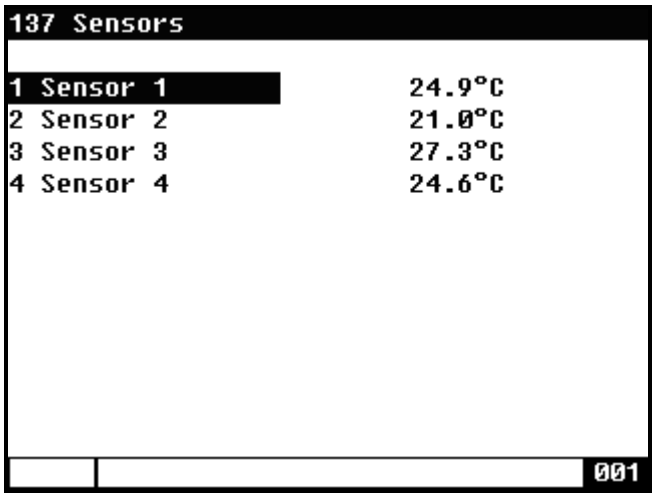
The temperature monitoring function is activated by your installer.

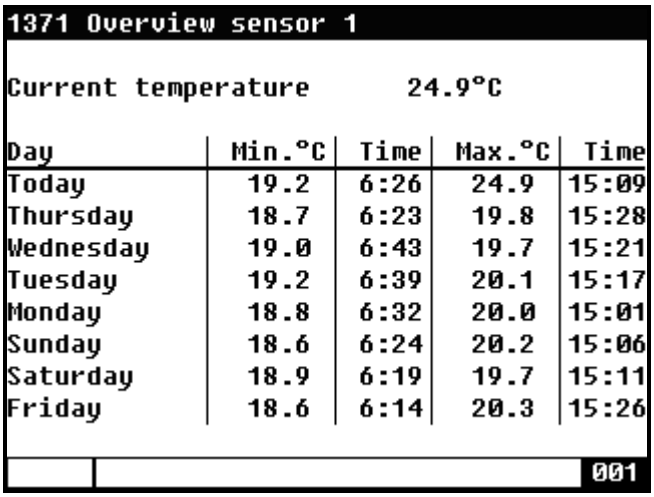
The current measurement of each sensor is compared with the measurement of one minute ago. Is the temperature increase in that minute greater or equal than the relative limits an alarm is given. If the measurement is within the limits, the previous measurement is made equal to the current measurement and a new measurement is started.

Increases the temperature of the sensor above the absolute limit, then there is also alarm.

The temperature monitor alarm occurs only when a positive difference is detected (not when the temperature drops down).

Sensors

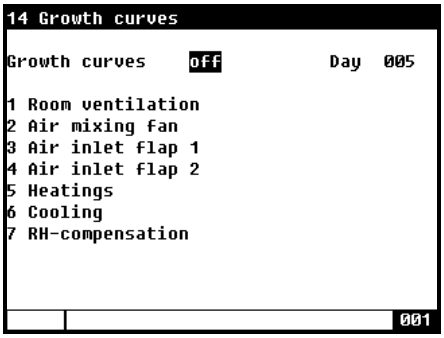




Your installer can change the sensor names to any name of a maximum of 15 characters.

Selecting a sensor displays a table with the minimum and maximum sensor temperatures for the past week. The table also states the times when the minimum and maximum temperatures occurred on the various days.

Growth curves



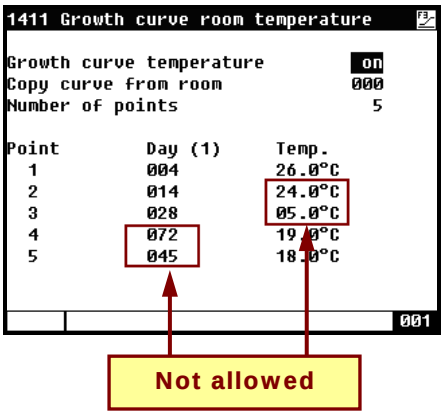
You determine the climate settings on the basis of the number of animals in the room and the animal weight. You set these settings in a curve. The required temperature will automatically decrease a little then and the ventilation will automatically increase then after some time. If you remove a number of animals from a room, while other animals remain behind in the room, you should not forget to adjust the fill ratio. Otherwise the minimum ventilation will lead to unnecessary heating and/or too low a room temperature.

Several curves are available to gradually decrease the target values. A curve can consist of a maximum of 7 breakpoints.

Growth curves on / off You can use this setting to switch **all curves** on or off simultaneously.

Note!

- Settings in curves below 10.0°C are also relative to the room temperature setting.
- Do not switch from a relative to an absolute setting within the curve (all settings are below 10.0°C or all settings are +10.0°C or higher).
- The day numbers in the curve have to be consecutive numbers. If the previous day number is higher than the day number of the current breakpoint **the curve** will end at the previous breakpoint (see example).
- If the day number of the first breakpoint is greater than 1, the setting for the first breakpoint will be maintained until the preset day number.
- If the **CURVE** of the setting you want to change is active, you can only change the relevant setting by changing the setting of the curve.
- The settings obtained from a growth curve are recalculated ***every hour*** to achieve a more gradual development of the setting.
- If the day number is changed; the room temperature compensation ***is cleared***.

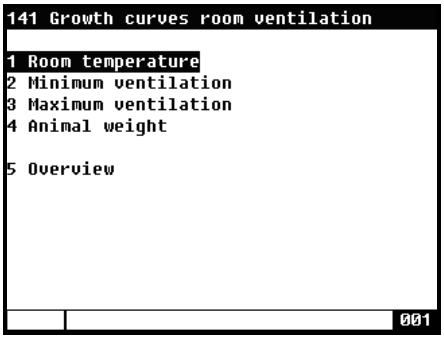


Add / remove breakpoint or period

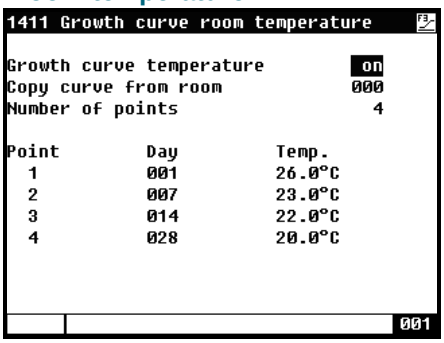
- Press the [Enter] key (edit mode)
- Press and hold the [F1] function key and then press the:
- [+] key to add a breakpoint/period (provided that the maximum value for periods/breakpoints has not been reached)
- [-] key to remove a breakpoint/period (provided that there is at least one period/breakpoint)

The number of breakpoints/periods is adjusted automatically.

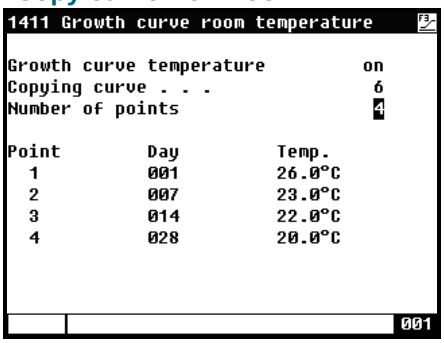
Room ventilation



Room temperature



Copy curve from room



When changing the room temperature curve you have to consider that some of the curves may be related to the room temperature.

Copy curve from room

If the climate computer has been set as the main station or if the climate computer forms part of a communication loop, you can copy the curve of any random room to the current room. The copying may take a couple of minutes, depending on the number of rooms in the communication loop. If the curve has been copied successfully, the curve settings, except the On/Off status, will be adjusted automatically. If copying is not successful, the text **Copying failed** will be displayed. You can only copy growth curves of climate computers

of the KL-6001 series, and not of climate computers of the CB-series. It is also possible to copy growth curves of controls that are not installed in the other room.

Minimum ventilation

```
1412 Growth curve room ventilation

Growth curve minimum              on
Copy curve from room             000
Number of points                   4

Point        Day (1)       Min.
  1          004           010%
  2          028           015%
  3          077           022%
  4          140           028%

                                  001
```

Maximum ventilation

```
1413 Growth curve room ventilation

Growth curve maximum              on
Copy curve from room             000
Number of points                   4

Point        Day (1)       Max.
  1          004           070%
  2          028           080%
  3          077           090%
  4          140           100%

                                  001
```

Animal weight

```
1414 Growth curve animal weight

Growth curve weight               on
Copy curve from room             000
Number of points                   5

Point        Day (1)       Weight
  1          007           007kg
  2          021           011kg
  3          028           015kg
  4          035           018kg
  5          042           020kg

                                  001
```

At present, the growth curve of the animal weight is only used for the overview.

Overview

```
1415 Overview growth curves

Day (1)   |  1  |  29  |  57  |  85  | 113  | 141
Weight    |  7  |  15  |  20  |  20  |  20  |  20
Temp.     | 26.0| 23.9 | 22.2 | 20.8 | 19.9 | 19.0
Min.vent. | 10  |  15  |  19  |  23  |  25  |  28
Max.vent. | 70  |  80  |  86  |  91  |  96  | 100

                                  001
```

Air mixing fan

```
142 Growth curve air mixing fan

Growth curve temperature          on
Copy curve from room             000
Number of points                   4

Point        Day           Temp.
  1          004           21.0°C
  2          028           20.2°C
  3          077           19.5°C
  4          140           19.0°C

                                  001
```

All settings of the air mixing fan curve are also absolute setting.

Air inlet flap 1

```
143 Growth curves air inlet flap 1

1 Temperature
2 Minimum flap opening
3 Maximum flap opening

                                  001
```

Temperature

```
1431 Growth curve air inlet flap 1

Growth curve temperature          on
Copy curve from room             000
Number of points                   4

Point        Day           Temp.
  1          004           +27.0°C
  2          028           +24.0°C
  3          077           +23.0°C
  4          140           +21.0°C

                                  001
```

Minimum flap opening

```
1432 Growth curve air inlet flap 1

Growth curve minimum              on
Copy curve from room             000
Number of points                   3

Point        Day           Min.
  1          001           006%
  2          007           008%
  3          112           023%

                                  001
```

Maximum flap opening

```
1433 Growth curve air inlet flap 1

Growth curve maximum              on
Copy curve from room             000
Number of points                   3

Point        Day           Max.
  1          001           030%
  2          007           032%
  3          112           080%

                                  001
```

You can only set the growth curve for the temperature with an air inlet flap which controls **on the basis of temperature**

Air inlet flap 2

Setting air inlet flap 2 is identical to setting air inlet flap 1.

Heatings

```
145 Growth curves heatings

1 Room heating
2 Inlet heating
3 Floor heating
4 Nest heating

                                001
```

Room heating

```
1451 Growth curve room heating

Growth curve temperature        off
Copy curve from room            000
Number of points                  3

Point        Day         Temp.
  1          001         -1.0°C
  2          056         -2.0°C
  3          077         -3.0°C

                                001
```

The settings of the room heating are relative to the calculated room temperature.

Inlet heating

```
1452 Growth curve inlet heating

Growth curve temperature        off
Copy curve from room            000
Number of points                  4

Point        Day         Temp.
  1          001         22.0°C
  2          018         20.0°C
  3          028         19.0°C
  4          035         18.0°C

                                001
```

Floor heating

```
1453 Growth curve floor heating

Growth curve temperature        off
Copy curve from room            000
Number of points                  4

Point        Day         Temp.
  1          001         40.0°C
  2          007         37.0°C
  3          014         35.0°C
  4          042         25.0°C

                                001
```

Nest heating

```
1454 Growth curve nest heating

Growth curve temperature        off
Copy curve from room            000
Number of points                  2

Point        Day         Temp.
  1          001         30.0°C
  2          070         20.0°C

                                001
```

Cooling

```
146 Growth curves cooling

1 Temperature
2 Minimum cooling
3 Maximum cooling

                                001
```

You can only set the minimum and maximum opening with a 0-10V controlled cooling.

Temperature

```
1461 Groeicurve koeling

Groeicurve temperatuur          aan
Kopieer curve uit afdeling      000
Aantal punten                     3

Punt         Dag         Temp.
  1          001         +30,0°C
  2          028         +25,0°C
  3          049         +20,0°C

                                001
```

Minimum cooling

```
1462 Growth curve cooling

Growth curve minimum            off
Copy curve from room            000
Number of points                  4
Point        Day          Min.
  1          004           10%
  2          028           15%
  3          077           22%
  4          140           28%

                                001
```

Maximum cooling

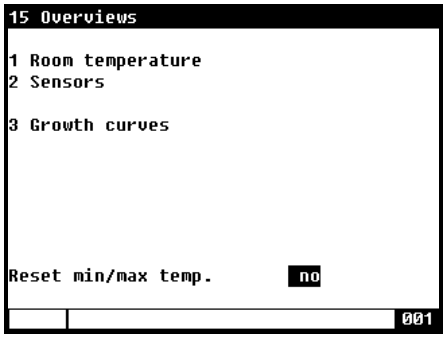
```
1463 Growth curve cooling

Growth curve maximum             on
Copy curve from room            000
Number of points                  4

Point        Day          Max.
  1          004          070%
  2          028          080%
  3          077          090%
  4          140          100%

                                001
```

RH-compensation

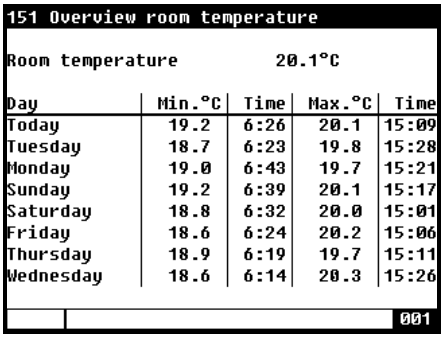
```
147 Growth curve RH-compensation

Growth curve RH                  on
Copy curve from room            000
Number of points                  3

Point        Day           RH
  1          004          072%
  2          028          070%
  3          077          065%

                                001
```

If your installer has activated "RH" and you switch on "RH compensation", you will be able to set the growth curve of the RH compensation

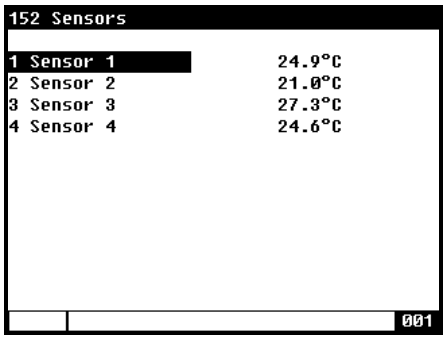
Overview



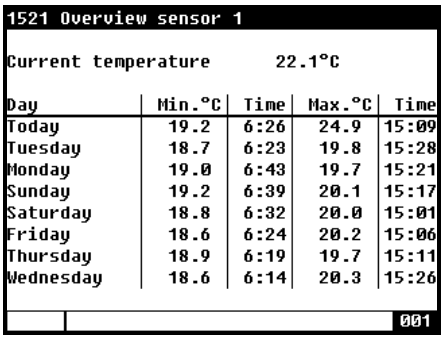
Overview room temperature



Sensors



Overview sensor 1



A table with the minimum and maximum temperatures of the past week, of the selected option, will be shown. In addition, the table will show the times when the minimum and maximum values occurred on the relevant days.

-99,9 ºC Temperature sensor failure
???.? ºC Invalid room temperature

You can use the "**Reset min/max temp.**" setting to clear the min/max measurements in all temperature listings of "Today" are cleared.

Overview "Growth curves", see screen 1415 page 22

Alarm

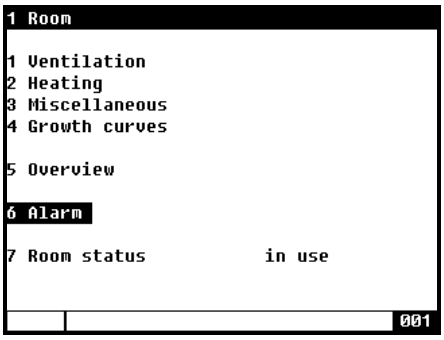
You can switch the alarms of the controls on or off and set or change the corresponding alarm limits in the individual screens of the controls.

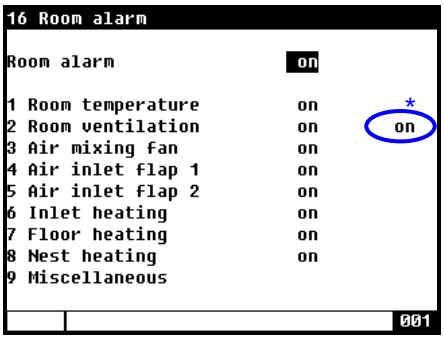
The alarm function is NOT DISABLED when you switch the heating or cooling off. If you switch a heating or cooling off the alarm function is still active.

