CL-5400

CLIMATE CONTROL
FOR NATURALLY VENTILATED HOUSES

Table of contents

Disclaimer

1 General introduction

The manual is intended for the user of this device. It contains all the information necessary for operating and cleaning this product. Please read all information and instructions carefully before using the product.

Symbols mark warnings, important notes, tips, etc. in this manual.

Stienen has compiled this manual with all due care. If you find any errors, please let us know.

1.1 Symbols and definitions


Risk of injury by dangerous electric shock. Danger to people and animals.


Warning indicating danger to product, people and animals if procedures are not strictly complied with.


Warning indicating damage to products if procedures are not strictly complied with.


Pressure cleaning is not allowed.


Collect as separate flows


Important note


Additional information


Example of a concrete application of the functionality described.


Example calculation


Manual control


Tips and advice


Screenshot


Application note

1.2 Customer service

If you have any questions, please contact your installer. Be sure to have all the necessary data handy. You should also always write down the cause of a fault and the circumstances that occurred during the fault. This will enable you to avoid any ambiguities and it will enable your installer to deal with any faults quickly and effectively.

2 Safety instructions and warnings

Read the general safety instructions in this chapter carefully before using the device. A certified installer must install the device and resolve any faults, in accordance with the applicable guidelines. If this product is installed and used in any other way, the warranty will not apply.

2.1 Sound, independent alarm system

Although we have designed and built our control equipment with the greatest care possible, technical faults can never be ruled out. Insurance requirements in many countries are becoming increasingly stringent. This requires the alarm contacts of the various control computers to be connected a central alarm unit.


We recommend also installing a sound independent alarm system, for example a min/max thermostat.


We advise you to manually test the alarm at least once a week.

2.2 During use

The people who operate the device have read the manual carefully. They are aware of potential hazards that may arise from improper use and maintenance of the product.


The device must only be opened by authorized personnel.


Do not switch off the control computer while the house is empty, but switch it to *Off* mode. This will prevent condensation caused by the equipment cooling down.


Check the device for any damage at regular intervals. A damaged device is unsafe. Always report any damage to your installer.


Electronic equipment is splash-proof and must not be cleaned using a pressure cleaner.


If any emergency has occurred, write down: the circumstances under which the emergency occurred, installation settings, software date, software version number and possible causes.

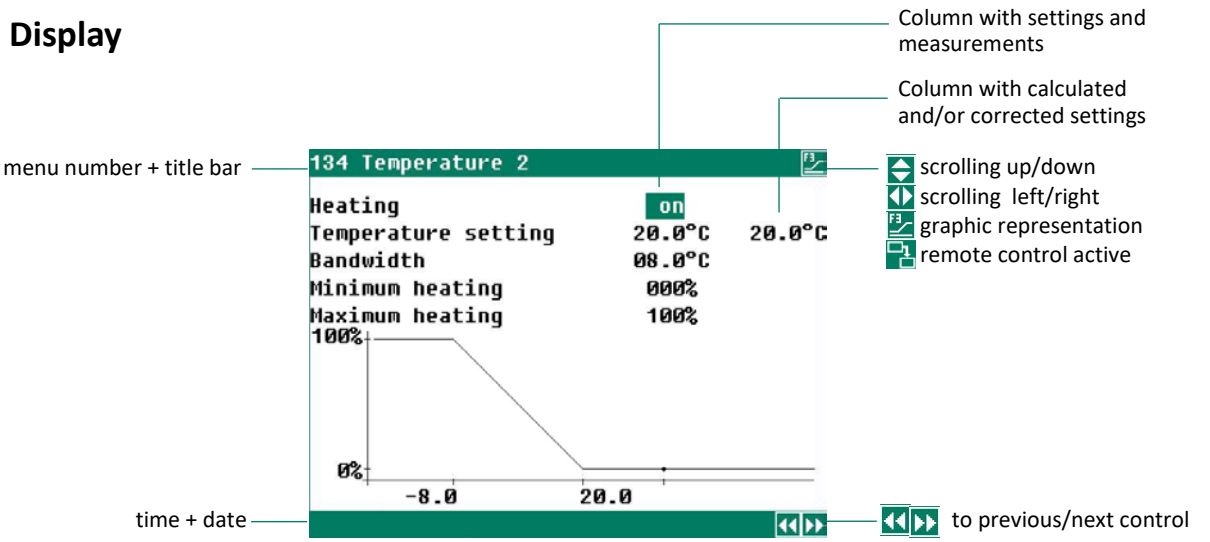
2.3 Disposal

The EU has set up systems for the separate collection of waste electrical and electronic equipment and batteries (Directive 20212/19/EU). If you do not dispose of the device properly, you risk a fine.


Electrical and electronic equipment must be collected separately at the end of its life.

3 Display and Keyboard

3.1 Display



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

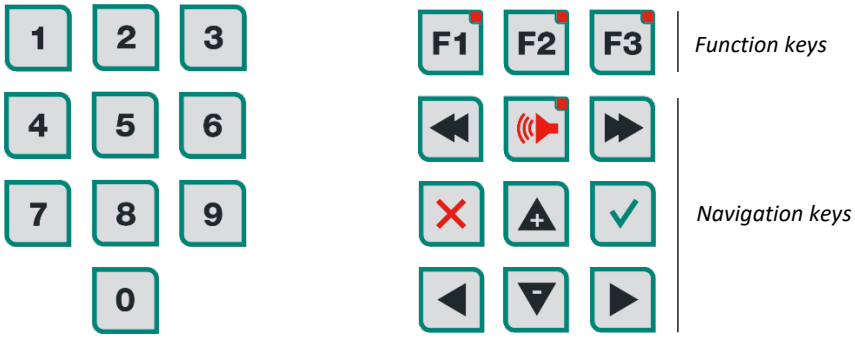
If the text extend beyond the screen, appears in the title bar. Use to reach the remaining settings/measurements.

If the text extend beyond the screen, appears in the title bar. Use to reach the remaining settings/measurements.

If is shown in the title bar and you press function key F3, the settings will be displayed graphically. The dot (●) in the graph indicates the calculated value. Pressing F3 again turns off the graphical mode.

Indication that you can select the previous/next screen pressing / .

3.2 Keyboard



Numeric keys

Operate the keys with your fingertips and not with sharp objects, such as a pen or screwdriver.

3.3 Function keys

F1 Press and hold this button and use ◀ ▶ to select the previous/next language.

F2 Displaying house status.

F3 Selecting graphical mode. When the light in the function key is on, the graph is active. Pressing F3 again turns off the graphical mode and the LED will go off.

3.4 Numeric keys (0...9)

Numeric keys (0 - 9)

The numeric keys allow to enter a screen number, valve number, value or text. Select menu item 10 with 0.

Key	Character
0	_0
1	. ,1'-:+
2	abcäàâç2ABCÄÁÀÂÇ
3	defëéèê3DEFËÈÊ
4	ghïíîì4GHÏÍÎÌ
5	jkl5JKL
6	mnoöóòô6MNOÖÓÒÔ
7	pqrs7PQRS
8	tuvüúùû8TUVÜÚÙÛ
9	wxyz9WXYZ

Text input

Use 2 - 9 to change the name of a recipe, timer, external alarm (max. 15 characters including spaces). The character is shown in a little box. Press the numeric key repeatedly until the character to be selected is shown. To enter a punctuation mark, press 1 repeatedly. Use 0 to insert spaces.

2 : Press once for a, twice for b etc.
Use ◀ and ▶ to move the text cursor.

For example, for menu choices, the text automatically starts with a capital letter.

3.5 Navigation keys

✕ Cancelling menu selection or change.
Press and hold to return to the main menu

◀ ▶ In control mode, press and hold to move cursor left/right.
In edit mode, move cursor left/right.

▲ ▼ In control mode, move cursor up/down.
In edit mode, decrease/increase value.

✓ Confirming menu selection, starting edit mode and confirming change.
In edit mode, the value to be changed appears in a green rectangle: 19.5°C.
When editing, the cursor changes into a black frame: 19.5°C.

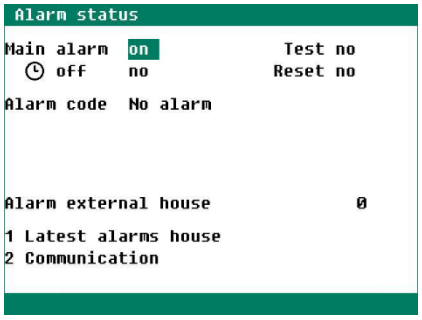
3.6 Inserting/removing breakpoint or period

1. Press ✓ to enter edit mode.
2. Hold down function key F1 and press:
   ▲ to insert a breakpoint/period (provided that the maximum value for periods/breakpoints has not been reached)
   ▼ to remove a breakpoint/period (provided that there is at least one period/breakpoint)
3. The number of breakpoints/periods is adjusted automatically.

3.7 Alarm key

Shortcut key for alarm screen.

Set *Test* to *yes* to test the alarm relay (siren) for 10 seconds. Set *Test* to *no* to clear the alarm test time.



off Option to temporarily disable the alarm (siren). This does not apply to hardware alarms. The main alarm will be switched off for 30 minutes; the alarm LED will flash evenly. After 30 minutes, the main alarm automatically turns back on. If the alarm cause has not been eliminated, the alarm relay de-energizes again (alarm).

Set *off* to *no* to delete alarm delay time.

You can delete all alarms by setting *Reset* to *yes*. All active alarms will be reset.

When the alarm relay has tripped (alarm delay time has expired), the cause will appear on the display. You can switch the main alarm on and off. If the main alarm is switched off, the LED in the alarm key will flash. The LED is on when there is an alarm in one of the sections and/or central controls. In addition to the alarm cause, the corresponding control and section number are displayed.

Alarm external house If a message is received via the communication loop that the alarm relay of a connected controller has failed, the *Alarm external house* displays the relevant house number.

Remember to switch the alarm back on after clearing the fault. Preferably use the *off* function to solve the problem.

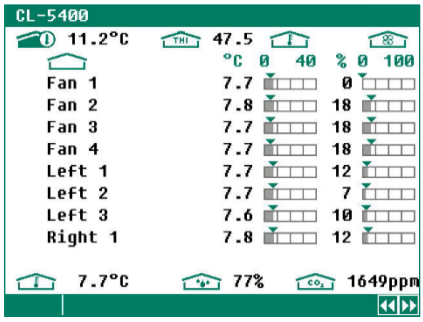
3.8 Terminal numbering for inputs / outputs

The terminal number of an input/output consists of: a 2-digit module address, the input/output type (letter) and a 2-digit serial number (between 01 and 99, 00 = output not used).

Letter	Input/output type	Description
A	0-10V output	Analog output: 0-10V or 10-0V
B	Relay output	Relay contact output (not: alarm relays, digital outputs, etc.)
C	Digital output	Optically switched on/off output (maximum 35Vdc 30mA)
D	Open/close output	Open/close control with position feedback. This includes heaters and valves with feedback potentiometer.
F	Controlled triac output	Controlled triac output: 30-230Vac
G	Analog output	Fixed-range 2-10V analog output with position feedback. This includes valves with feedback potentiometer.
K	Temperature sensor	Temperature sensors with a 10K NTC resistor (N10B, BV10B, etc.)
L	0-10V input	Analog 0-10V input for connection of e.g. measuring sensors (RH, pressure, CO_2, NH_3 etc.)
M	Digital input	Measuring fans, counter contacts etc.
N	Meteo station	Module to which wind speed, wind direction and a rain sensor can be connected.
R	Pressure sensor	n.a.

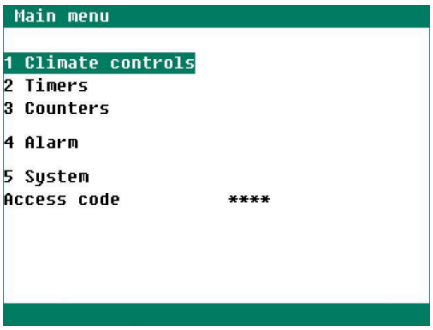
4 Overview screen + Main menu

4.1 Overview screen



Icon	Description
	Alarm (alarm delay time expired)
	Alarm disabled
	Alarm (alarm delay time has not expired)
	Alarm disabled
Fan 1	Ventilation group name
	Ventilation group temperature in °C
	Ventilation group in %
	Outside temperature
	THI (Temperature Humidity Index)
	House temperature
	Relative humidity
	1649ppm
	CO_2

4.2 Main menu



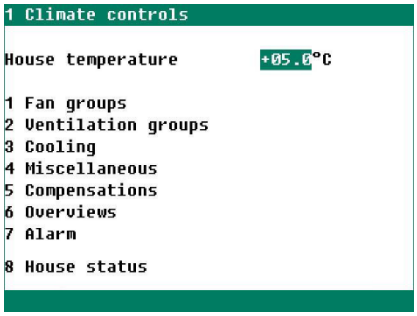
When using an access code, we recommend to write it down and keep it somewhere safe. You will not be able to change any settings if you do not have the access code.

If one access code is active, you can only change the setting after entering the correct access code.

The access code will remain active until the overview screen is selected. If you want to change a setting, you will then have to enter it again.

5 Climate control

5.1 House temperature



Based on the house temperature, the ventilation, cooling and heating systems are controlled.

If you set a low stall temperature, bear in mind that the water may freeze in winter.

Relative or absolute temperature setting

Control	Relative to house temperature	Absolute temperature setting
Fans	yes	n.a.
Ventilation group (left/right etc.)	yes	n.a.
Cooling 1 and 2	n.a.	yes
Recirculation, Temperature 2 ... 4	n.a.	yes

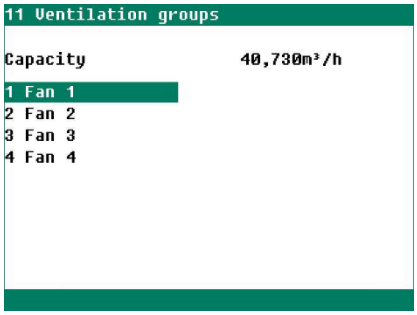
Relative Temperature control operates with a differential temperature with respect to the house temperature setpoint; it follows the house temperature setpoint.

Differential temperature	5.0°C
House temperature is	20.0°C
The temperature rail controls:	20.0°C+5.0°C = 25.0°C

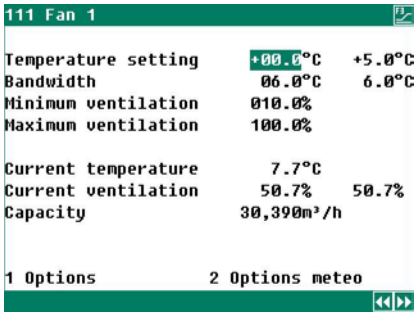
Absolute Temperature control is based on absolute temperature settings. If the temperature is set at 5.0°C, the output also controls at 5.0°C. The temperature control works independently of the house temperature setpoint.

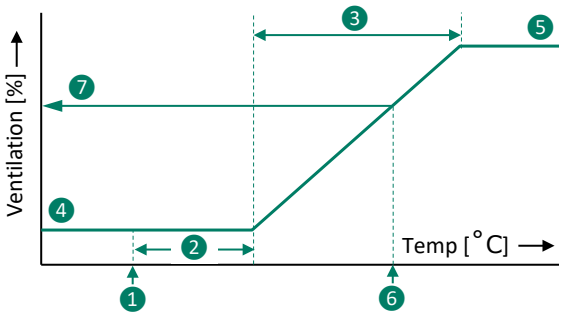
5.2 Ventilation groups

Ventilation groups and fan groups



Fan group control based on temperature





1. House temperature
2. Temperature setting
3. Bandwidth
4. Minimum ventilation
5. Maximum ventilation
6. Current temperature
7. Current ventilation

Temperature setting — The ventilation group control is based on the temperature setpoint. This setpoint is relative to the house temperature. The second value is the calculated temperature based on which the ventilation group controls.

Bandwidth — The bandwidth determines the 'sensitivity' of the control. With a smaller bandwidth, the computer reacts more strongly to a temperature change. This is not good for the house climate because of too many ventilation fluctuations.

Minimum ventilation — Minimum ventilation setpoint.

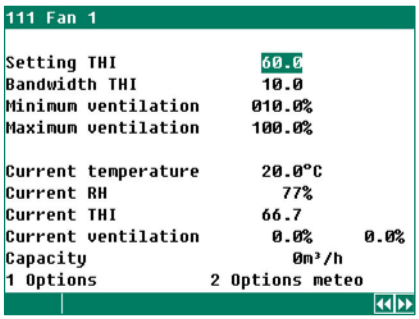
Maximum ventilation — Maximum ventilation setpoint.

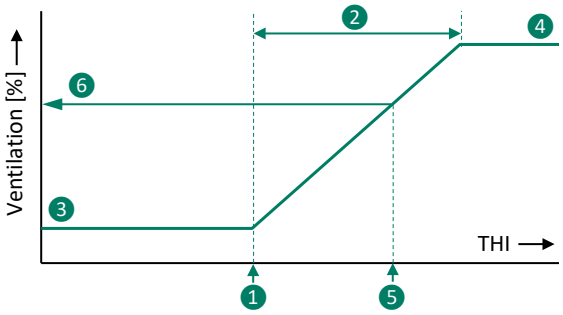
Current temperature — The ventilation group control is based on the current temperature.