You can only disable the alarm function of a heating or cooling by:

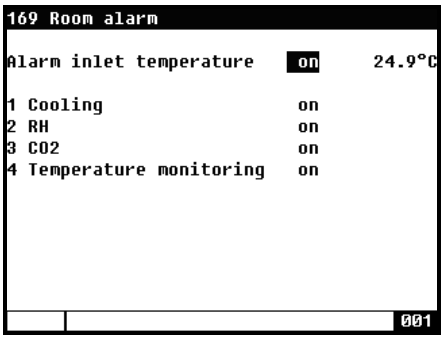
- ❑ **switching the individual alarm off**
- ❑ **to switch the main alarm off.**

Alarm room





You can switch the room alarm on or off in this window



* Status 2nd measuring fan

Note! An air inlet flap, which controls on the basis of the room ventilation, does not have its own alarm settings.

ATTENTION! The states MANUAL CONTROL, CLEANING, PRE-HEATING and NOT IN USE *influence the alarm operation* of the climate control.

Installation errors such as "Output already assigned", "Incorrect output type", "Input already assigned" etc. have to be solved first before putting the system into operation.

Attention ***NEVER FORGET TO SWITCH THE ALARM BACK "ON"*** when you have switched this feature off 'temporarily', e.g. to solve a problem. Failing to switch it back on may have adverse effects for humans, animals, equipment or property.

Preferably use the Off *(alarm retard)* function to solve a problem.

Communication alarm

A communication alarm can only occur at:

- ❑ A main station if the main station has not received any data from a device which forms a part of the same RS-485 data communication loop.
- ❑ A climate computer with central controls installed on it and which has not received any data for the relevant central control.

Alarm codes installation

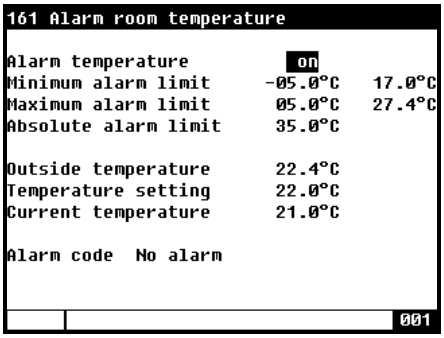
Alarm code	Description
Configuration changed	Module configuration (type) changed. Read the module number into the system again.
Input already assigned	The input has been assigned to two or more controls.
Module absent	Module address not found, check settings on module.
Module not found	The module number set for the terminal does not exist
Module reset alarm	Module continues to reset due to a fault, check the module
No communication address	Device address KL-6001 missing.
No information from rooms	A central control installed on the climate control system has not received any data from the external controller to drive the central control (e.g. an incorrect central control number etc).
No input assigned	No input terminal number entered
No output assigned	No output terminal number entered
No outside sensor	The control installed requires an outdoor sensor but no sensor has been installed
Not a valid input	The input number does not exist on the module.
Not a valid output	The output number does not exist on the module.
Output already assigned	The output has been assigned to two or more controls.
Room x without AQC	The room with the number shown does not have a flap with a measuring fan whereas central ventilation has been set at “room with AQC”
Unknown terminal type	This type of terminal does not exist
Wrong input type	The type of input set does not comply with the type of input which the control can use for its control operation
Wrong output type	The type of output set does not comply with the type of output which the control can drive
Wrong terminal setting	Faulty allocation. The function you have assigned to the terminal is not supported by the module.

Alarm codes climate control

Alarm code	Description
Alarm unknown (xxx)	An unknown and non-documented alarm code has occurred. Note down the number that is displayed and contact your supplier.
CO2 too high	The CO2 measured is higher than the maximum alarm limit calculated
CO2 too low	The CO2 measured is below the minimum alarm limit calculated
Outside sensor faulty	Value measured by outside temperature sensor < -50.0°C or > +50.0°C
Pressure sensor faulty	The pressure sensor value measured is outside the preset limits.
Pressure too high	The pressure measured is higher than the maximum alarm limit calculated
Pressure too low	The pressure measured is below the minimum alarm limit calculated
RH sensor faulty	The RH sensor value measured is outside the preset limits
RH too high	The RH measured is higher than the maximum alarm limit calculated
RH too low	The RH measured is below the minimum alarm limit calculated
Sensor faulty	The values measured by the sensor (temperature, RH, CO_2, pressure etc.) are outside the preset limits
Temperature sensor faulty	Value measured by temperature sensor < -50.0°C or > +100.0°C
Temperature too high	The temperature measured is higher than the maximum alarm limit calculated
Temperature too low	The temperature measured is below the minimum alarm limit calculated
Thermo-differential Sensor x	The temperature difference between the last two measurements by the sensor is greater than the maximum difference allowed or the sensor temperature is higher than the absolute limit, see pages 20 and 29.
Ventilation 0%	The measuring fan has stopped
Ventilation too high [1]	The ventilation measured is higher than the maximum alarm limit calculated
Ventilation too low [1]	The ventilation measured is below the minimum alarm limit calculated

[1] At a flap control; first check if the flap is not in manual operation mode.

Room temperature

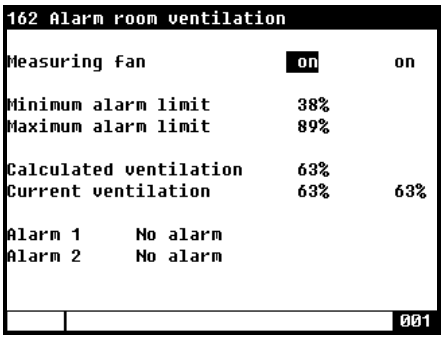


You can set the alarm limits for the room temperature here. If temperature compensation is active, the maximum alarm limit can be adjusted by means of the corrected “Temperature setting”. If an outdoor sensor is used, the maximum alarm limit can be adjusted by the current outside temperature, also see page 55.

Alarm code

Depending on the type of sensor, the alarm status can be indicated by one of the texts listed in the table, see page 26.

Room ventilation



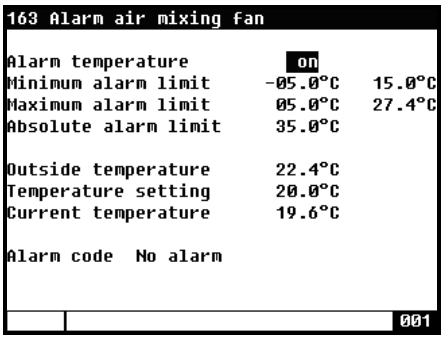
You can switch off the measuring fan in this window. In addition, this window displays the calculated room ventilation alarm limits.

The calculations shown in this window concern the controlled ventilation group and not the total room ventilation. The values shown may differ from the readings in other windows as a result.

If the measuring fan is switch off the measuring doesn’t effects the output signal and the ventilation alarm detection any more.

Measuring fan 1 **on**:	The output signal is dependent on the difference between the calculated and measured ventilation.
Measuring fan 1 **off**:	The output signal is dependent on the calculated ventilation.
Measuring fan 2 **on**:	The output signal is dependent on the difference between the calculated and measured ventilation.
Measuring fan 2 **off**:	❑ If measuring fan 1 is **on** the output of the 2nd fan follows the output of the 1st fan in case the calculated ventilation is higher than the start percentage of the 2nd fan. ❑ If measuring fan 1 is also **off** the output signal dependent on the calculated ventilation.

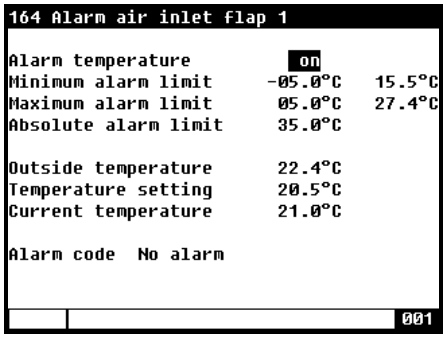
Air mixing fan

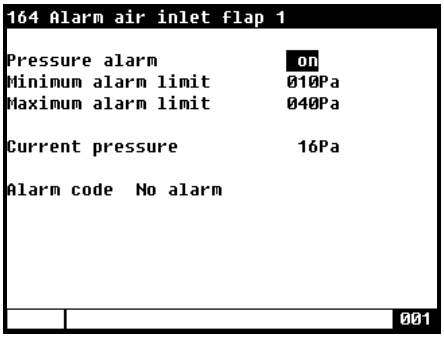


You can set the alarm limits for the air mixing fan temperature here.

Caution! *The “air mixing fan” alarm is **switch off** during “pre-heating”.*

Air inlet flap 1 / 2



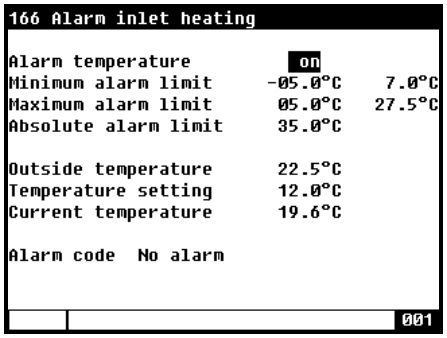


If the outside temperature rises to above 10.0°C, the maximum alarm limit will be corrected, see temperature compensation page 55.

Note! An air inlet flap, which controls on the basis of the room ventilation, does not have its own alarm settings.

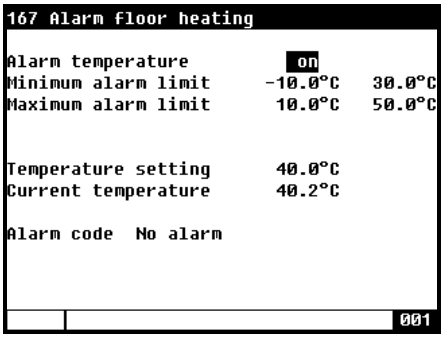
Air inlet flap 2 can be set in the same way as air inlet flap 1.

Inlet heating

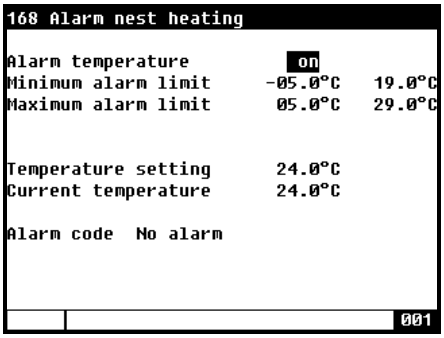


If the outside temperature rises to above 10.0°C, the maximum alarm limit will be corrected, see temperature compensation page 55.

Floor heating



Nest heating

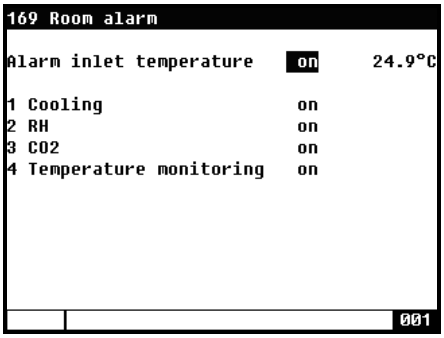


Infrared heating

With infrared heating the heat is transferred by means of radiation so that no heat-transferring medium is required. With infrared heating the heat is primarily transferred to the animals and secondarily to the air in the room.

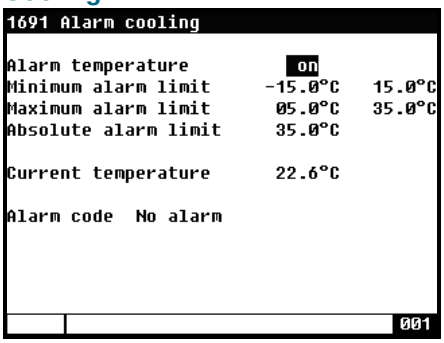
In a cold room of, for example, 15°C, there will be a maximum radiation intensity as soon as the infrared heating is switched on. The radiation intensity will gradually decrease as the room temperature gradually increases. After a while the temperature of the air in the room may be, for example, 18°C. The air temperature and the radiation intensity will now remain constant. This means that a balance has been reached where the combination of both heating mechanisms ensures a comfortable climate.

Miscellaneous

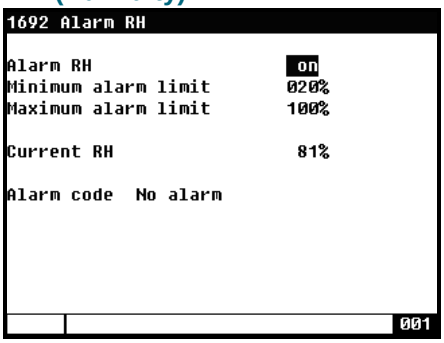


If the temperature compensation of the room is based on the inlet temperature that is measured using a separate temperature sensor, you can switch the inlet temperature alarm **on** or **off** on this screen. The current inlet temperature is shown next to the alarm status.

Cooling

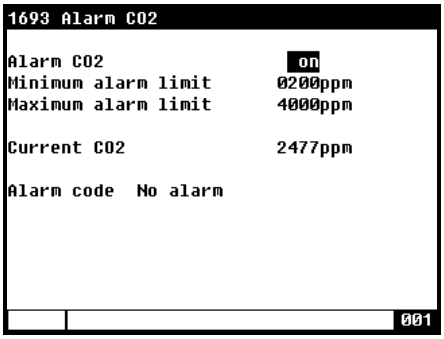


RH (Humidity)

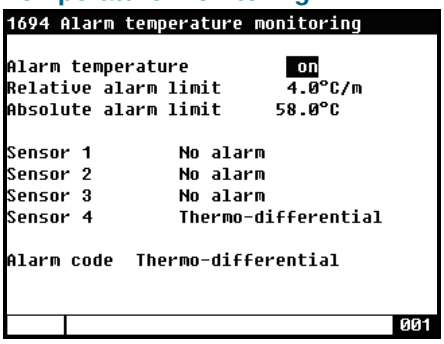


This window enables you to switch the alarm of the humidification control on/off. The minimum and maximum alarm limits cannot be set to less than 20%.

CO2



Temperature monitoring



Switching off the temperature monitoring alarm:

- ❑ Resets the temperature measurements
- ❑ Automatically switches the alarm on again.

See also “Temperature monitoring” page 20

F2 ROOM STATUS

You can have a separate access code set for the status screen.

Room status:	Cleaning	Pre-heat	Not in use
			
Air mixing fan	Off	Manual control	Off
Room ventilation	Manual control	Off	
Diaphragm flap	Automatic control	Off	
Air mixing fan	Off	Off	
By-pass flap	Off	Off	
Air inlet flap on temperature	Manual control	Off	
Air inlet flaps on ventilation or pressure	Automatic control	Off	
Cooling	Off	Off	
CO2	Off	Off	
Humidification	Off	Off	
Temperature monitoring (Thermo-differential)	Active	Active	
Timer	Off	Off	
Day number growth curves	Unchanged	Unchanged	

Not in use or Cleaning

- The inlet heating (***without*** active frost protection) and the nest heating are switched off.
- The room heating, the inlet heating (***with active*** frost protection) and the floor heating switch over to frost protection.
- The lower alarm limit calculated equals the frost protection (5.0°C) for the:
  - room heating,
- The lower alarm limit calculated equals the frost protection (5.0°C) minus the lower limit setting for the:
  - inlet heating (with active frost protection),
  - floor heating.
- An alarm is generated if the temperature of the control rises to beyond the calculated alarm limit for the following temperature measurements:
  - room temperature,
  - inlet temperature (with active frost protection),
  - floor temperature.

Pre-heating

- All heating's are controlled, except the inlet heating which continues to be switched off.
- The inlet heating (with active frost protection) switches over to frost protection.
- The lower alarm limit calculated equals the frost protection (5.0°C) for the:
  - room heating.
- The lower alarm limit calculated equals the frost protection (5.0°C) minus the lower limit setting for the:
  - inlet heating (with active frost protection),
  - floor heating,
  - nest heating.
- An alarm is generated if the temperature of the control rises to beyond the calculated alarm limit for the following temperature measurements:
  - room temperature,
  - inlet temperature (with active frost protection),
  - floor temperature,
  - nest temperature.

In use

- The room control according to the setting...

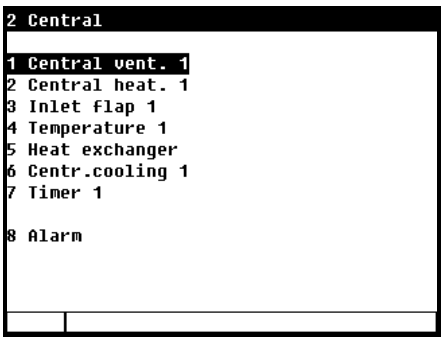
Note: The nest heating does not have frost protection. Of course, the following applies to all controls: if installed.

KL-61 manual control*

The room ventilation can be set manually by turning the control knob on the KL-61. **The current room status is changed to "Cleaning"** (see also page 8).

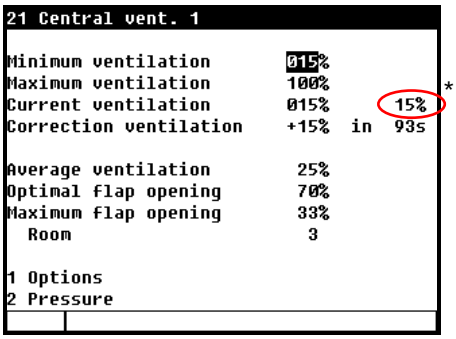
ATTENTION! The states MANUAL CONTROL, CLEANING, PRE-HEATING and NOT IN USE *influence the alarm operation* of the climate control; *ONLY USE THESE STATES IF THERE ARE NO ANIMALS IN THE ROOM*. We advise you to use the MANUAL CONTROL, CLEANING, PRE-HEATING and NOT IN USE states with due care.

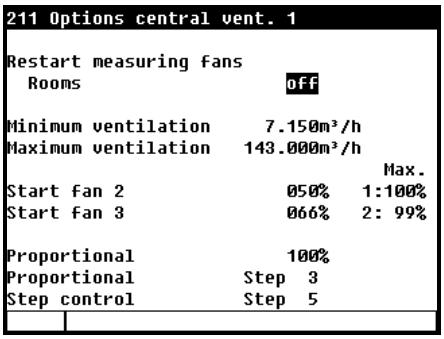
2 CENTRAL

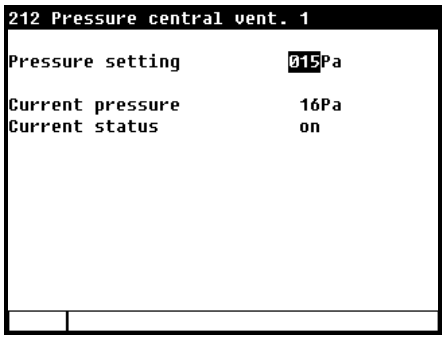


Central vent. 1

Central exhaust system with measuring fans in the room (AQC flap) or ECOVENT.

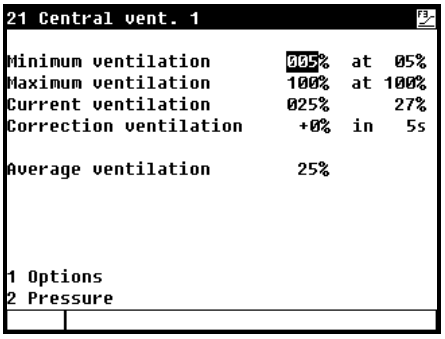


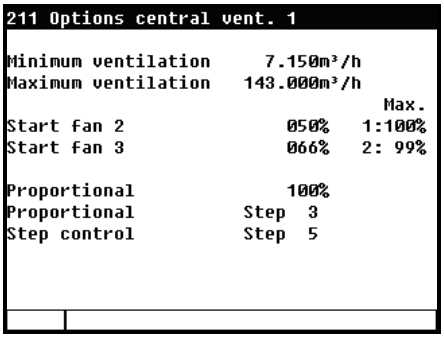


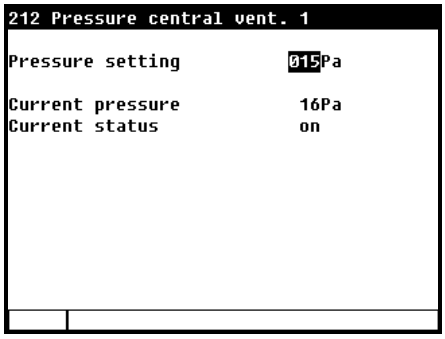


* If the central exhaust has a measuring fan, the ventilation measured is shown in the last column.

Central exhaust system without measuring fans in the room.







Minimum ventilation

You set the lower limit for ventilation behind “Minimum ventilation”. A minimum setting which is set slightly too high will result in a significant increase in your costs of heating. Excessive ventilation results in unnecessary loss of energy.

Maximum ventilation

You set the upper limit for ventilation behind “Maximum ventilation”.

Current ventilation

This line shows the current ventilation calculated by the climate computer.

Correction ventilation

This line shows the percentage by which the central fan is adjusted when the time displayed has passed. Depending on the difference between the current ventilation and the calculated ventilation, the following correction values are possible: 1%, 5% and 10%.

Average ventilation

The calculated average ventilation percentage is displayed. With central extraction without measuring fans in the room, the control works on the basis of this value.

Optimal flap opening

The optimum flap opening is the flap opening at which the flap in the room ensures optimum regulation. With central extraction with measuring fans in the room the optimum flap opening is approximately 65%, with ECOVENT this is usually 85%. The average ventilation and the optimum flap opening setting are used to determine the optimum flap opening for the room with the highest ventilation request. The central extraction controls on the basis of this calculated flap opening.

Maximal flap opening

The maximum flap opening is the flap opening of the room with the highest request. The flap opening matches the drive signal of the output to which the flap in the room is connected.

Room

The room number of the room with the highest request is shown.

Restart measuring fans rooms

If you enter “yes” next to “Restart measuring fans rooms” the measuring fan alarms in all rooms will be “restarted”. As a result, the room will “participate as usual” for the central ventilation system for the duration of time shown. Restarting is mainly used when commissioning the central ventilation system or after a power-down situation, since virtually all rooms have ventilation alarms then.

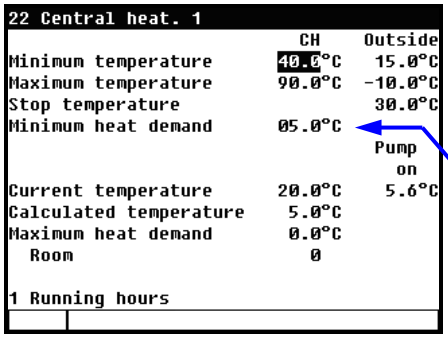
Minimum/Maximum ventilation

The minimum and maximum ventilation capacity is shown in m^3/h.

Start ventilator

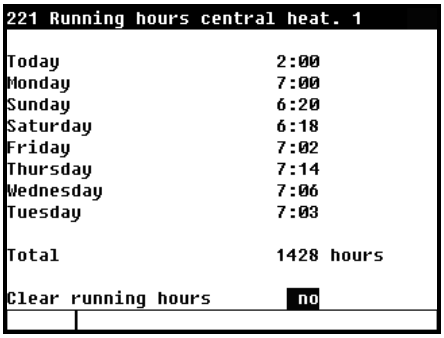
If the proportional ventilation group exists of two or three fans, you can set the start percentage in after "Start fan 2" and "Start Fan 3". In the line below the status of the controlled ventilation group and the step control (if installed) is displayed.

Central heat. 1



You can use the minimum, maximum and stop temperatures to set the firing line, see “Weather-dependent central heating control” page 48.

Minimum water temperature in case the central heating is controlled on heat demand.



If the central heating controls on the basis of heat request, the two bottom lines will be displayed. “Maximum heat demand” shows the highest heat request in a room. The following line shows the number of the room with the highest heat request. In case of a communication error the control will switch over from heat request to firing line operation until the communication error has been remedied. See CH-control based on heat request on page 48.

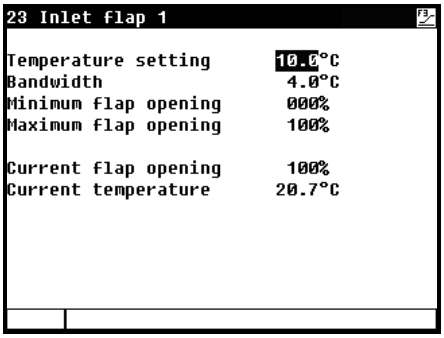
Running hours

At an on/off controlled (not modulating) central heating it is possible to get an overview of the running hours (time heating on). Beside the hours of today the running hours of the last 7 days and the total number of hours is shown. If you changed the setting “Clear running hours no” to “yes”, the running hours of central heating 1 will be cleared.

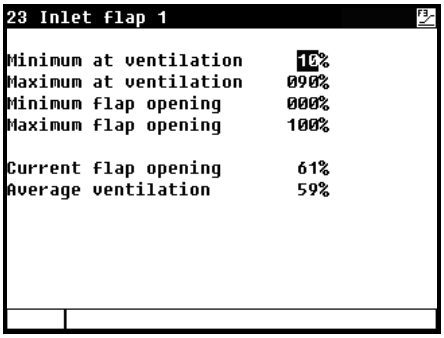
Inlet flap 1

The central inlet flap can be controlled on the basis of temperature or on the basis of the ventilation in the room or on the basis of pressure.

Temperature

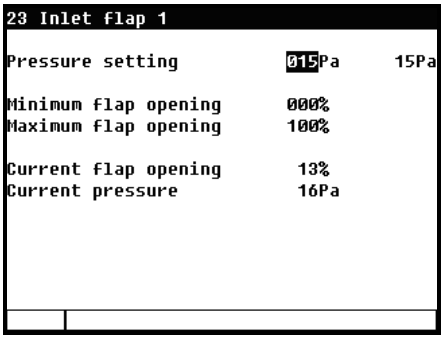


Room ventilation

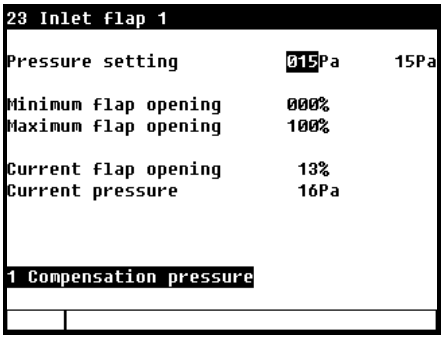


Contrary to the room settings, the temperature settings below 10.0ºC are absolute settings (i.e. .9.5ºC = 9.5ºC)

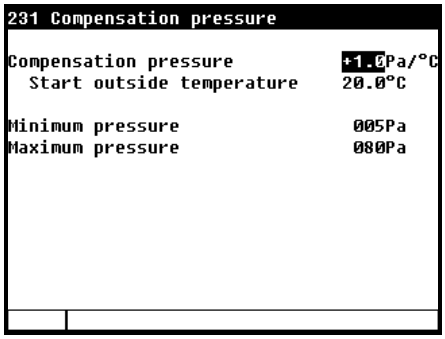
Pressure



With pressure compensation



Compensation pressure



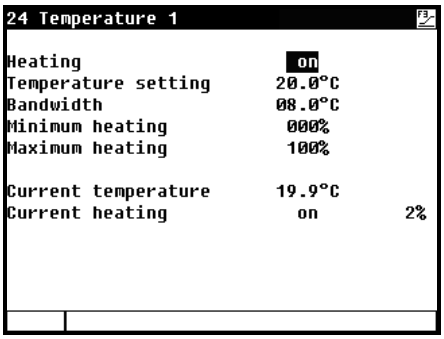
Pressure setting

Here, you set the minimum underpressure of the central channel which the central control must maintain in order to decrease the wind sensitivity in your rooms. For more information about “Compensation pressure”, see page 54.

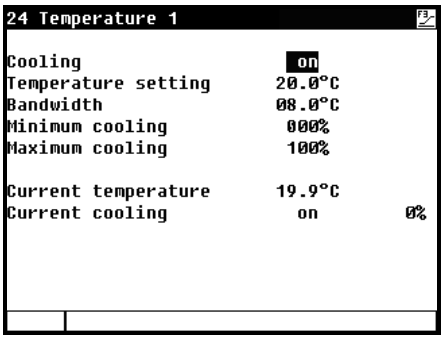
Compensation pressure

Automatic adjustment of the overpressure to the current outside temperature is possible. You can use the “Minimum pressure” and “Maximum pressure” to limit the correction. If, in the event of negative compensation, you do not wish the underpressure to drop to below the pressure setting, you should make the “Minimum pressure” setting (screen 231) equal to the “Pressure setting” (screen 23).

Temperature 1



Temperature control as heating



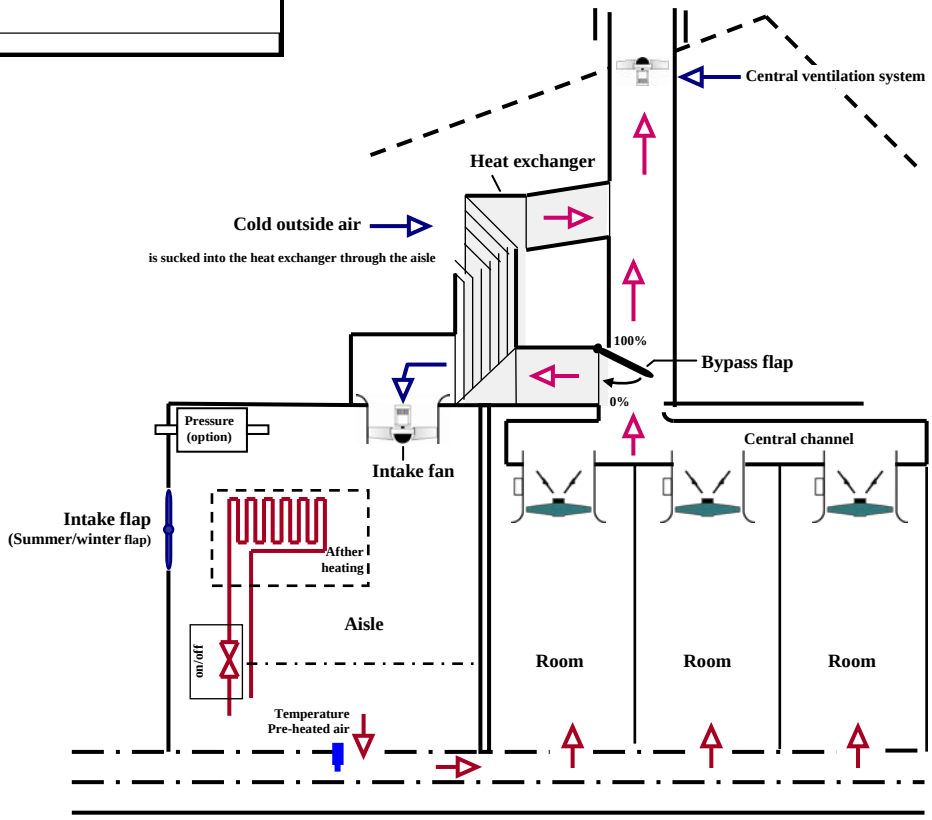
Temperature control as cooling

Your installer can change the name of “Temperature 1” and “Temperature 2” to any name of a maximum of 15 characters.

Heat exchanger

```
25 Heat exchanger

1 Bypass flap
2 Intake fan
3 Rinse timer
```

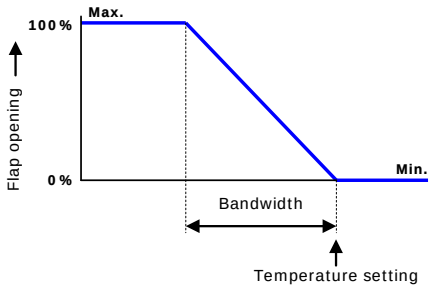
The purpose of this heat exchanger is to pre-heat the cold outside air via a central inlet, using a heat exchanger. The exit air of the central ventilation system is used as the source of heat. If the temperature of the pre-heated air drops too much, the inlet flap (summer/winter flap) will close and the bypass valve will send more air through the heat exchanger. The purpose of the input fan is to compensate the pressure difference in the aisle due to the heat exchanger's air resistance.



Bypass flap

```
251 Bypass flap

Temperature setting      18.0°C
Bandwidth                04.0°C
Minimum flap opening      000%
Maximum flap opening      100%

Current temperature      24.9°C
Current flap opening        0%
Intake flap              open
```

Temperature pre-heated air



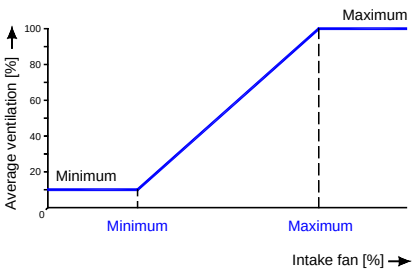
Intake fan

```
252 Intake fan

Minimum at ventilation     05%
Maximum at ventilation     100%
Minimum ventilation        005%
Maximum ventilation        100%

Average ventilation         25%
Current ventilation        015%
Intake flap              close
```

The intake fan controls on the basis of average ventilation.

```
252 Intake fan

Pressure setting          010Pa
Minimum ventilation        005%
Maximum ventilation        100%

Current pressure            16Pa
Current ventilation        100%
Intake flap              close
```

The intake fan controls on the basis of the pressure difference setting.