Current ventilation — If a measurement fan is used for the fan control, the measured ventilation is displayed as second value. If no measuring fan has been installed or if the measuring fan is defective, the measured ventilation is equal to the current ventilation.
The current ventilation is calculated from the current temperature, the bandwidth and the minimum and maximum ventilation setpoints.

Capacity — The ventilation capacity of the fans is calculated from the ventilation capacities entered by your installer.

Fan group control based on THI basis





1. Setting THI
2. Bandwidth THI
3. Minimum ventilation
4. Maximum ventilation
5. Current THI
6. Current ventilation

THI setting — The ventilation group control is based on the THI (Temperature Heat Index).

Bandwidth THI — The bandwidth determines the control's 'sensitivity'. With a smaller bandwidth, the computer reacts more strongly to a THI change. Too many ventilation fluctuations are not good for the house climate.

Minimum ventilation — Minimum ventilation setpoint.

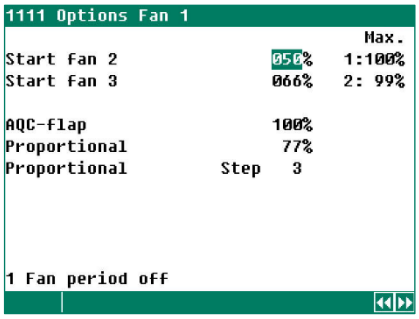
Maximum ventilation — Maximum ventilation setpoint.

Current THI — The current THI based on which the ventilation group controls.

Current ventilation — If a measurement fan is used for the fan control, the measured ventilation is displayed as second value. If no measuring fan has been installed or if the measuring fan is defective, the measured ventilation is equal to the current ventilation.
The current ventilation is calculated from the current temperature, the bandwidth and the minimum and maximum ventilation setpoints.

Capacity — The ventilation capacity of the fans is calculated from the ventilation capacities entered by your installer.

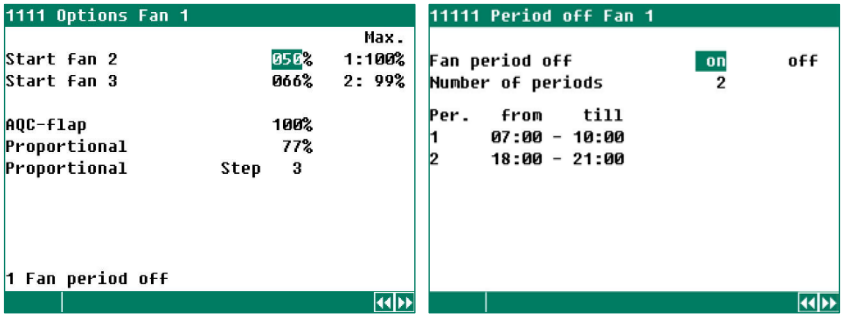
Fan options

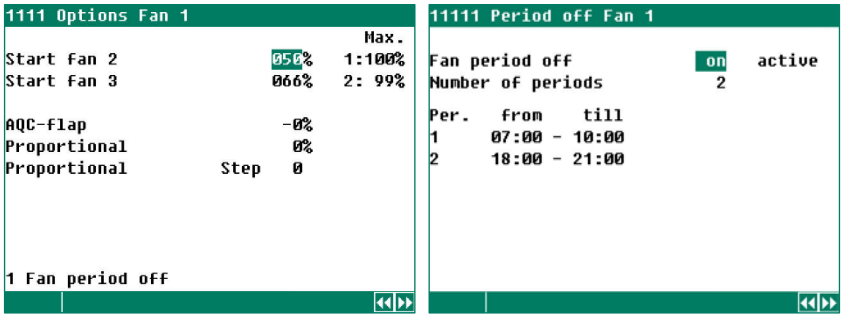


Start fan 2 / 3
If the fans consist of more than one fan control, enter at *Start fan 2* and/or *Start fan 3* the percentage (in relation to the total capacity of the controlled ventilation group) at which the second/third fan control should activate.

Proportional Step shows the currently activated number of ventilation controls:
1 = 1st ventilation control,
2 = 1st and 2nd ventilation control,
3 = 1st , 2nd and 3rd ventilation control.

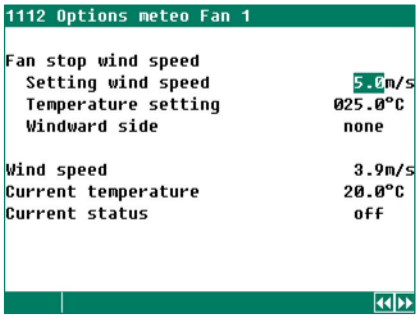
Fan period-off time





The *Fan period off* setpoint allows to switch off the fan for up to four periods. This prevents overloading the mains connection, e.g. during milking.

Meteo options

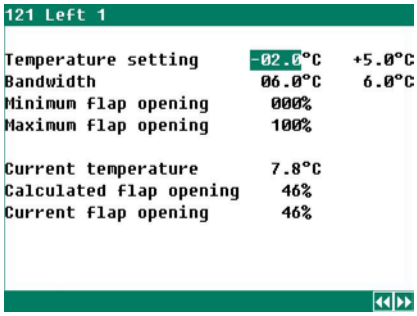


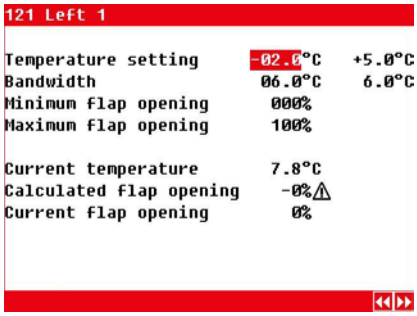
Fan stop wind speed:
With a sufficiently high natural wind speed, it is often not necessary to mechanically ventilate below a certain house temperature. When there is no wind, it is desirable.

Furthermore, you see the *current wind speed*, the *current house temperature* and the *wind side* setpoint.

The *Current status* changes to *on* if:
- the current wind speed is higher than the wind speed setpoint and
- the current house temperature is lower than the temperature setpoint and
- the current wind direction matches the wind side setpoint.

Ventilation groups without fan group

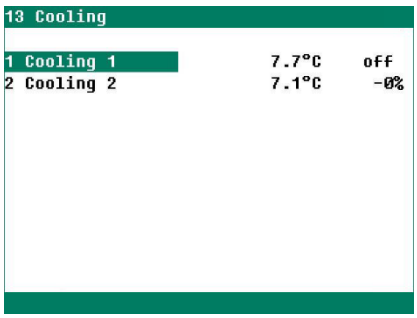


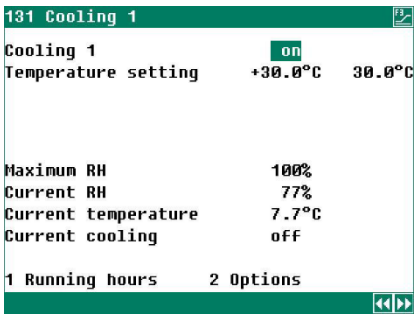


Emergency stop active

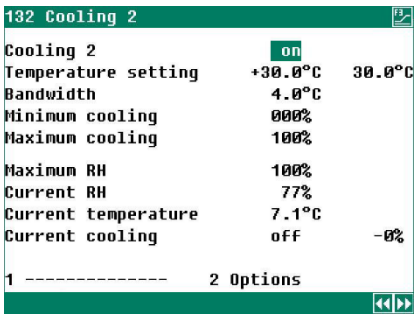
Temperature setting	The ventilation group control is based on the temperature setpoint. This setpoint is relative to the house temperature. The second value is the calculated temperature.
Bandwidth	The bandwidth determines the 'sensitivity' of the control. With a smaller bandwidth, the computer reacts more strongly to a temperature change. This is not good for the house climate because of too many ventilation fluctuations.
Minimum flap opening *Maximum flap opening*	Setting the minimum and maximum air inlet opening.
Current temperature	Displays the actual average temperature on the basis of which the ventilation group controls.
Calculated flap opening	The air inlet opening is calculated from the current temperature, the bandwidth and the minimum and maximum air inlet opening setpoints.
Current flap opening	Displays the current air inlet opening of the ventilation group.