Minimum at ventilation
The intake fan will continue to run at the preset minimum if the average ventilation is less than this percentage. If this percentage is exceeded, the intake fan will start to run faster.

Maximum at ventilation
If this percentage of the average ventilation is exceeded, the intake fan will run at maximum speed.

Minimum ventilation
The intake fan will never run at a speed lower than the "Minimum" percentage setting.

Maximum ventilation
The intake fan will never run at a speed higher than the "Maximum" percentage setting.

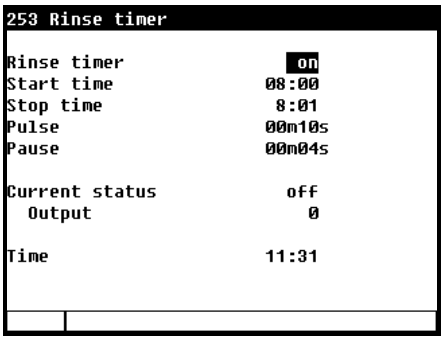
Average ventilation
For every room, you can set which heat exchanger the room belongs to. The heat exchanger uses the ventilation in the corresponding rooms to calculate the average ventilation percentage. This percentage is used to drive the intake fan which controls on the basis of ventilation.

Current pressure
The current pressure is used to drive the intake fan which controls on the basis of pressure.

Current ventilation
The calculated ventilation percentage is shown (the calculated and controlled percentages are equal)

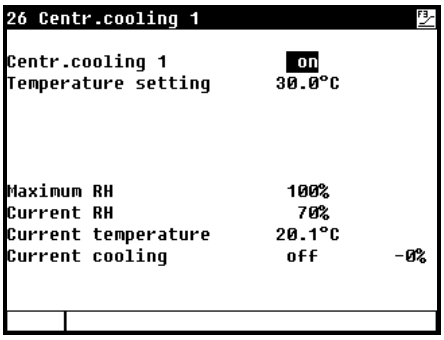
Intake flap
Indicates the intake flap (summer/winter flap) position (open=summer).

Rinse timer

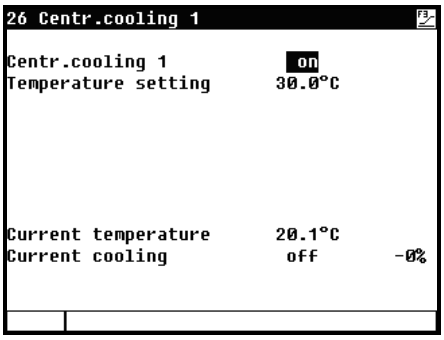


The heat exchanger efficiency is affected by increasing pollution (regardless of the medium) insulating the walls of the pipes. Rinsing removes such insulating pollution.

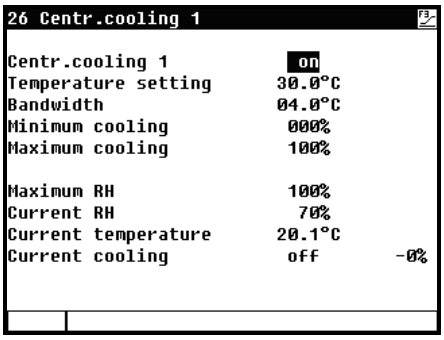
Centr.cooling 1



On/off cooling with RH

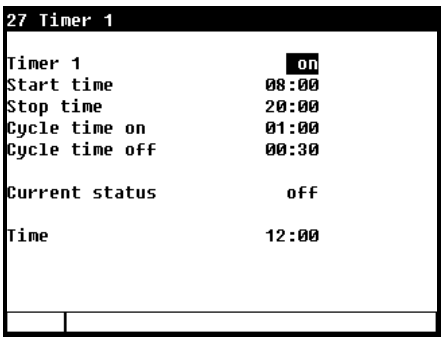


On/off cooling without RH



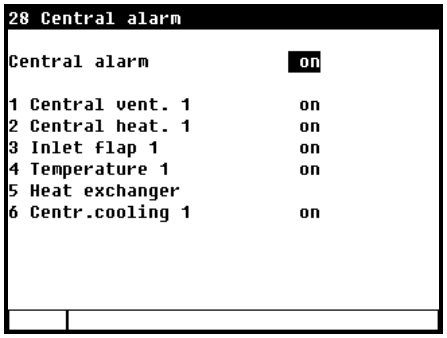
Controlled cooling

Timer 1



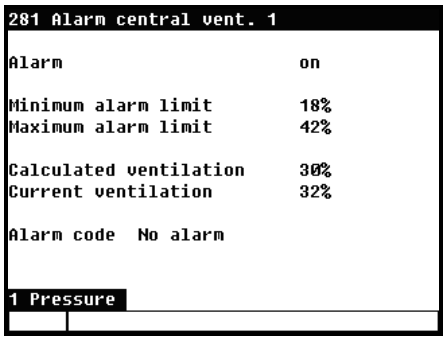
Setting the central timer is identical to setting the room timer, see page 19.

Central alarm



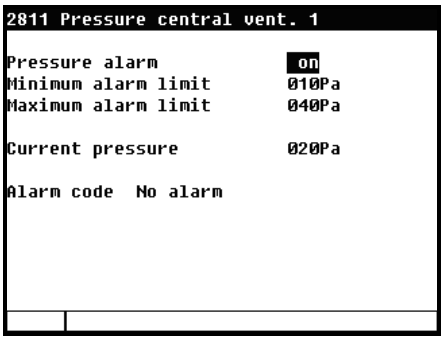
You can switch the alarm status of the separate central controls on or off in this window.

Alarm central ventilation

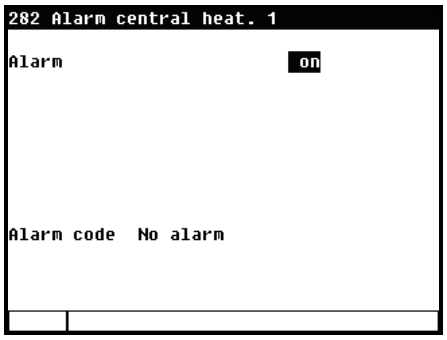


Central exhaust system **with** measuring fan.

Central exhaust system **without** measuring fan.

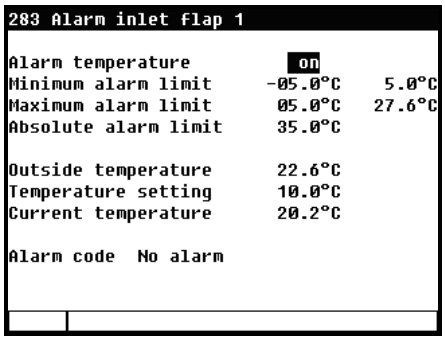


Alarm central heating

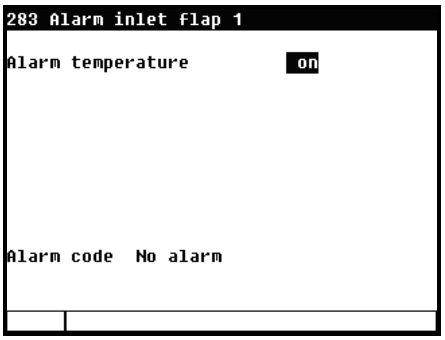


Alarm central air inlet flap

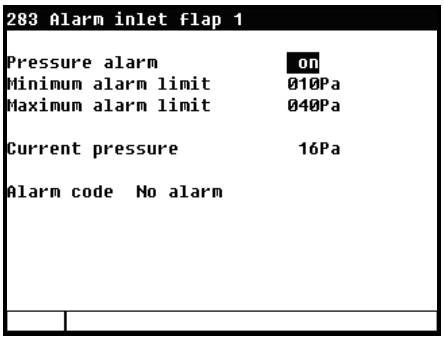
Temperature



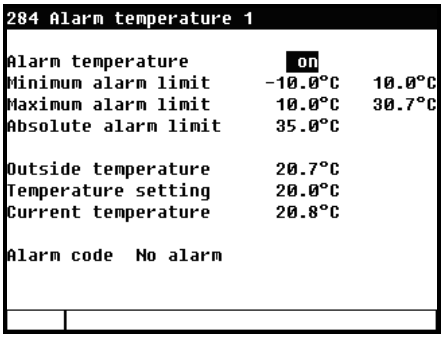
Room ventilation



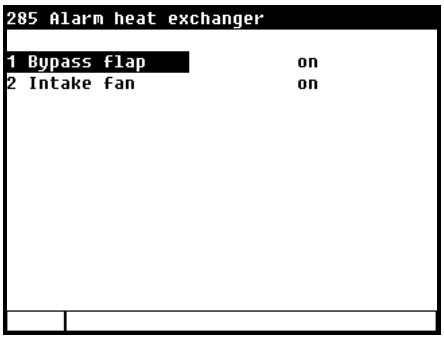
Pressure



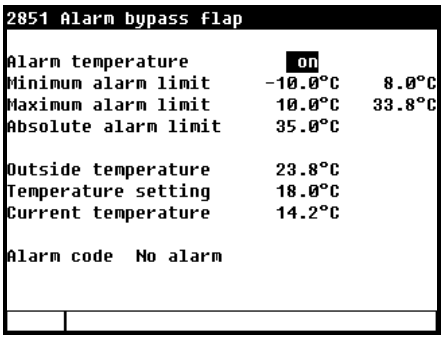
Temperature 1



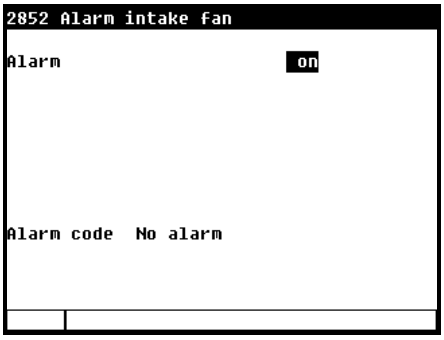
Alarm heat exchanger



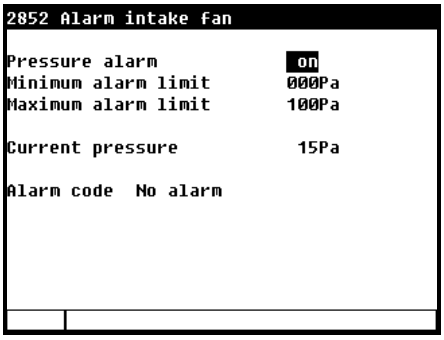
Bypass flap



Intake fan

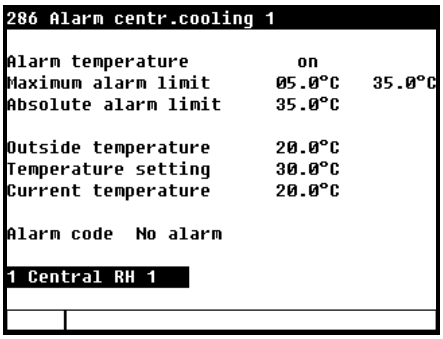


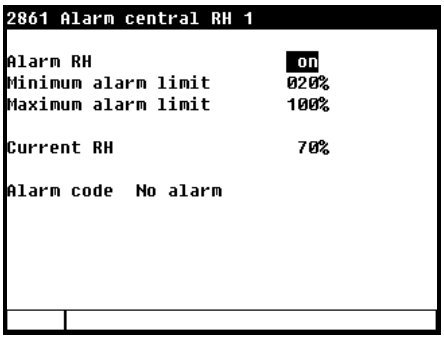
Based on average ventilation



Based on pressure

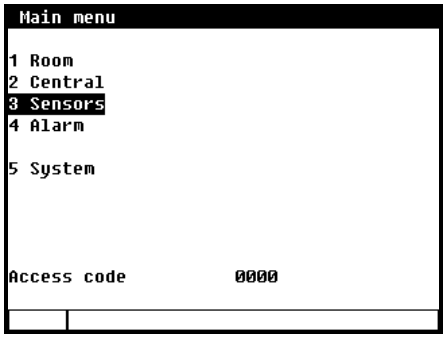
Centr. cooling



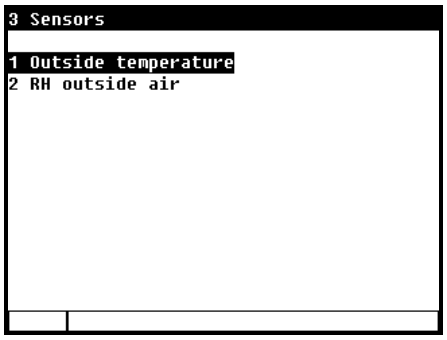


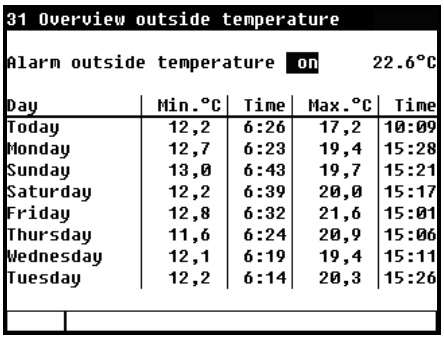
There is no “Central RH” option if no RH sensor has been installed for central cooling.

3 SENSORS



Alarm outside temperature

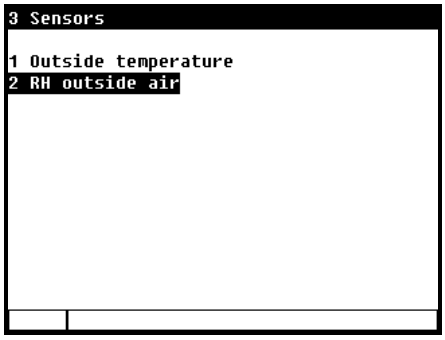


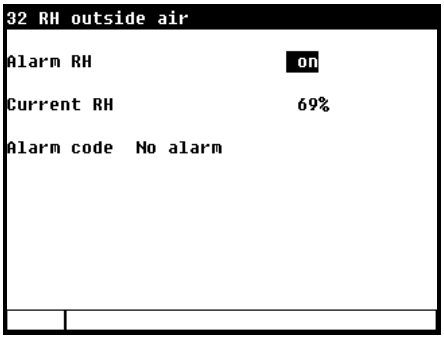


If you select menu option 1 “Outside temperature”, a table with the minimum and maximum outside temperatures of the past week will be shown. In addition, the table will show the times when the minimum and maximum values occurred on the relevant days. In this window you can also **switch the outside temperature alarm on / off** (only if a sensor is used to measure the outside temperature, not when the outside temperature is received by communication)

-99,9 °C Outside temperature sensor failure
???.? °C Invalid outside temperature

Alarm RH outside air



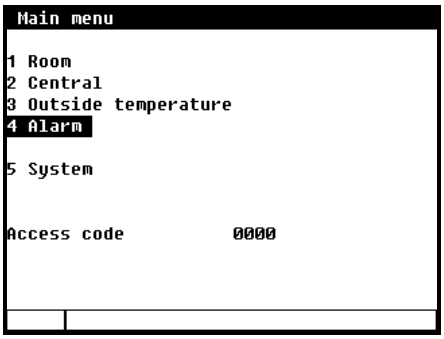


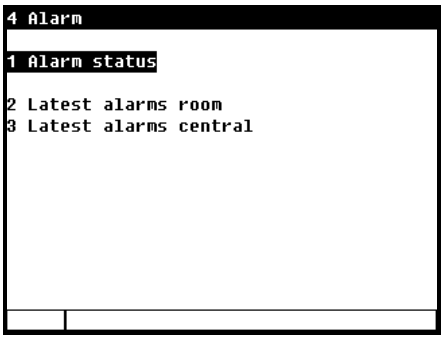
You can activate/deactivate the alarm of the “RH outside air” in this window.

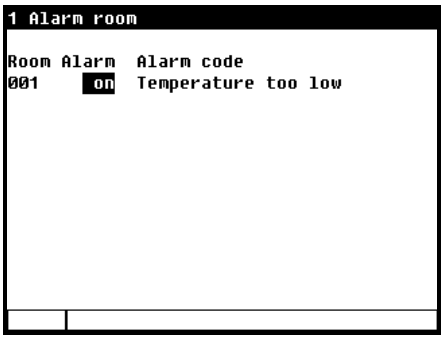
In addition to the current RH, the current alarm code is also displayed.