5.3 Temperature-based cooling control





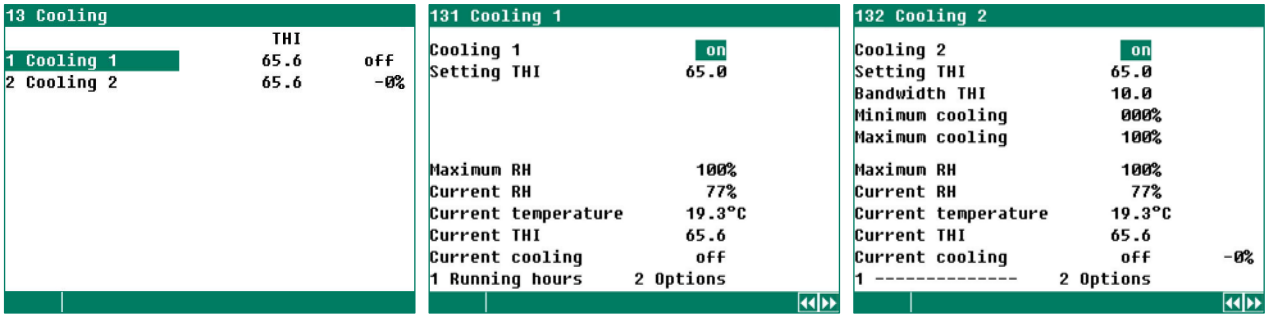
On/off cooling



Proportional cooling

Cooling x	Switching the cooling on and off.
Temperature setting	Temperature setpoint based on which the cooling controls. This setpoint is - if less than 10.0°C - relative to the house temperature. If the temperature setpoint is set to 10.0°C or higher, the temperature setpoint is an absolute value.
Bandwidth	The bandwidth – within which the cooling is controlled from minimum to maximum – determines the 'sensitivity' of the control. With a smaller bandwidth, the cooling system reacts more strongly to a temperature change. This is not good for the house climate because of too many ventilation fluctuations.
Min/max cooling	Minimum and maximum cooling setpoints to limit the capacity of a proportionally controlled cooling system to a minimum and maximum percentage.
Maximum/current RH	To prevent the house from becoming too humid due to cooling, the cooling by RH can be switched off. If the RH rises above the setpoint + hysteresis, cooling will be switched off. If the RH subsequently drops below the setpoint, cooling switches on again. Default hysteresis setpoint = 2%.
Current temperature	The cooling control is based on the current, average temperature.
Current cooling	The current cooling status. With controlled cooling, the percentage on which the cooling is controlled is displayed. 0% = control switched off.

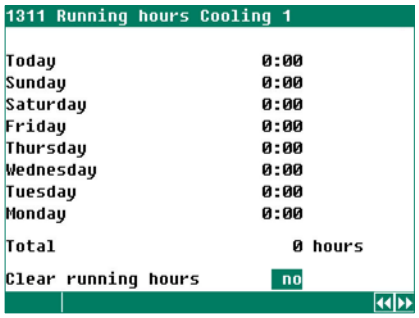
5.4 THI-based cooling control



Switched cooling *Controlled cooling*

Cooling	Switching cooling on and off.
Setting THI	THI based on which the cooling control.
Bandwidth THI	The bandwidth – within which the cooling is controlled from minimum to maximum – determines the 'sensitivity' of the control. With a smaller bandwidth, the cooling system reacts more strongly to a THI change. This is not good for the house climate because of too many ventilation fluctuations.
Minimum/Maximum cooling	Minimum and maximum cooling setpoints to limit the capacity of a proportionally controlled cooling system to a minimum and maximum percentage.
Maximum/current RH	To prevent the house from becoming too humid due to cooling, the cooling by RH can be switched off. If the RH rises above the setpoint + hysteresis, cooling will be switched off. If the RH subsequently drops below the setpoint, cooling switches on again. Default hysteresis setpoint = 2%.
Current THI	Displays the current THI, based on which the cooling controls.
Current cooling	The current cooling status. With controlled cooling, the percentage on which the cooling is controlled is displayed. 0% = control switched off.

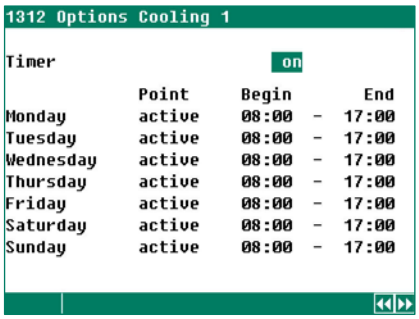
Operating hours



With an on/off (non-modulating) cooling system, you can display the operating hours of the cooling system. In addition to today's operating hours, the operating hours of the past seven days and the total number of operating hours are displayed.

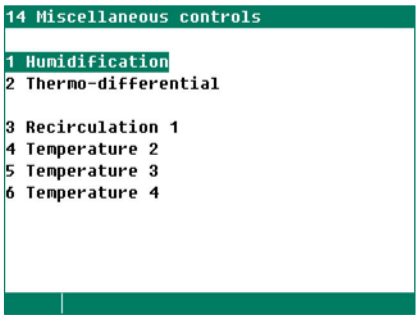
Set *Clear running hours* to *Yes* to delete the operating hours of the cooling system.

Options

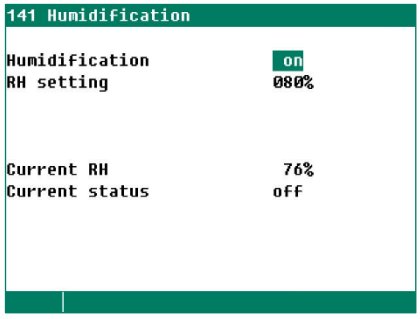


If the cooling should only be active on certain days or parts of the day, you can set this via the *Timer*.

5.5 Other

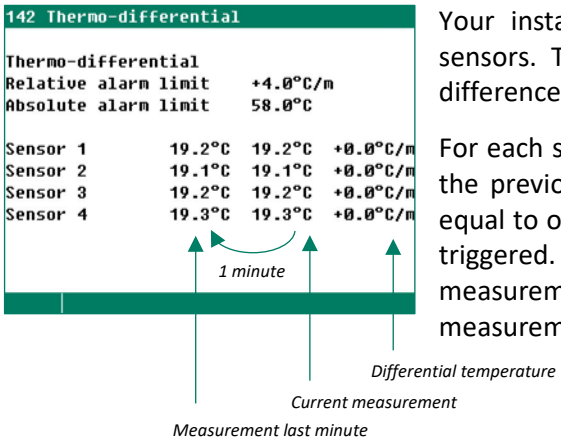


Humidification



Here you can turn the humidification control on and off. Furthermore, you can enter an RH setpoint (%) below which the control should be active.

Temperature monitoring (thermos-differential)

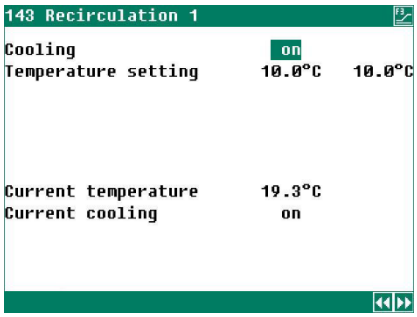


Your installer configures the temperature monitoring: max. four sensors. Temperature monitoring alarms only occur with positive differences.

For each sensor, the current measurement is compared with that of the previous minute. If the temperature increase in that minute is equal to or greater than the relative alarm limit setpoint, an alarm is triggered. If the measured value is within the limits, the previous measurement is made equal to the current measurement and a new measurement is started.

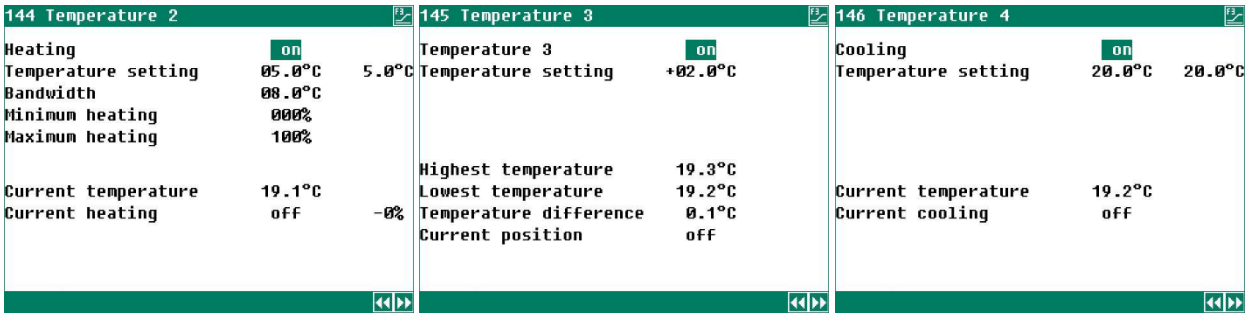
An alarm is also triggered when the measured sensor temperature rises above the absolute limit.

Recirculation



The recirculation control can be used to cool the house. If the temperature rises above the temperature setpoint, the recirculation control switches on. If the temperature drops below the hysteresis setpoint, the recirculation control switches off again. Your installer can set a hysteresis of up to 5.0°C.

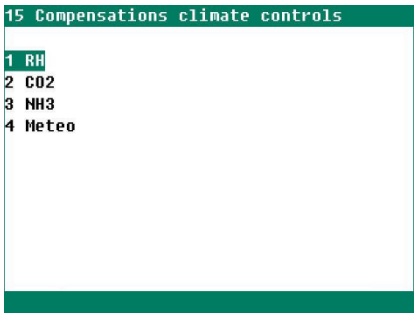
Temperature 2/3/4

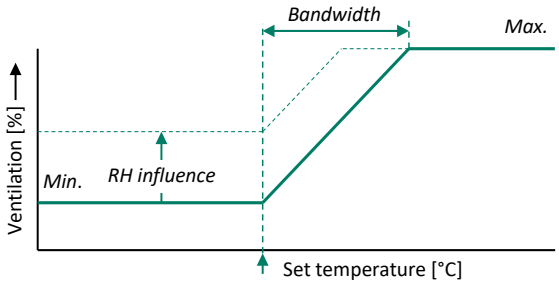


Heating/cooling/ Temperature	Here you can switch heating/cooling/temperature control (ΔT) on and off.
Temperature setting	Temperature setpoint based on which the heating/cooling system should control. The temperature setpoint is always an absolute value.
Bandwidth	The bandwidth – within which the heating/cooling is controlled from minimum to maximum – determines the 'sensitivity' of the control. With a smaller bandwidth, the heating/cooling system responds very quickly to a temperature change. This is not good for the house climate because of too many ventilation fluctuations.
Maximum heating *Minimum heating*	The *Minimum* and *Maximum heating* setpoints allow you to limit the minimum or maximum positions (burning rate) of a controlled heating system.

Minimum cooling *Maximum cooling*	The *Minimum* and *Maximum cooling* setpoints allow you to limit the minimum or maximum positions (burning rate) of a controlled cooling system.
Current temperature	Display of the current, average temperature on the basis of which the cooling is controlled.
Current cooling	Displays the current status of the cooling system. In case of a regulated cooling system, you can see the percentage by which the cooling system is controlled: -0% is off.
Highest temperature	Highest measured temperature (ΔT measurement).
Lowest temperature	Lowest measured temperature (ΔT measurement).
Temperature difference	Temperature difference (ΔT) between highest and lowest reading.
Current position	Current control status (ΔT measurement).

5.6 Compensations



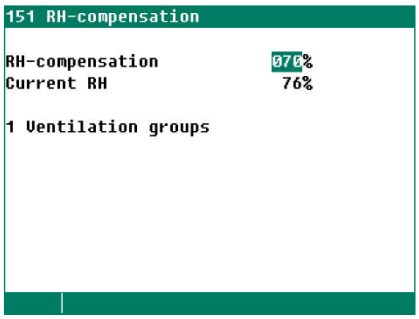


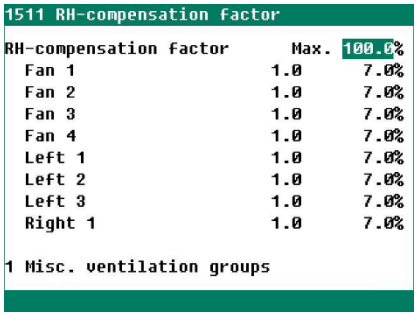
If RH compensation, NH_3 compensation and CO_2 compensation are active, the highest compensation value determines the correction of the ventilation/air inlet position.

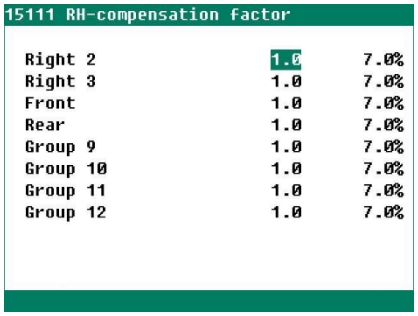
RV compensation

The RH compensation only affects the ventilation/valve position. This means that ventilation increases as soon as the reading exceeds the set value of *RH compensation*.

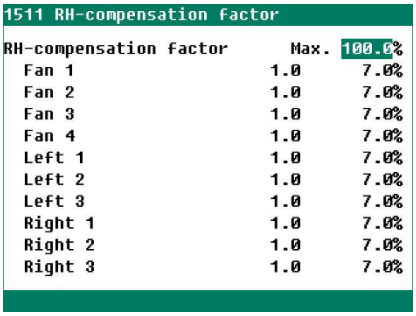
! The screen always shows the absolute compensation.







Menu No. 1 appears only for more than 9 ventilation groups.



Menu 1511 has a dynamic structure. Controls without RH compensation or uninstalled controls are not shown.

RH compensation factor

If the factor is set to 0.0, RH compensation has no influence on the ventilation or air inlet valve position. If the factor is set to 9.9, the RH compensation has a maximum effect on the ventilation or the air inlet valve position. The maximum correction is limited by the maximum setpoint (*Max*.).

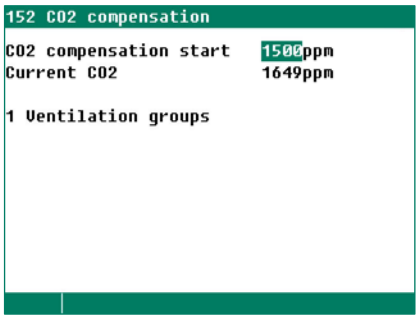
Absolute = (*Current RH - RH compensation start*) × *RH compensation factor*

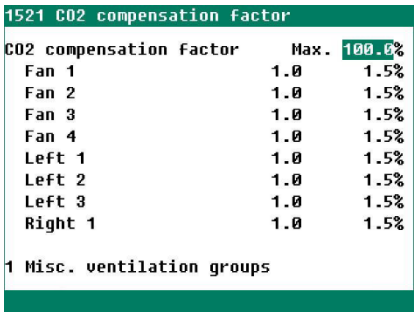
Relative = ((*Current RH compensation start*) × *RH compensation factor*)/100%) × *Calculated ventilation*

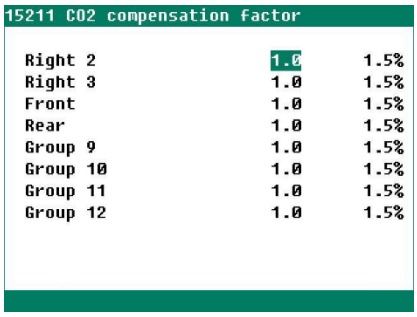
CO_2 compensation

The *CO_2 compensation* only influences the ventilation/air inlet valve position. This means that the ventilation increases as soon as the measurement exceeds the *CO_2 compensation* setpoint.

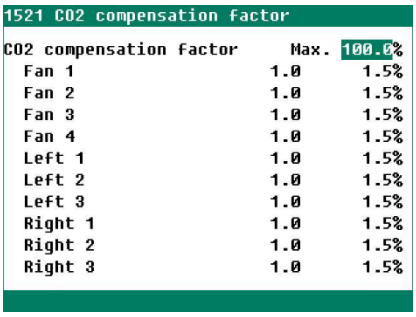
! The absolute compensation is always displayed.







Menu No. 1 appears only for more than 9 ventilation groups.



Menu 1521 has a dynamic structure. Controls without CO_2 compensation or uninstalled controls are not shown

CO_2 compensation factor

If the factor is set to 0.0, the CO_2 compensation has no influence on the ventilation or the air inlet valve position. If the factor is set to 9.9, the CO_2 compensation has a maximum effect on the ventilation or the air inlet valve position. The maximum correction is limited by the maximum setpoint (*Max*.).

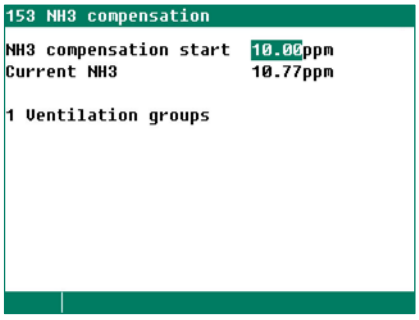
Absolute = (*Current CO_2 - CO_2 compensation start*) × *CO_2 compensation factor*

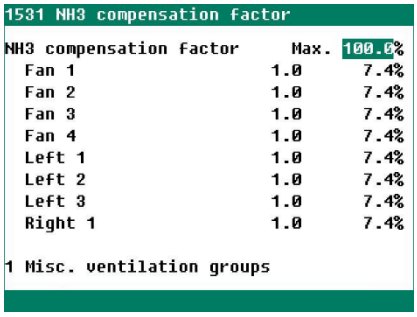
Relative = ((*Current CO_2 - CO_2 compensation start*) × *CO_2 compensation factor*)/100%) × *Calculated ventilation*

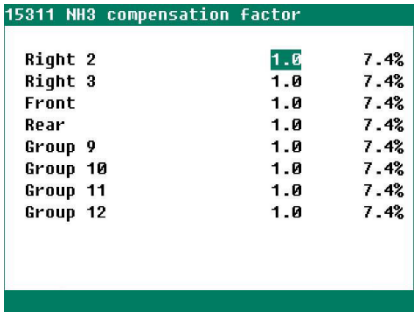
NH_3 compensation

The *NH_3 compensation* only influences the ventilation/air inlet valve position. This means that the ventilation increases as soon as the measurement exceeds the *NH_3 compensation* setpoint.