Alarm code: RH sensor defect, the RH sensor of the outside air is only tested on the correct functioning of sensor.

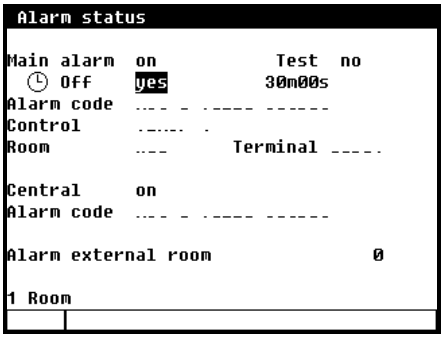
4 ALARM





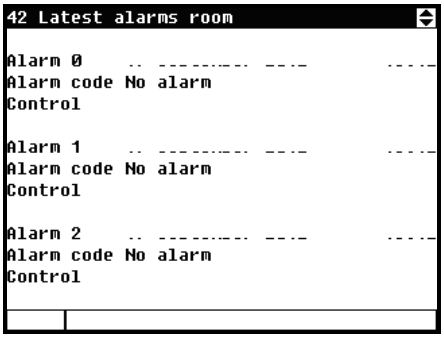


Alarm status



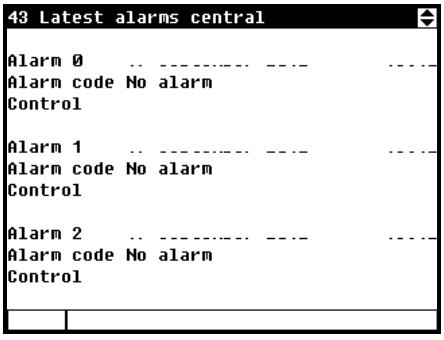
For further information, see the “Alarm key” page 3

Latest alarms rooms



The last 5 alarm causes which caused the alarm relay to de-energize due to an alarm condition are shown. The cause of the alarm is displayed in addition to the date and time.

Latest alarms central



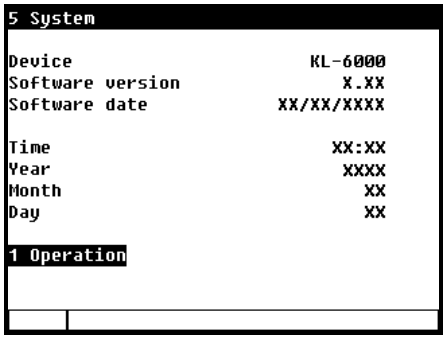
The last 5 alarm causes which caused the alarm relay to de-energize due to an alarm condition in one of the central controls are saved for the central controls. The cause of the alarm is displayed in addition to the date and time.

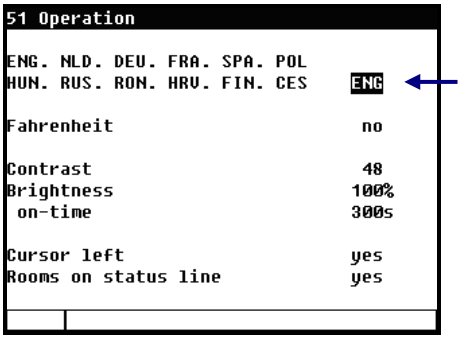
Alarm 0: The cause of the most recent alarm is displayed in addition to the time until which the alarm was active.

Press the arrow down key to display the data for numbers 3 - 5.

5 SYSTEM

Operation





Language: Set the interface language for the windows here. Set the language to ENG (English) for this manual

This window shows the device type as well as the software program version. In addition, it enables you to change the date and time.

Select “1 Operation” with the cursor key and press the confirmation key or press numerical key 1 to display the following window.

Changing language: Hold down F1 and press on the right cursor key.

Fahrenheit

The default temperature reading is in °C. If you enter “yes” for “Fahrenheit”, the temperatures will be shown in °F. Temperatures displayed in Fahrenheit or Celsius can be converted using a formula. The following applies if T_C and T_F are the number of degrees Celsius and respectively the number of degrees Fahrenheit:

Absolute
°F = 32 + (°C * 9/5)
°C = (°F -32) * 5/9

Relative
°F = °C * 9/5
°C = °F * 5/9

19.5°C = **32** + 19.5* **9/5** = 67.1°F

3.1°C = 3.1* **9/5** ≈ 5.6°F

Language: You can set the language of the display texts here. The language in this example is set to ENG (English).

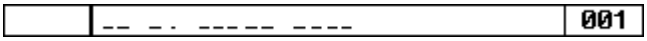
Contrast: Shows the ratio between the "colours" white and black. The greater this ratio, the better the contrast and the display quality.

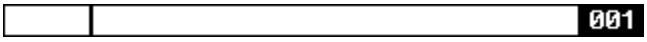
Brightness: You can set the light intensity of the background lighting here.

on-time: Time seconds during which the lighting has to stay on after the last time a key is pressed.

Cursor left: If you are going to change a setting and you enter “Yes” here, the cursor will be placed on the extreme left digit. If you are going to change a setting and you enter "No", the cursor will be placed on the extreme right digit.

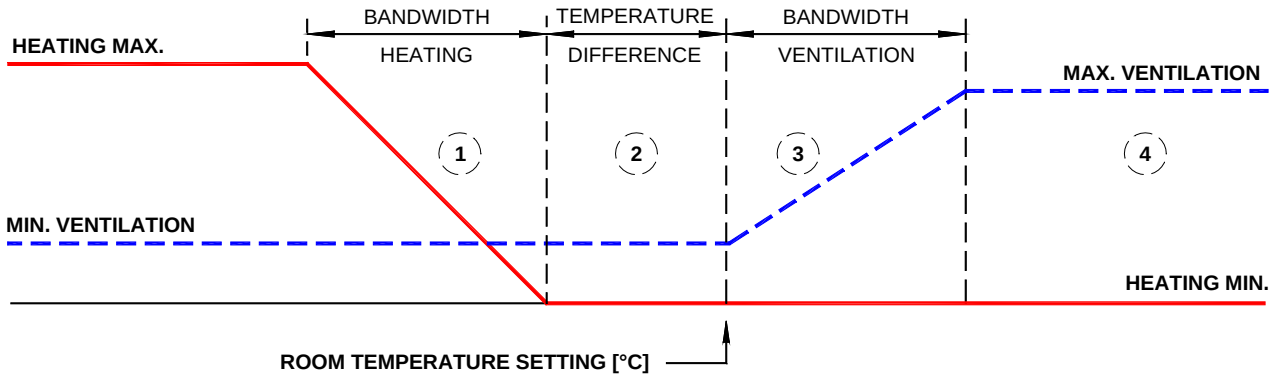
Room on status line If you enter yes, only the room number is shown on the status line (no date).

No 

Yes 

VENTILATION CONTROLS

Relation between room heating, temperature and ventilation



Bandwidth ventilation: area in which the ventilation is set from minimum to maximum.
Temperature difference: area in which the heater is off and the ventilation is minimal.
Bandwidth heating: area in which the room heater is set from minimum to maximum.

Example:

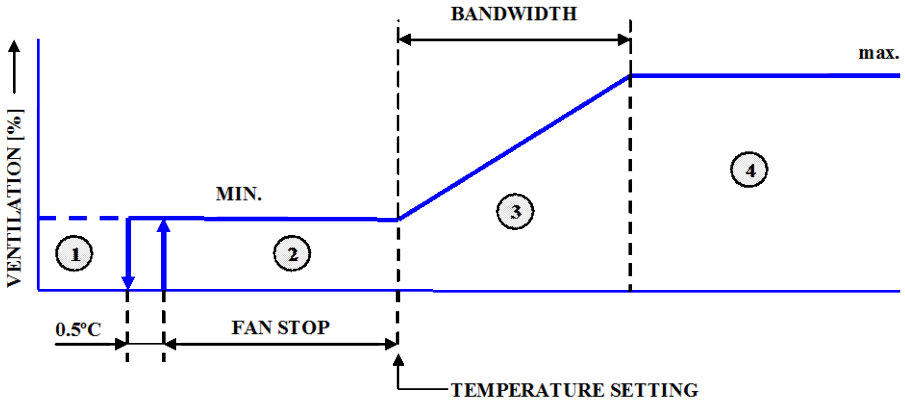
- ❑ The adjusted room temperature is 20ºC.
- ❑ The minimal ventilation is 10%.
- ❑ The maximal ventilation is 90%.
- ❑ The bandwidth is 4ºC.
- ❑ The temperature difference is 3ºC.

Explanation:

There are four situations to distinguish:

1. The temperature in the room is 17ºC or lower (adjusted temperature – temp. difference = 20ºC - 3ºC), the heater is on. The ventilation runs on 10% (minimal ventilation);
2. The temperature is between 17ºC and 20ºC, the ventilation is minimal and the heater is off.
3. The temperature is between 20ºC and 24ºC (adjusted temperature + bandwidth = 20ºC + 4ºC), the ventilation raises of 10% to 90% (maximal ventilation).
4. The temperature in the room is 24ºC or higher, the ventilation is now 90%.

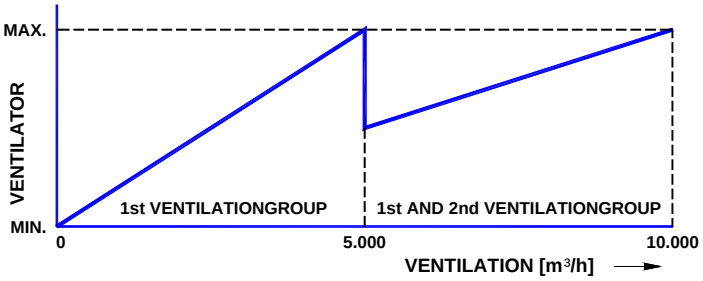
Controlled ventilation group



1. If fan stop is active 0% ventilation is calculated until the temperature exceeds the set point, if fan stop is not active the minimum ventilation is applied.
2. Minimum ventilation is applied if the temperature measured is below or equal to the temperature setting.
3. For intermediate value (bandwidth), the ventilation is calculated proportionally.
4. Maximum ventilation is applied if the temperature rises by at least the bandwidth.

2nd group of fans

The start percentage of the second ventilation group depends on the capacity of the main (first) ventilation group. The installer adjusts the capacity of the main ventilation group. The user can change the start percentage of the second ventilation group.



Example 1:

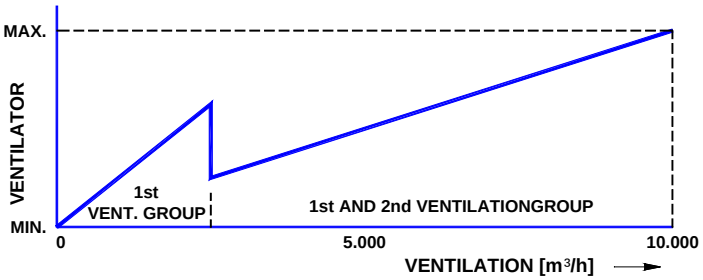
Capacity main ventilation group = 5000m³/u

Capacity second ventilation group = 5000m³/u

The installer then sets a capacity of 50% for the main ventilation group (parameter 5.26).

$$Capacity\ \ main\ \ vent..group = \frac{5000\,m^3}{5000\,m^3 + 5000\,m^3} * 100\% = 50\%$$

In this example the start percentage of the 2nd fan is set to 50%.



Example 2:

Capacity main ventilation group = 5000m³/u

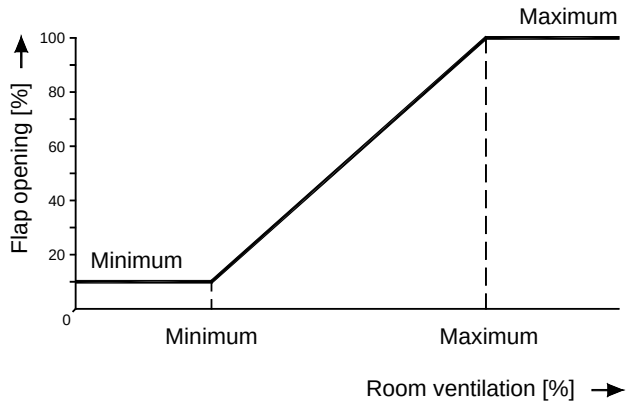
Capacity second ventilation group = 5000m³/u

The installer then sets a capacity of 50% for the main ventilation group (parameter 5.26).

$$Capacity\ \ main\ \ vent..group = \frac{5000\,m^3}{5000\,m^3 + 5000\,m^3} * 100\% = 50\%$$

On a central exhaust systems the start percentage of the 2nd fan/flap is set to 25% in stead to 50% to reduce the energy consumption.

Flap control based on room ventilation



Minimum flap opening — The flap will never close further than the percentage set at "Minimum opening".

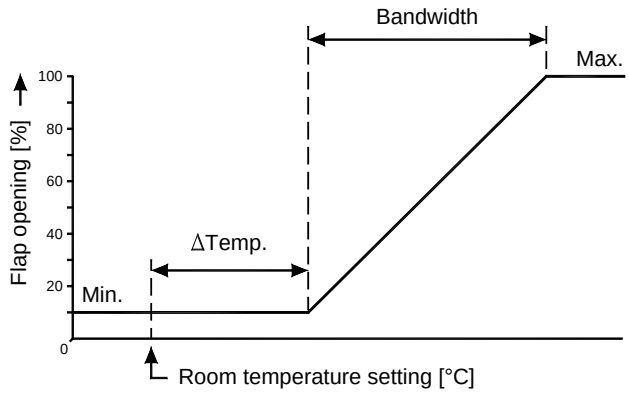
Maximum flap opening — The flap will never open further than the percentage set at "Maximum opening". At some controls you cannot set the maximum flap opening in that case the maximum flap opening is automatically set to 100%.

Minimum ventilation — The percentage of ventilation to which the flap remains on the preset minimum opening. When this percentage is exceeded, the flap will be opened further.

Maximum ventilation — The flap will never open further than the percentage set at "Maximum ventilation".

Attention! : If no measuring fan is installed in the room the diaphragm flap is controlled on base of the calculated ventilation of the 1st fan group. If the 2nd fan is switched on the diaphragm flap is always set to maximum.

Flap control based on room temperature



Condition — Adjusted temperature is below the 10.0°C.

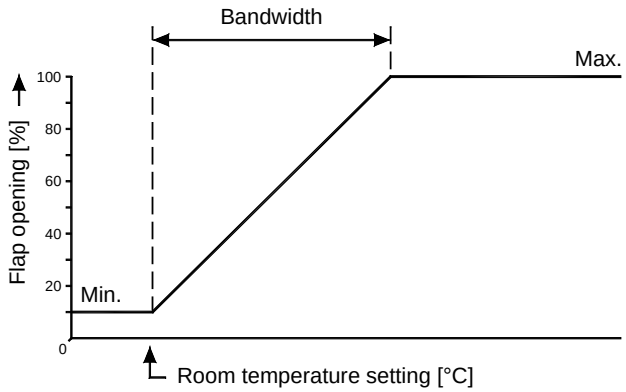
Δ Temp. — Temperature difference in relation to the room temperature. As soon as the room temperature exceeds this setting, the flap will open in accordance with the preset bandwidth.

Bandwidth — The temperature difference within which the flap regulates from minimum to maximum opening.

Min. — The flap will never close further than the percentage set at "Minimum opening".

Max. — The flap will never open further than the percentage set at "Maximum opening". At some controls you cannot set the maximum flap opening in that case the maximum flap opening is automatically set to 100%.

Flap control based on temperature setting



Condition — Adjusted temperature is 10.0°C or higher.

Temperature setting — As soon as the temperature exceeds this setting, the flap will open in accordance with the preset bandwidth.

Bandwidth — The temperature difference within which the flap regulates from minimum to maximum opening.

Min. — The flap will never close further than the percentage set at "Minimum opening".

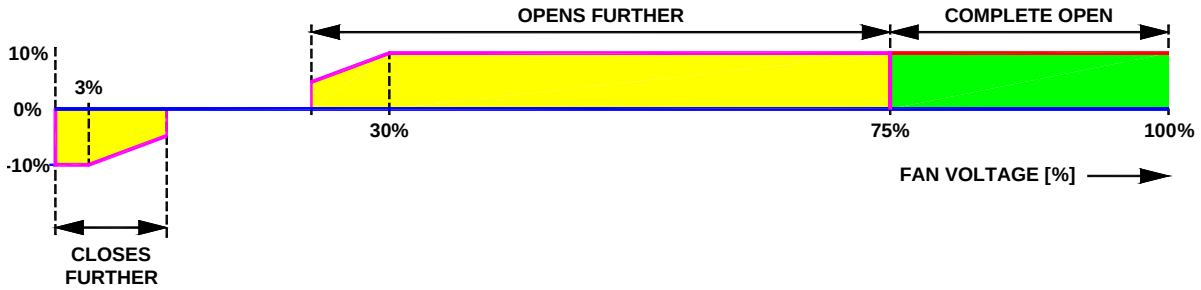
Max. — The flap will never open further than the percentage set at "Maximum opening". At some controls you cannot set the maximum flap opening in that case the maximum flap opening is automatically set to 100%.

AQC-unit

The AQC flap can be adjusted as measuring and adjusting unit in central exhaust systems and as measuring and throttle unit under the ventilation shafts. Due to the excellent aerodynamic qualities of the measuring fan and the double control flap, the AQC flap is a reliable ventilation control system. The capacity of the usual ventilators can be regulated with the AQC flap from 0.4m/s of the maximum capacity.

Inter-action between fan + AQC-flap

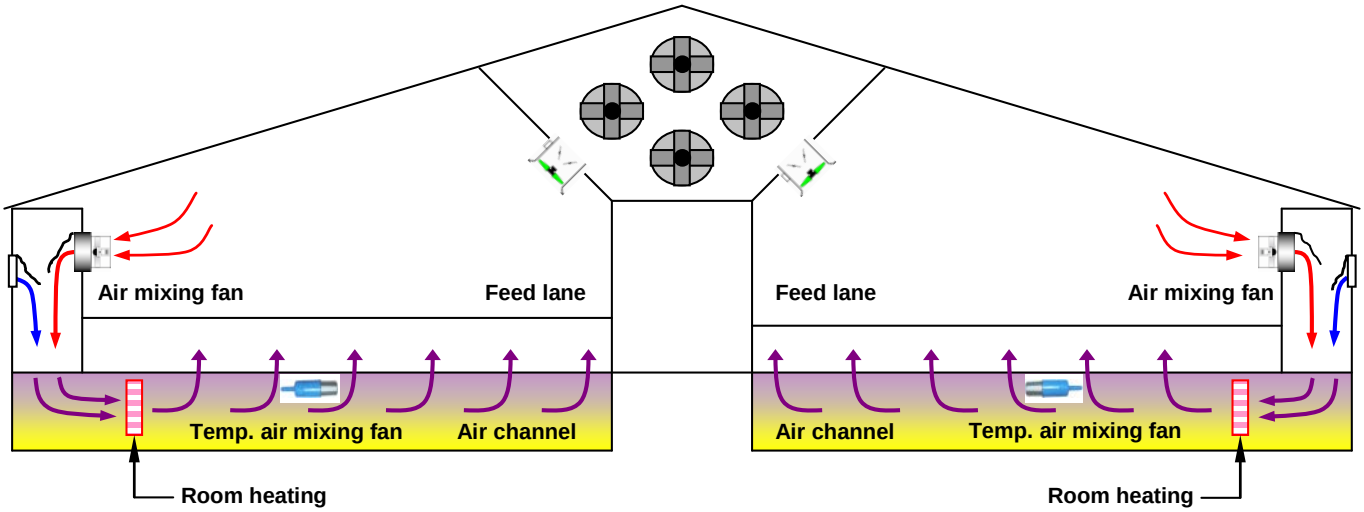
The flap will not run until the fan regulates the ventilation any further. Depending on the fan voltage, the flap will be opened or closed every minute in small steps



Ventilator voltage	Flap
Lower than 3%	Flap is closed 10% further
Between 3% and 30%	Flap adjustment in ratio to the fan voltage
Between 30% and 75%	Flap is opened 10% further
Larger than 75%	Flap complete open

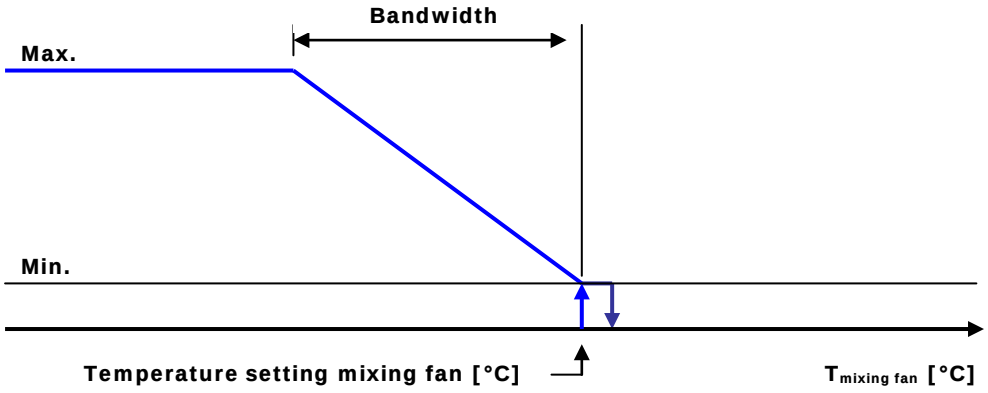
Air mixing fan

The purpose of the air mixing fan is to lower the heating costs and to improve at the same time the climate in the room. This fan mixes the “hot” air, located in the upper part of the room, with “cold” air drawn in via an air intake opening after which the pre-heated air is blown back into the room via the air channel under the feed lane. If the temperature in the room drops too much, the mixing fan is switched off in order to prevent a draught in the room (mixing in air from the house is only useful if the air in the house is warmer than the fresh air taken in).



An air mixing fan, driven by a regulator, is built into the double wall cavity. The fan opening is sealed by a DPC film flap when the mixing fan is not running. To prevent air flowing out of the room through the air intake opening, a DPC film flap is also installed over the air intake opening. The air intake is drawn open by the airflow.

When necessary, the room heating can be installed in the air channel under the feed lane. The room heating is regulated on the basis of the room temperature.



CENTRAL EXHAUST SYSTEMS

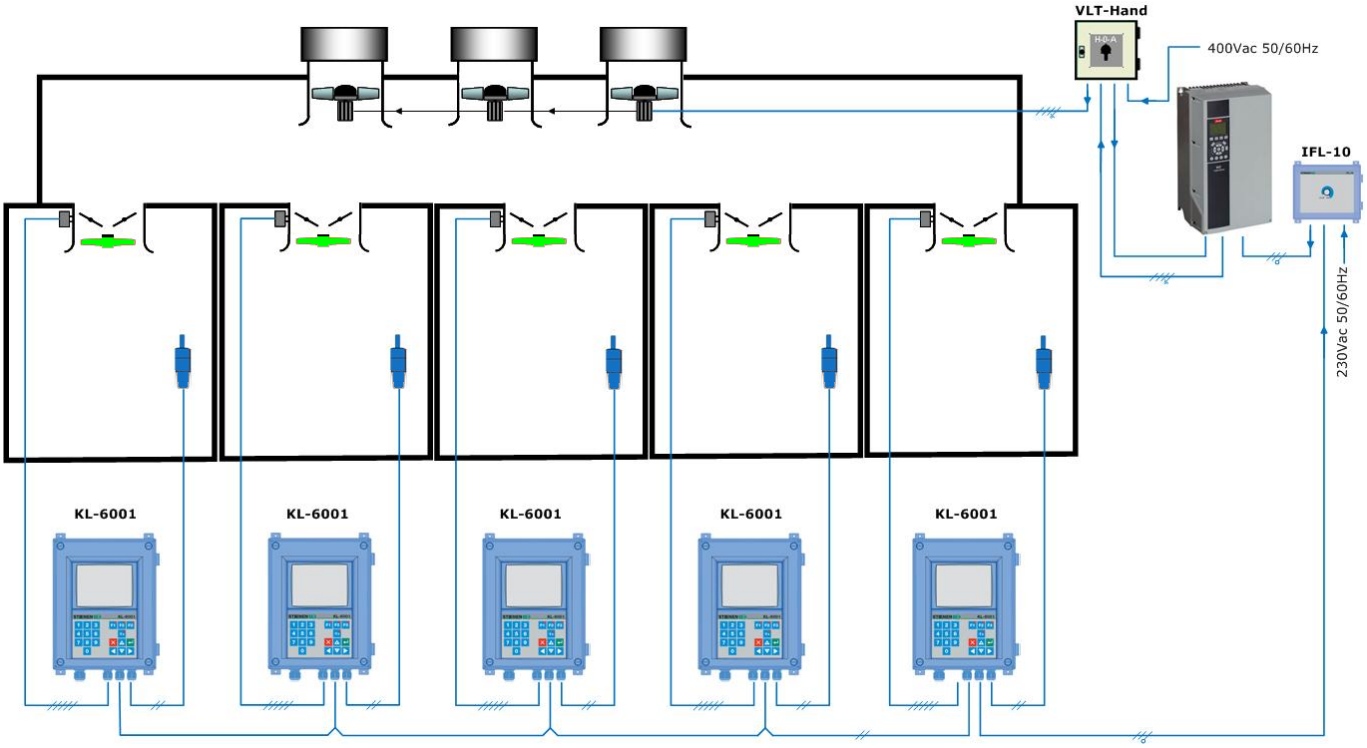
60 to 90% of the electricity consumption in pig farming is due to ventilation. The use of energy-efficient ventilation controls can result in considerable savings then. In recent years, Stienen BE has launched a number of energy-efficient ventilation systems. The use of frequency controls instead of triac-controlled fans enables energy savings of 30 to 70%.

Central exhaust systems are:
- ☐ Central fan control, with or without a measuring fan.
- ☐ ECOVENT: Ventilation systems where separate fans are used for every room.
- ☐ Step control.
- ☐ Controlled fan group with step control.

Not only the type of ventilation system, but especially also the installation design influence the energy consumption.

Central fan control (optimisation for correct ventilation)

In a central exhaust system, all rooms of a pig house (sty) are connected to a large exhaust channel in which an under pressure is created by a number of central fans. Each room is connected to this exhaust channel by an AQC-unit, which controls the ventilation in the room. The central fans are controlled by means of a frequency converter on the basis of the room with the highest ventilation request.



To be able to use a central fan control, the control must be provided with a unique identification number. To have the ventilation in a room controlled by a central fan, enter the corresponding control identification number.

With measuring fans (SMV) in the room

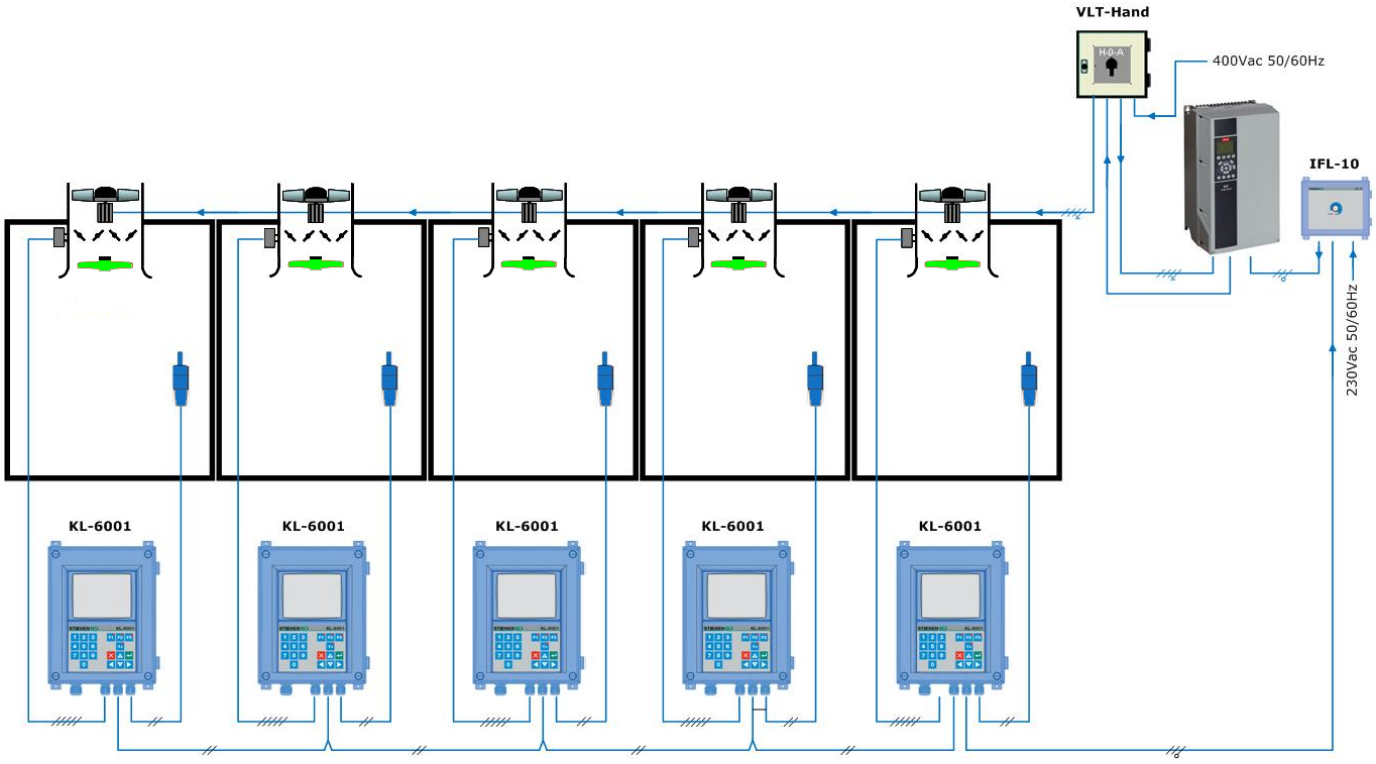
A room where this type of central fan control is used **must be fitted with a measuring fan** to register the current ventilation in the room. Rooms without measuring fans are not considered in the central fan control calculation

Without measuring fans (SMV) in the room

In a room where this type of central fan control is used the current ventilation in the room will not be registered. The ventilation requirement in the room is calculated on the basis of the temperature setting, the minimum and maximum ventilation settings and the bandwidth. Contrary to the previous control (with a measuring fan in the room), rooms with a measuring fan are included in the calculation of the central fan control.

ECOVENT system (optimisation for energy consumption)

The ECOVENT system offers an excellent alternative to existing systems where a central extraction system is not possible or not economically effective. With the ECOVENT system, one or more fans are used for every room, as is the case with a conventional 230V ventilation system. The ECOVENT system uses 400 VAC fans, all of which are controlled centrally using a frequency convertor.

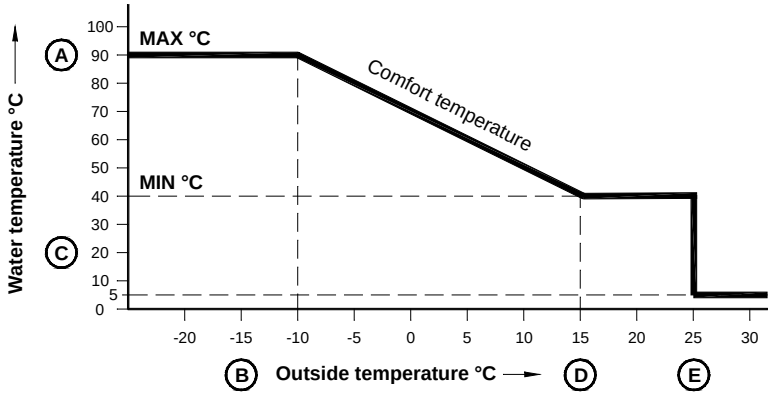


To be able to use an ECOVENT control, the ECOVENT control must be provided with a unique identification number. To have the ventilation in a room controlled by the ECOVENT system, enter the corresponding ECOVENT control identification number.

CENTRAL HEATING

Weather-dependent central heating control

In fact, weather-dependent central heating control is nothing more than controlling the water temperature of the central heating on the basis of the outside temperature. The temperature of the heating water is determined exclusively by the current outside temperature and the preset comfort temperature. This control is used to gradually introduce heat into the room. I.e. do not heat up to 70°C water temperature in spring or autumn/winter, but for example 50°C or maybe even lower.



If the outside temperature falls to below the stop temperature (E), the boiler water temperature is calculated according to the preset comfort temperature. If the outside temperature rises to a higher value than the stop temperature (hysteresis = 1°C), the calculated boiling water temperature is made equal to 5°C (frost protection). In case of an invalid outside temperature, the water temperature, which was, calculated the last will be maintained.