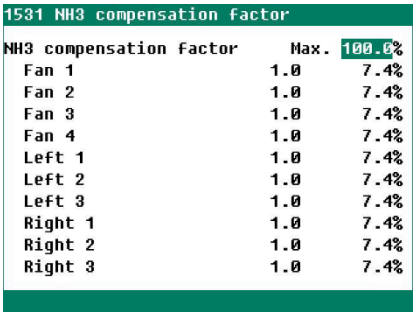
! The absolute compensation is always displayed.







Menu No. 1 appears only for more than 9 ventilation groups.



Menu 1531 has a dynamic structure. Controls without NH3 compensation or uninstalled controls are not shown.

NH_3 compensation factor

If the factor is set at 0.0, the NH_3 compensation has no influence on the ventilation or the air inlet valve position. If the factor is set to 9.9, the NH_3 compensation has a maximum effect on the ventilation or the air inlet valve position. The maximum correction is limited by the maximum setpoint (*Max.*).

Absolute = (*Current NH_3 - NH_3 compensation start*) × *NH_3 compensation factor*

Relative = ((*Current NH_3 - NH_3 compensation start*) × *NH_3 compensation factor*)/100%) × *Calculated ventilation*

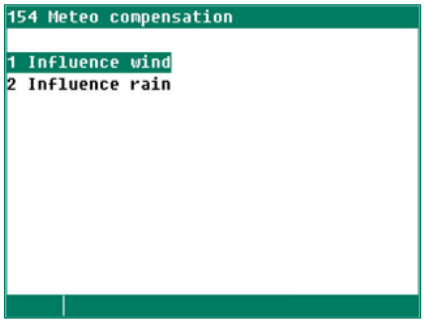
Never clean the sensors with a high-pressure cleaner. This may damage them.

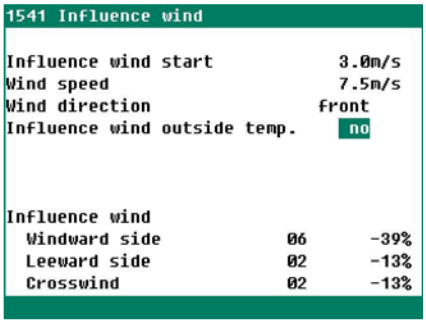
Remove the RH, CO_2 and NH_3 sensors before cleaning the house.

Meteo

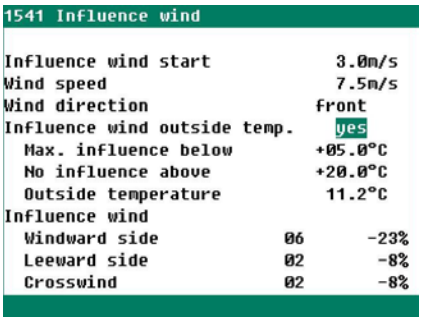
Wind compensation takes place after any RH, CO_2 and NH_3 compensation.

Wind influence (<u>not</u> adjustable per ventilation group)





Without wind outside temp. influence



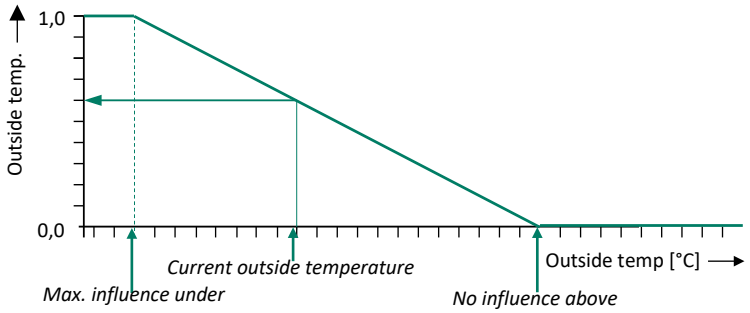
With wind outside temp. influence

Influence wind start — When the wind exceeds the setpoint, the ventilation/ air inlet valve position will be affected.

Wind speed — The current wind speed in metres/second.

Wind direction — The current wind direction.

Influence wind outside temp. — The wind influence is corrected by the outside temperature.



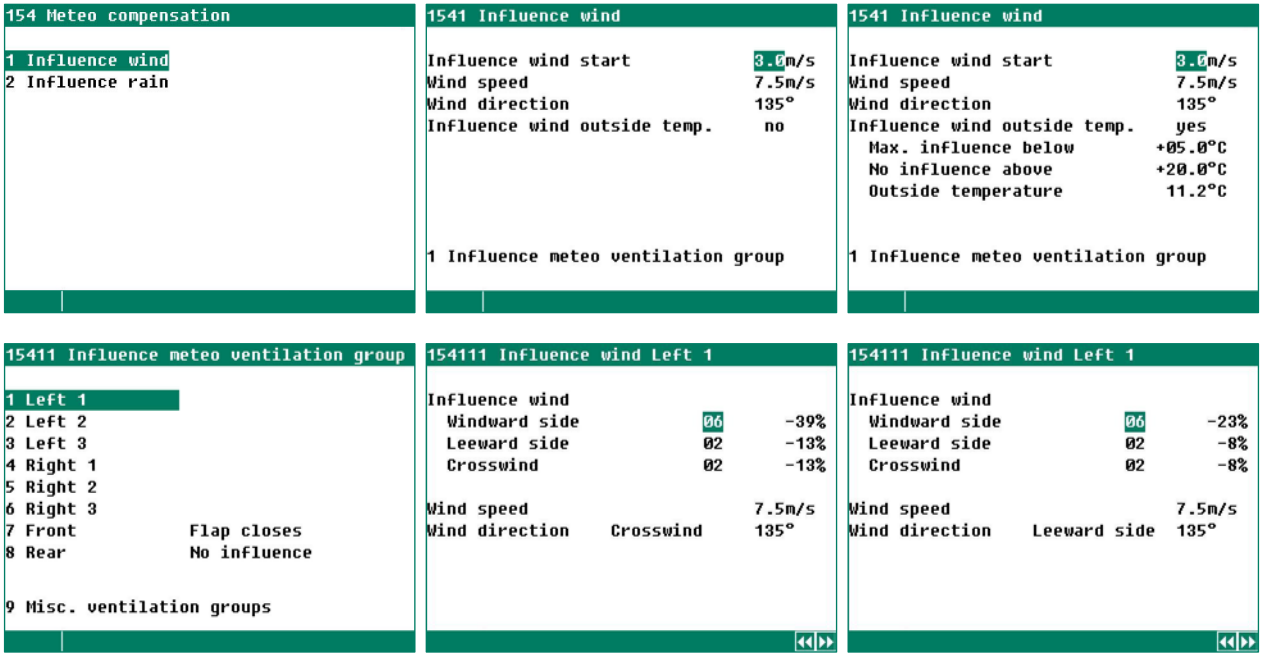
Max. influence below — Below this value, the wind influence on the ventilation/air inlet position is at its maximum.

No influence above — Above this value, there is no wind influence on the ventilation/air inlet position.

Influence wind — Wind influence setpoint: 0 = no influence ….. 20 = maximum influence.
Per side you can set a factor: *Windward, Leeward* and *Crosswind side*.

Wind influence (adjustable per ventilation group)

The wind influence on the ventilation group can be set for each ventilation group. You can only enter the *Influence meteo ventilation group* if your installer has activated this setting.



Without Influence wind outdoor temp. *With Influence wind outdoor temp.*

Wind influence (absolute)

The wind influence (0-9) can be adjusted per ventilation group: 0 = no influence, 20 = maximum influence. You can set the wind influence for each side: wind, lee, and cross. This can be corrected by the outside temperature (see page 17).