A Maximum supply water temperature

B Outside temperature at which the maximum supply water temperature has to be reached

C Minimum supply water temperature

D Outside temperature at which the minimum supply water temperature has to be reached

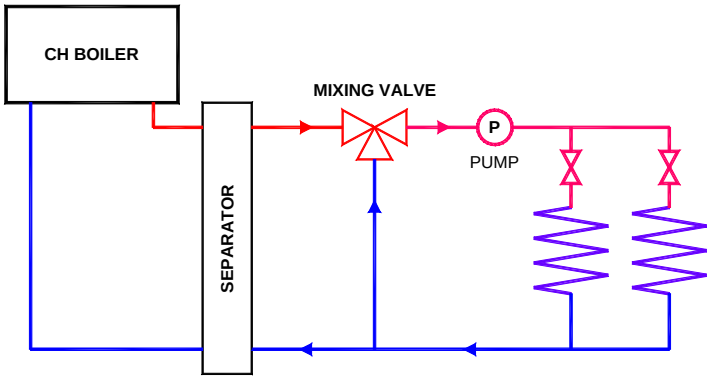
E Stop temperature. This is the temperature at which the boiler is switched off (the minimum water temperature is set to 5ºC for reasons of frost protection).

CH-control based on heat request

The calculated boiler water temperature is made equal to the highest water temperature requested by the room. The maximum calculated water temperature is limited by the maximum boiler water temperature setting (see firing line). However, the calculated boiling water temperature **never becomes less** than the **minimum heat request** setting.

Because the central control will automatically switch over to the preset firing line if the communication with the computers of the rooms is disturbed, the firing line has to be set on the basis of heat request, even if central heating control is used.

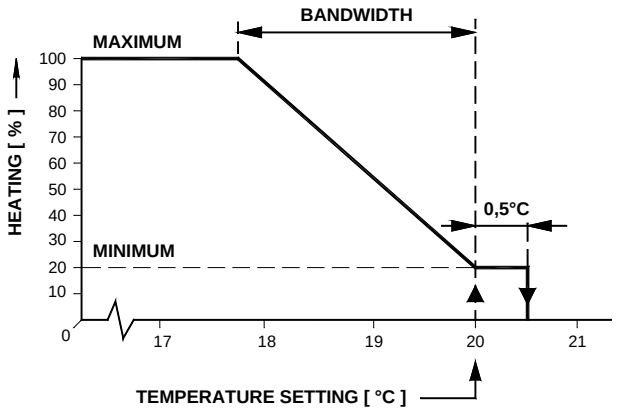
Mixing valve



The CH-control consists of a central heating (CH-group 1) and a mixing valve (CH-group 2). If the mixing valve is partly open the water of heating group is mixed with the water of the separator.

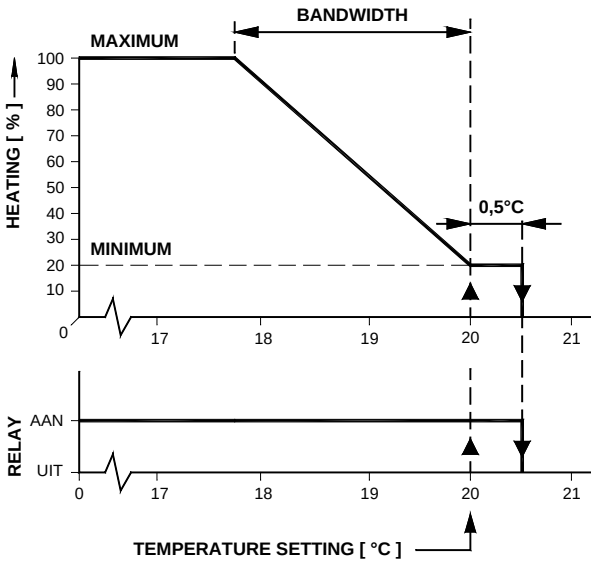
TEMPERATURE CONTROLS

Analogue controlled heating (0-10V)



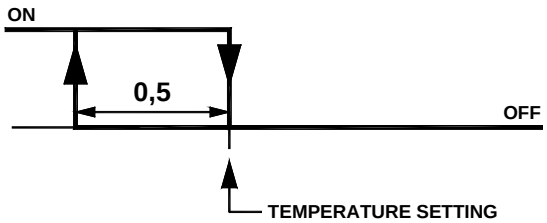
The climate computer controls the heating capacity between the minimum and maximum settings. The speed to control from minimum to maximum depends on the bandwidth. When the temperature measured exceeds the temperature setting + hysteresis (0.5°C), the output is driven at 0V (-0%) (or 10V with 10-0V control).

With auxiliary relay



If the room is out of operation, or if the heating is off, the controlled heating is driven at 0 Volt instead of the minimum voltage; in case of inverted control the drive signal is 10 Volts.

On/off heating control



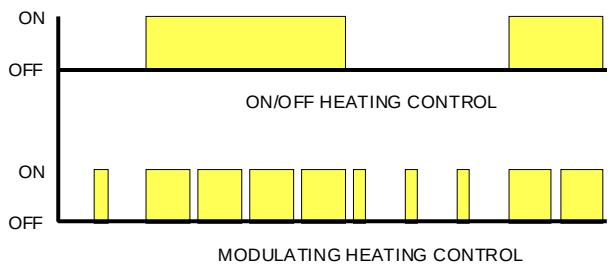
The On/Off heating is connected to a solid-state relay output, which means that the heating is switched on or off using an AC signal (max. 24 VAC). Since the climate control does **not** have an internal 24 VAC source, an external 24 VAC transformer will have to be installed.

The switching hysteresis is fixed and is 0.5ºC.

Modulating heating control

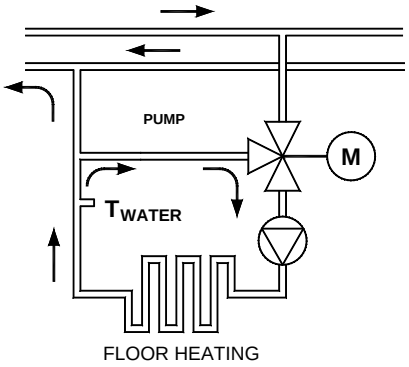
Non-modulating heating is 'all or nothing': the heaters are on or they are off. This results in significant temperature variations. When using modulating heating (with time-proportional control), the power is automatically adjusted to the heat request. The modulating heating consists of a thermal motor of the ABV type (manufactured by Danfoss) and a shut-off control valve. The shut-off voltage is closed when there is no voltage on it (Normally Closed). The shut-off valve is opened by applying a supply voltage. If there is only a minor heat request, the shut-off valve will only be opened a little. In the event of a great heat request, the shut-off valve will be opened all the way.

The modulating operation can be checked by the changing On/Off time of the LED over the solid-state output. The pulse/pause ratio depends on the differential temperature.

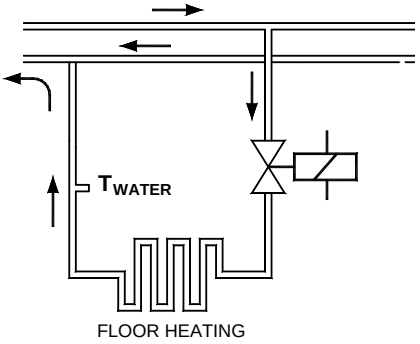


Modulating heating control is to be preferred, since this prevents the heating from lagging and the room temperature from tending to become too high as a result of which the excess heat has to be dissipated by the ventilation control.

Floor heating



Mix flap (0-10V) controlled heating



On / off or modulating controlled heating

The floor temperature is lowered if the temperature in the room is too high. This prevents the floor heating energy from heating up the room, after which the ventilation capacity will increase to discharge this energy again. The calculated setting will be reduced by the compensation factor per degree by which the room has been overheated. However, the calculated setting must not fall below the minimum floor setting.

E.g. if the room is 4.0°C too hot and the compensation factor is 3.0°C/°C, the setting will be decreased by 4.0 * 3.0 = 12.0°C. For a setting of 37°C and a minimum of 27°C, the calculated setting will not be 25.0°C, but 27°C.

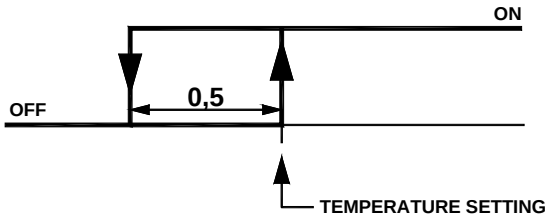
Cooling

Animal houses are very difficult to cool. Keeping the roofs wet is an option, but with little effect. Spraying the animals or the feeding aisle with water is not to be recommended: this would cause the relative humidity in the house to rise, as a result of which it would become much more difficult for the animals to dissipate heat.

Cooling can be done in several ways:

- Atomising water: If water is atomised, the temperature in the house will fall (heat is required to evaporate water). Atomising water is not recommended in humid conditions: install a RH sensor to check this.
- Climate conditioning: The incoming air is cooled using a heat exchanger. An extra advantage is that a heat exchanger can also be used for heating.
- Floor cooling: The floor cooling consists of pipes or panels poured into the concrete floor. If the temperature measured rises to above the preset value, groundwater will be pumped through the pipes/panels. Floor cooling may be combined with floor heating.

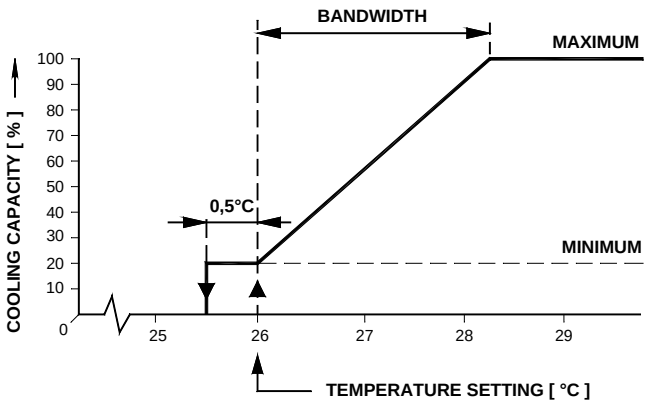
On/off cooling



The cooling system is connected to a solid-state relay output, which means that cooling is switched on or off using an AC signal (24 VAC). Since the climate control does **not** have an internal 24 VAC source, an external 24 VAC transformer will have to be installed.

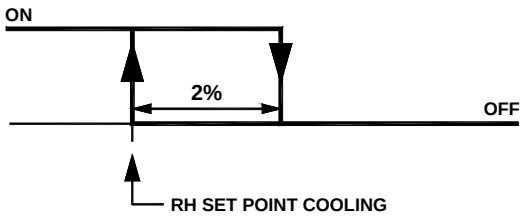
The switching hysteresis is fixed and is 0.5ºC.

Analogue cooling



The climate computer controls the cooling capacity between the minimum and maximum settings. The speed to control from minimum to maximum depends on the bandwidth. The output is lowered to 0V when the measured temperature falls to below the preset temperature - hysteresis (0.5°C).

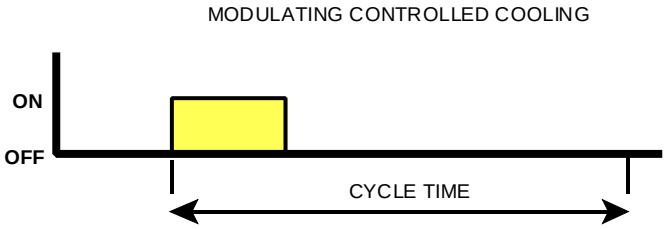
Cooling off on RH



If the cooling is on and the RH rises by 1% above the preset RH, the cooling will be switched off.

If the RH then falls by 1% below the setting and the temperature is still too high, the cooling is switched on again.

Modulating controlled cooling



With modulating controlled cooling the output is driven for a percentage (current cooling) of the cycle time setting.

Example

Cycle time	10 minutes
Current cooling	25%
Output **on** during:	10 *100 /25 =5 minutes
Output **off** during	10 – 5 = 15 minutes

Soaking

Most manure and dust can easily be removed using a pressure cleaner, but to really clean a room well it is a good idea to soak the surfaces first. You can save water and time by soaking, possibly with a detergent.

Caution!:
- ❑ Never use a high-pressure sprayer to clean the climate computer, the measuring fan impeller, flaps and other electrical equipment but use a moist wash-leather or rag.
- ❑ Switch off the voltage in the room while cleaning with water.

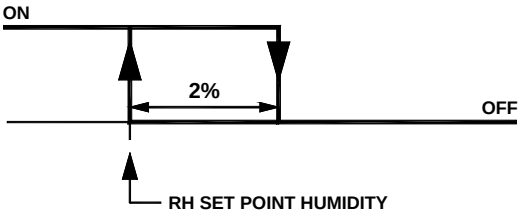
Cleaning helps to prevent rust and it will enable you to notice minor defects faster. While cleaning, check the flaps, the temperature sensors etc.

HUMIDIFICATION

In addition to the temperature, the relative humidity plays an important role in the animals' comfort. The indoor air may be very dry due to heating etc. Too dry air can cause health problems among the animals. Air humidifiers are easy and adequate instruments to increase the relative humidity level. A relative humidity of 60 - 80 % is ideal for the animals. A higher value may occur if the relative humidity of the outside air is higher than the setting. This is no problem if there is sufficient ventilation, but a permanently excessively low or high relative humidity must be avoided at all times.

Humidification can be done in several ways:

- ❑ By evaporating cold water with a fan ensuring that moisture is released into the ambient air (often through a filter mat). Possible contaminations in the air are filtered out.
- ❑ By evaporating hot water. A heating is used to heat the water; the resulting steam humidifies the air;



The climate computer can control the relative humidity in rooms, which have a misting system. If the RH measured falls to below the preset value, the misting system will be switched on. If a heating is on, humidification control will be switched off.

COMPENSATIONS

Night setting

You can use the night settings to create natural temperature behaviour between day and night by reducing the temperature setting by a couple of degrees during the night. In addition to the period when the night setting has to be active, you can also set the number of degrees by which the house temperature has to be increased/decreased during this period

111 Room ventilation		
Temperature setting	20.0°C	23.0°C
Bandwidth	04.0°C	4.0°C
Minimum ventilation	010%	10%
Maximum ventilation	100%	100%

11121 Compensations room temperature	
Night setting temperature	+0.0°C
Night setting	from 20:00 till 07:00

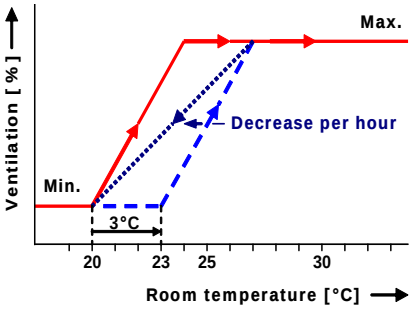
Night setting house temperature: 20.0°C **-1.0** = 19.0°C

Temperature compensation

The animals may fall ill due to rapid temperature drops. To prevent these rapid temperature drops, which usually take place in summer, from occurring you must activate the temperature compensation. Temperature compensation will limit the room temperature corrected by the control. The 'decrease per hour' setting determines the speed at which the corrected room temperature is controlled down to the preset room temperature in the event of a drop in temperature. If you set the maximum temperature compensation to 0.0 ºC, the temperature compensation is switched off (see parameters 4.03 and 4.04).

Example:

Room temperature setting	20.0ºC
Maximum temp. compensation	3.0ºC
Reduce temp. compensation	0.2ºC/h
Bandwidth	4.0ºC
Current room temperature	28.1ºC
Corrected setting room temperature	23.0ºC



Calculated compensation = Room temperature measured - (room temperature setting + bandwidth)

= 28,1 ºC - (20 ºC + 4,0 ºC) = 4,1 ºC

However, the temperature correction can never be more than the maximum temperature compensation. This means that in the above example it can never be more than 3.0ºC (maximum setting) instead of 5.1 ºC (calculated excess value). The corrected temperature setting becomes equal to: room temperature setting + temperature correction = 20.0 ºC + 3.0 ºC = 23.0 ºC.

In this example, the time in which the room temperature is controlled back to the temperature setting is: (Room temperature correction / max. temperature compensation per hour = (3.0ºC / 0.2 ºC/h) = 15 hours.

Instead of room temperature your installer may also select the intake air temperature to correct the preset room temperature. In the "Start temperature compensation" setting you can set the temperature difference from the preset room temperature at which the compensation has to become active.

Example:

Room temperature setting	20.0ºC
Start temperature compensation	-2.0ºC
Maximum temp. compensation	3.0ºC
Reduce temp. compensation	0.2ºC/h
Bandwidth	4.0ºC
Current inlet temperature	19.2ºC
Corrected setting room temperature	21.2ºC

Temperature compensation

Temperature compensation

= Current inlet temperature - (Room temperature setting + Start temperature compensation)

= 19,2 ºC - (20 ºC -3,0 ºC) = 2,2 ºC

In this example, the time in which the room temperature is controlled back to the temperature setting is: Temperature compensation / reduce temp. compensation = (2.2ºC / 0.2 ºC/h) = 11 hour.

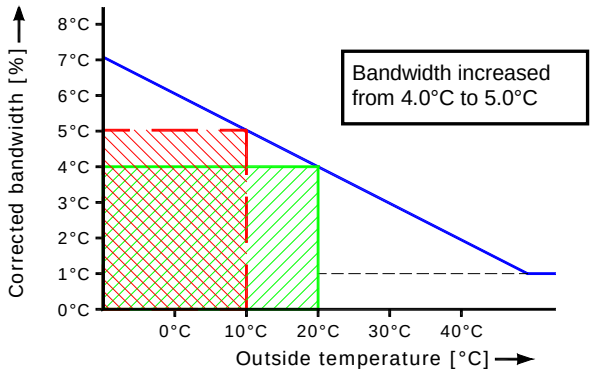
Fill ratio

As a rule, less ventilation will be required in a room, which is not completely filled with animals. E.g. if the room is filled for only 95%, the minimum and maximum ventilation values might be lowered by 5% to still allow optimum ventilation. The fill ratio is calculated on the basis of the maximum number of animals and the current number of animals in the room.

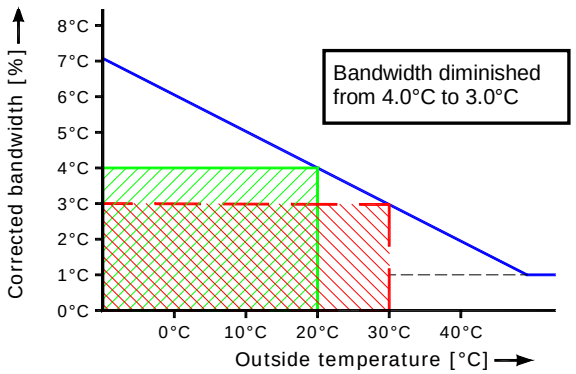
Bandwidth compensation

If the outside temperature is part of the installation, the bandwidth of the room ventilation and/or air inlet flaps can automatically be adjusted to changes in outside temperature. As a result, it is possible to obtain a larger bandwidth at low outside temperatures and a smaller bandwidth at high outside temperatures.

Current temperature outside = 10°C



Current temperature outside = 30°C



This setting is used to adjust the bandwidth to the current outside temperature.

Example bandwidth compensation:

Bandwidth	4.0 °C
Bandwidth compensation	-2.5 %/°C
Bandwidth compensation starts at outside temperature:	20 °C

At an outside temperature of 20°C the bandwidth is 4.0°C. If the outside temperature drops to 10.0°C the bandwidth is increased by 1.0°C.

ΔT = Current outside temperature-bandwidth compensation starts at outside temp. = 10.0°C-20.0°C= -10.0°C
Correction bandwidth = ((ΔT * Bandwidth compensation) * Bandwidth) / 100%
Correction bandwidth = (-10.0°C * -2.5%/°C) * (4.0°C / 100%) = 1.0°C
The corrected bandwidth is: 4.0°C + 1.0°C = 5.0°C
But if the outside temperature increase to 30.0°C the bandwidth will be diminished with 1.0°C to 3.0°C (4.0°C - 1.0°C = 3.0°C).

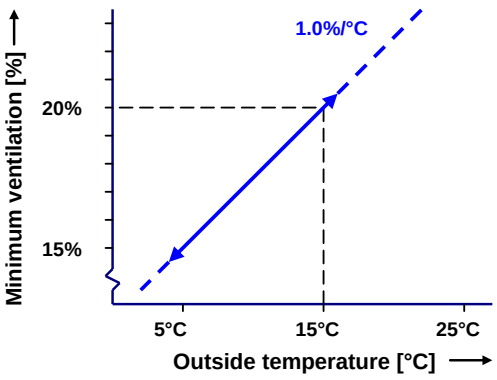
The bandwidth is limited: the upper limit is 20.0°C; the lower limit is 1.0°C.

Compensation minimum ventilation

The minimum ventilation can be automatically adjusted to the actual outside temperature. As a result, a lower minimum ventilation is obtained at low outside temperatures and a higher minimum ventilation at high outside temperatures. This way, you are always ensured of a correct minimum supply of 'oxygen-rich' air. The outside temperature at which the calculated minimum ventilation should be equal to the set minimum can be set behind 'Start outside temperature'. The percentage at which the minimum ventilation should be corrected per °C of change in outside temperature is set behind the “Compens. minimum ventilation” (the compensation of the minimum ventilation is a relative compensation).

Example:

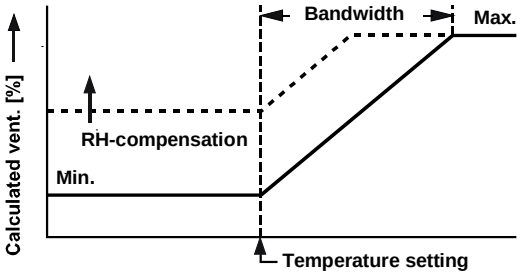
Adjusted minimum ventilation	20.0 %
Compens. minimum ventilation	1.0 %/°C
Start outside temperature	15.0 °C
Current outside temperature	5.0 °C
Calculated minimum ventilation (20.0%-2.0%)	18.0 %
Current outside temperature	25.0 °C
Calculated minimum ventilation (20.0%+2.0%)	22.0 %



RH-compensation

In addition to the temperature, the relative humidity (RH) plays an important role in the animals' comfort. A relative humidity of 60 - 80 % in the house would be ideal. At too low CO2 concentration the minimum ventilation is probably too high.

In addition to the standard ventilation control that controls on the basis of temperature, the climate computer also has the possibility of increasing the ventilation capacity on the basis of relative humidity. This means that extra ventilation is required if the relative humidity exceeds the preset relative humidity starting percentage. Below the preset percentage the RH control will not affect the ventilation operation.



The RH compensation factor can be used to set the influence of the RH on the ventilation. The factor can be set between 0.0 and 9.9. No compensation takes place if 0.0 is set. A setting of 9.9 means maximum ventilation compensation.

The calculated ventilation is limited by the pre-set maximum.

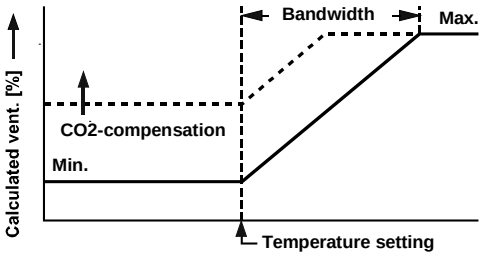
The factor is default set to 0.3

RH-compensation	Compensation ventilation
Absolute	Compensation = (current RH – start percentage RH) * factor
Relative	Compensation = (current RH – start percentage RH) * factor * (calculated ventilation / 100)

CO2-compensation

In addition to the temperature and the relative humidity (RH), CO2 plays an important role in the animals' comfort. A CO2 concentration of 2000-3000 ppm in the house would be ideal. A lower CO2 concentration in the house .

In addition to the standard ventilation control that controls on the basis of temperature, the climate computer also has the possibility of increasing the ventilation capacity on the basis of CO2 concentration. This means that extra ventilation is required if the CO2 concentration exceeds the preset starting concentration. Below the preset concentration the CO2 concentration will not affect the ventilation operation.



The CO2 compensation factor can be used to set the influence of the RH on the ventilation. The factor can be set between 0.0 and 9.9. No compensation takes place if 0.0 is set. A setting of 9.9 means maximum ventilation compensation.

The calculated ventilation is limited by the pre-set maximum.

The factor is default set to 1.0

CO2-compensation	Compensation ventilation
Absolute	Compensation = ((current CO_2 – start percentage CO_2) / 100) * factor
Relative	Compensation = ((current CO_2 – start percentage CO_2) / 100) * factor * (calculated ventilation / 100)

Pressure control central inlet flap

The under pressure can automatically be adjusted to the current outside temperature.
Negative compensation: This achieves a higher overpressure if the outside temperature is low and a low overpressure if the outside temperature is high (positive compensation gives the reverse effect).

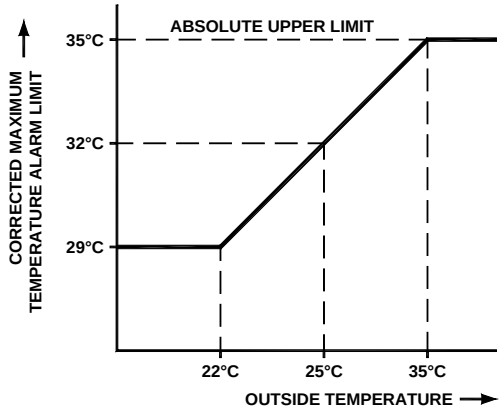
Example *(negative compensation)*

Underpressure setting:	25 Pascal
Underpressure compensation:	**-0.5Pa / °C**
from outside temperature:	20°C
Current outside temperature:	18°C
Calculated underpressure:	26 Pascal
Current outside temperature:	28°C
Calculated underpressure:	21 Pascal

Example *(positive compensation)*

Underpressure setting:	25 Pascal
Underpressure compensation:	**0.5Pa / °C**
from outside temperature:	20°C
Current outside temperature:	18°C
Calculated underpressure:	24 Pascal
Current outside temperature:	28°C
Calculated underpressure:	29 Pascal

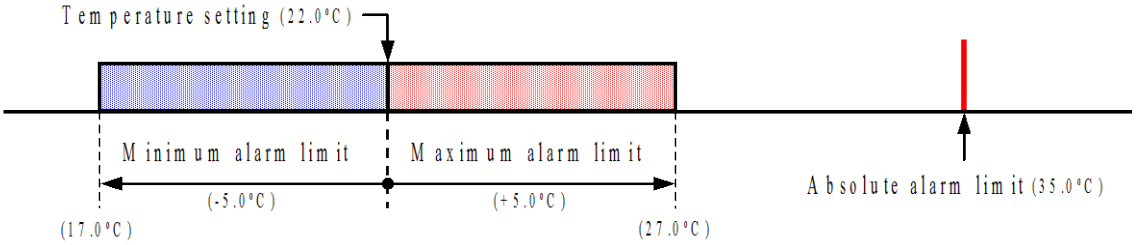
Outside temperature compensation on behalf of alarm



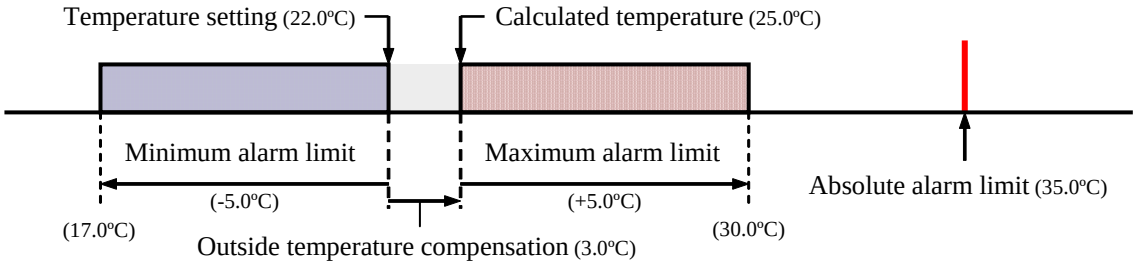
The following applies to all controls, except to nest heating: if the outside temperature rises above the temperature that has been set, the maximum temperature alarm limit will be corrected upwards until the absolute alarm limit is reached. This compensation prevents the alarm from being activated unnecessarily when outside temperatures are high. An alarm is generated as soon as the room temperature rises above the corrected alarm limit.

Example:	$T_{OUTSIDE} < T_{ROOM.}$	$T_{OUTSIDE} \geq T_{ROOM.}$	$(T_{OUTSIDE} + T_{ALARM}) > T_{ABS}$
Adjusted absolute temperature limit:	35,0°C	35,0°C	**35,0°C**
Adjusted temperature:	**22,0°C**	22,0°C	22,0°C
Adjusted maximum alarm limit.	**5,0°C**	**5,0°C**	5,0°C
Measured outside temperature:	18,0°C	**25,0°C**	31,0°C
Calculated maximum alarm limit	22,0+5,0 = **27,0°C**	25,0+5,0=**30,0°C**	**35,0°C**
	1	**2**	**3**

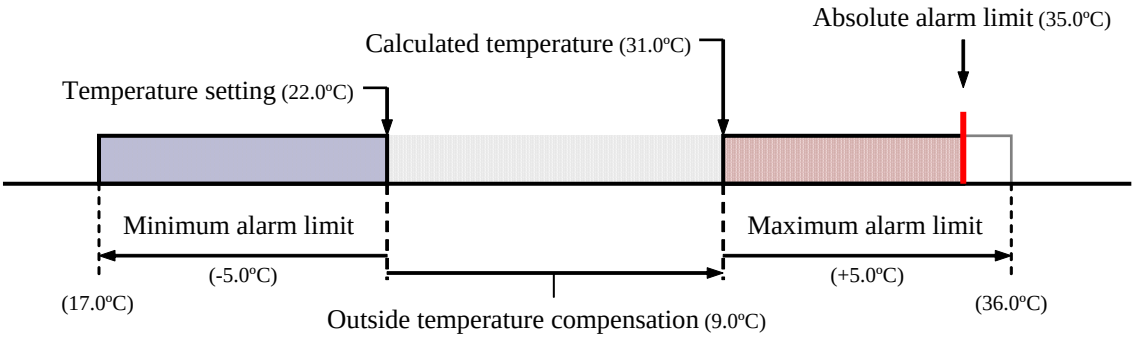
1. If the outside temperature is lower than the room temperature setting, the calculated alarm limit will be increased to the maximum alarm limit setting in keeping with the room temperature.



2. If the outside temperature is higher than the room temperature setting, the calculated alarm limit will be made equal to the outside temperature and the calculated alarm limit is shifted.



3. If the calculated maximum alarm limit exceeds the absolute alarm limit, the maximum alarm limit will be made equal to the absolute alarm limit.



MAINTENANCE AND CHECK UP

Regular maintenance and checking of the equipment are essential for its proper operation.

- **Don't forget to clean the ventilation system when cleaning the rooms.**
  To minimise the energy consumption, it is important that the fans are clean. This also applies to the flaps, measuring fan and the ventilation tube. Dust and dirt may affect the operation of the equipment. You can use a brush to clean the fans. Clean the climate computer, the measuring fan impeller and the flaps using a moist cloth. You are recommended to use a high-pressure sprayer to clean the tube. Never use a high-pressure sprayer to clean the climate computer, the measuring fan impeller, flaps and other electrical equipment.

- **Check the under pressure in the sty regularly.**
  Clogged up filters, air inlet flaps, which are still in "winter mode" etc., may cause an unnoticed increase in the counter-pressure in the ventilation system in combination with a rising temperature. This will result in the fans having to run much faster than is usually required. When opening or closing the room doors, be alert to any resistance, which you may feel. If you can feel the under pressure, we advise you to check the operation of the filters and flaps.

- **Check for air pressure leakage in the sty.**
  Air leaks can lead to draughts and - in summer - they can result in unwanted heating due to hot air being drawn in from between the roof and the insulating materials for example. This will require the fans to work extra hard to enable the preset house temperature to be reached, causing the energy costs to increase unnecessarily.

- **Check the measuring fans**
  The measuring fan operation will become less smooth due to wear. The result is that the ventilation rate will increase while the fan speed stays the same! Have the measuring fans checked by an expert in time.

- **Check the measured value and settings**
  Since the climate computer does what the sensors indicate, you should regularly (e.g. after cleaning the room) check the values measured by the sensors. We recommend having an expert check all settings and measured values at least once a year.

- **2nd fan**
  Switch on the 2nd fan at least 1x a week, even in winter, to prevent it from getting stuck.

- **Bandwidth**
  Increase the bandwidth to 5.0ºC - 6.0ºC in summer so that the fans do not have to run at a high speed all the time.

- **Heating's**
  Do not switch off heating's too early in autumn, so that possible temperature variations between day and night can still be compensated.

- **Alarm system**
  Check the operation of the alarm system at regular intervals, e.g. 1x a month.

- **Temperature sensors**
  Clean the temperature sensors every month.

- **Ventilation**
  Clean ventilation tubes at least 1x a year.

Good climate control is crucial for a good business operation. Disease prevention starts with an optimum climate in the house. Regular inspection of the fans and climate controls is necessary.