Calculated ventilation Left		**30%**
Calculated ventilation Right		**30%**
Calculated ventilation Front		**5%**
Calculated ventilation Rear		**5%**
Influence wind start		3.0 m/s
Current wind speed		7.5 m/s
Current wind direction		Right
Influence outside temperature		No
Influence wind	*(factor)*	
Windward side	*6*	((7.5-3.0) / (10-3.0)) × 6.0 × 10 = **39%** (38.57%)
Leeward side	*2*	((7.5-3.0) / (10-3.0)) × 2.0 × 10= **13%** (12.86%)
Crosswind side	*2*	((7.5-3.0) / (10-3.0)) × 2.0 × 10= **13%** (12.86%)
Corrected ventilation Left		**30 - 13 = 17%**
Corrected ventilation Right		**30 - 39 = -9%** becomes **0%**
Corrected ventilation Front		**5 - 13 = -8%** becomes **0%**
Corrected ventilation Rear		**5 - 13 = -8%** becomes **0%**

Influence outside temperature

Influence outside temperature	Yes
Current outside temp.	11.2°C
Max. influence below	+5.0°C
No influence above	+20.0°C

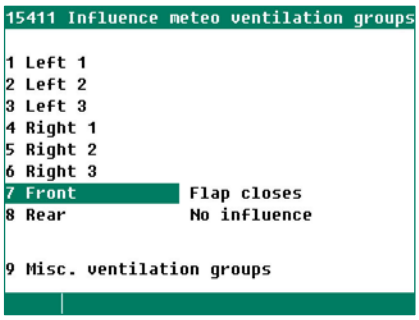
Outside temperature correction		(20.0 – 11.2)/(20.0 - 5.0) = **0.6** (0.586)
Influence wind	*(factor)*	
Windward side	*6*	((7.5-3.0) / (20.0 - 5.0)) × 6.0 × 10 × 0.586 =**23%** (22.62%)
Lee side	*2*	((7.5-3.0) / (20.0 - 5.0)) × 2.0 × 10 × 0.586 = **8%** (7.53%)
Transverse side	*2*	((7.5-3.0) / (20.0 - 5.0)) × 2.0 × 10 × 0.586 = **8%** (7.53%)
Corrected ventilation Left		**30 - (12.86*0.6) = 22.3%** becomes **22%**
Corrected ventilation Right		**30 - (38.57*0.6) = 6.86%** becomes **7%**
Corrected ventilation Front		**5 - (12.86*0.6) = -2.72%** becomes **0%.**
Corrected ventilation Rear		**5 - (12.86*0.6) = -2.72%** becomes **0%.**

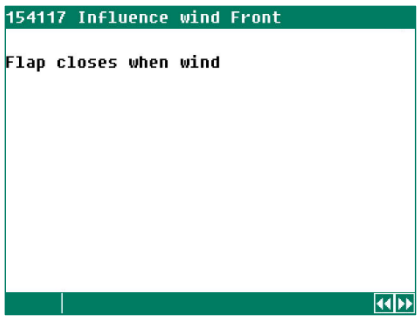
Wind compensation (absolute) = ((Cur. wind speed - Influence wind start) / (10 - Influence wind start)) × 10 × factor

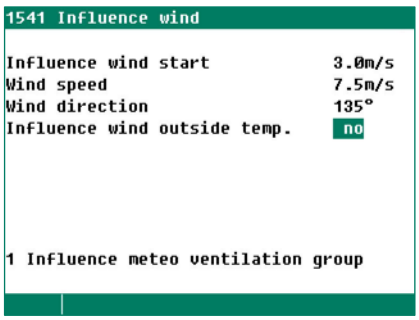
Influence outside temperature = (No influence above - Cur. outside temp.) / (No influence above - max influence below)

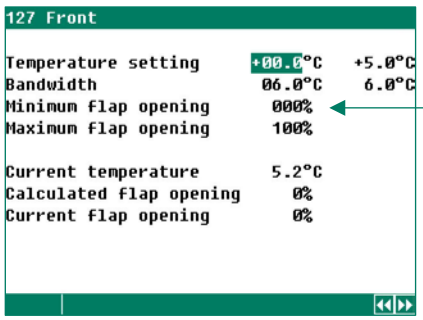
The calculated values may differ from the displayed values due to the hysteresis.

Flap (air inlet) closes when there is wind



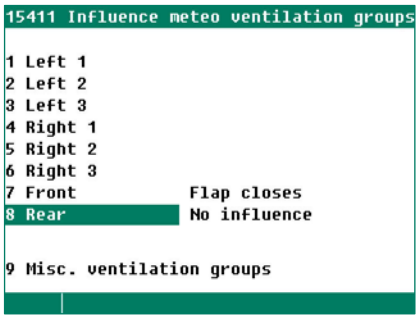


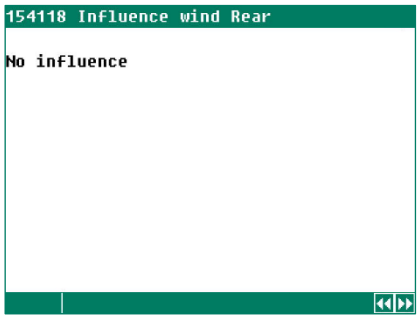




If the wind blows harder than the wind influence setpoint, the air inlet valve is moved to the minimum valve position setpoint.

No impact



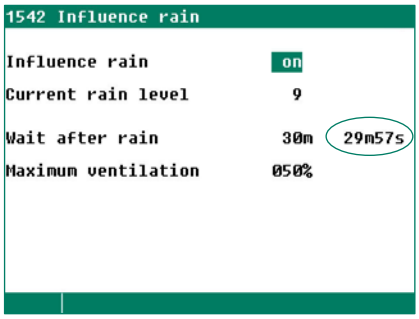


The text *No influence* is displayed if your installer has switched off the compensation for a ventilation group.

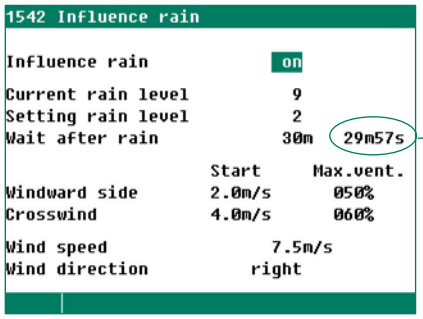
Rain influence

If the rain influence has been activated by the installer and the current rain level exceeds the rain level setpoint, the calculated air inlet valve position is made equal to the *Max. vent.* setpoint (desired air inlet valve position during rain). This only happens if the rain valve position setpoint is lower than the actually calculated air inlet position based on temperature.

Rain influence (not adjustable per ventilation group)



No meteostation but rain sensor

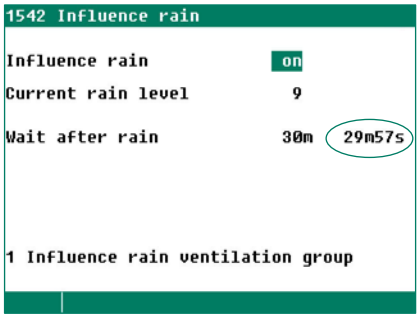


With meteostation and rain sensor

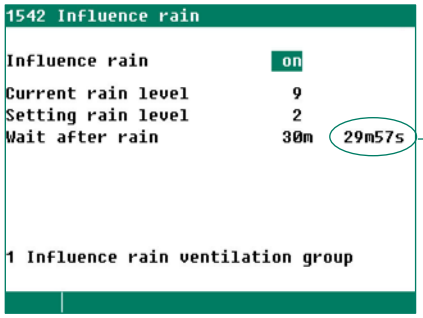
→ Current waiting time after rainfall

Rain influence	Here you can turn the rain influence on the air inlet position on and off. When it rains, the air inlet opening/ventilation is reduced to prevent rain from entering.
Current rain level	Readout of the current rain level.
Setting rain level	The rain level setpoint (value between 1 and 9) at which the control should activate: 1 = little rain, 9 = heavy rain.
Wait after rain	After a rain shower, the control waits for a certain time before resuming valve position control based on temperature. The waiting time setpoint is entered here. The second value displays the current remaining waiting time, which is only visible if it is greater than 0.
Maximum ventilation	If no meteo station is installed, the maximum air inlet position can be set here.
Windward side / Crosswind	Here you can set the maximum air inlet position for the windward side and crosswind during rain. If the rainfall is higher than the *rain level* setpoint and the wind blows harder than the value set at *Start*, the maximum air inlet position is limited to *Maximum ventilation* setpoint.
Start	The wind speed setpoint at which the air inlet positions (curtains) start to be controlled to their maximum rain position setpoint entered at *Max. Vent*.
Wind speed	The current wind speed.
Wind direction	The current wind direction.

Rain influence adjustable per ventilation group



No meteo station, but rain sensor



With meteostation and rain sensor

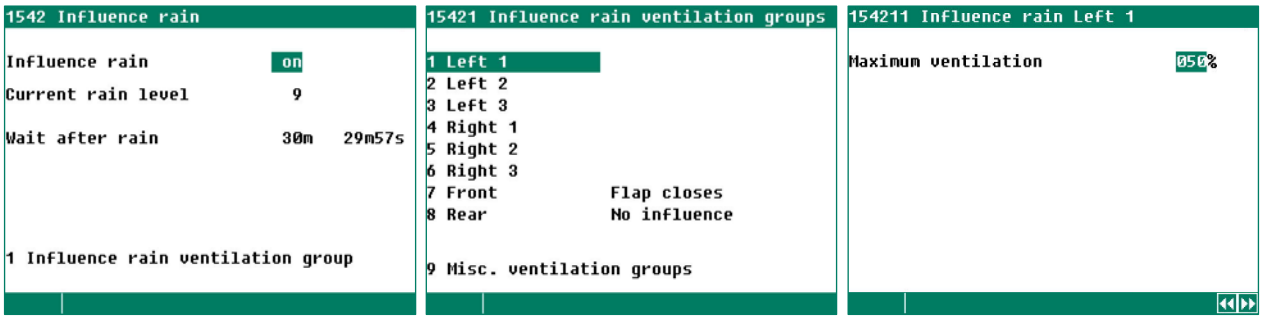
→ *Current waiting time after rainfall*

Influence rain	Here you can turn the rain influence on the air inlet position on and off. The control limits the air inlet (ventilation) when it rains to prevent rain from entering the house.
Current rain level	Readout of the current rain level.

Setting rain level The rain level setpoint at which the control should be activated: 1= light rain, 9 = heavy rain.

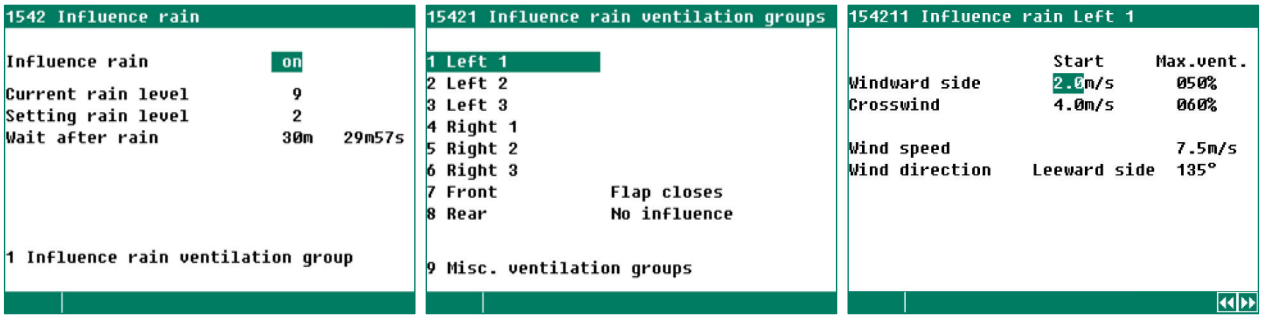
Wait after rain After a rain shower, the control waits a certain time before resuming the air inlet position control based on temperature. Here you can change the waiting time. The second value displays the current remaining waiting time, which is only visible if it is greater than 0.

Without meteo station with separate rain sensor



Maximum ventilation If no meteo station is installed, the maximum air inlet positions can be set here per ventilation group.

With meteo station and rain sensor



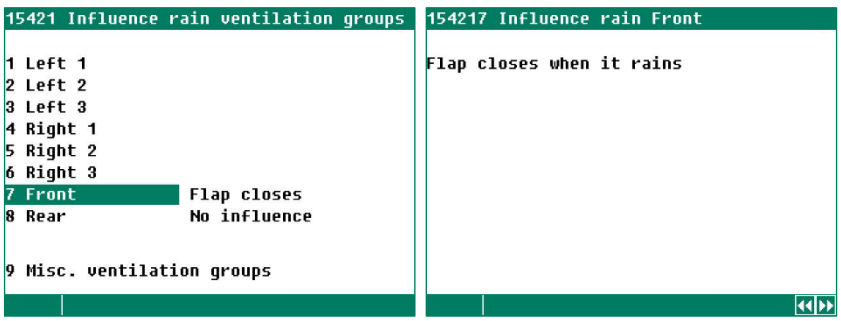
Windward site / crosswind Set the maximum air inlet position during rain for each ventilation group in the wind and transverse directions. If the rain exceeds the set level and the wind speed is higher than the set value for *From*, the air inlet position will be limited to the value set at *Max. vent.*.

Start The wind speed setpoint at which the air inlet positions (curtains) start to be controlled to their maximum rain position setpoint entered at *Max. Vent*.

Wind speed The current wind speed.

Wind direction The current wind direction.

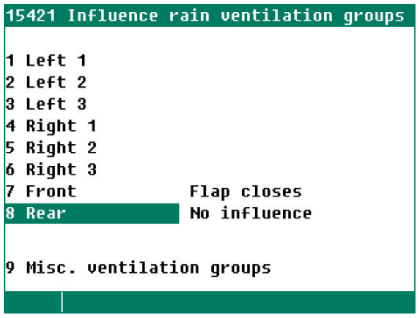
Air inlet closes when it rains

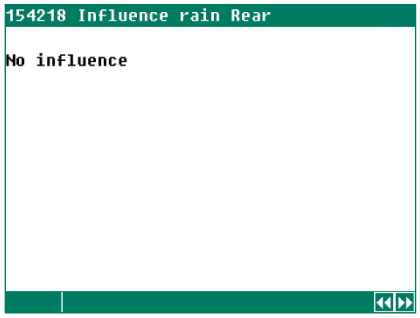


If your installer has set the ventilation group to close when the rainfall reaches the *rain level* setpoint, the text *Flap closes when it rains* will be displayed.

If it rains harder than the entered rain level setpoint, the air inlet (curtain of valve) closes completely. *Calculated air inlet position = Minimum air inlet position* (default 0%).

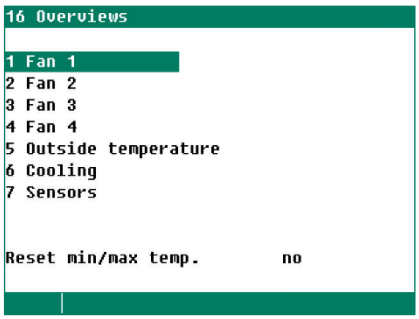
No influence





If your installer has turned off the ventilation group compensation, the screen on the right will appear.

5.7 Overviews



Displayed is an overview of the temperature selected control, cooling or sensors.

For the selected temperature, a table appears on the screen with the minimum and maximum temperatures measured during the past week. In addition, the table indicates the time at which these minima and maxima were measured.

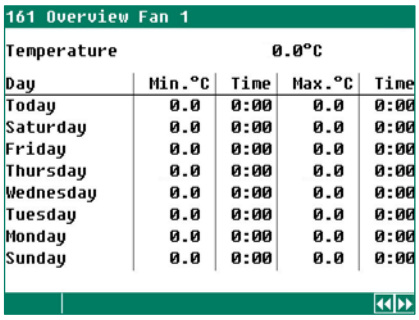
-99,9 °C → temperature sensor defective

???,? °C → invalid temperature

Reset min/max temp. The *Reset min/max temp.* setting deletes the min/max readings in all temperature overviews, the current value is entered under *Today*.

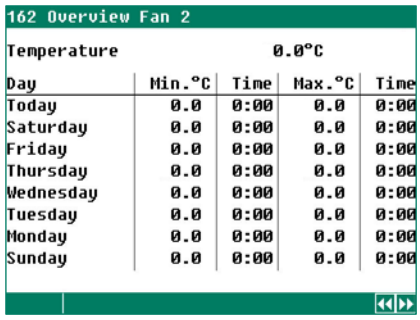
! The house temperature is equal to the temperature of *Fan 1*.

Fan 1



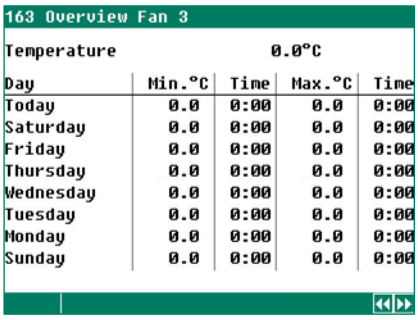
Overview Fan 1/House temperature

Fan 2



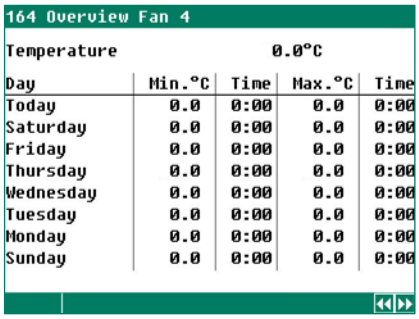
Overview Fan 2

Fan 3



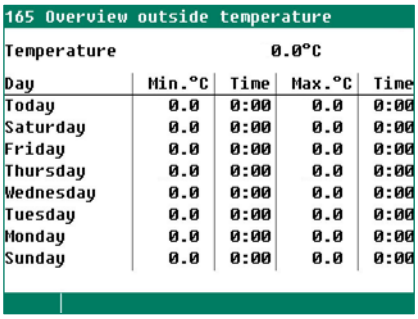
Overview Fan 3

Fan 4



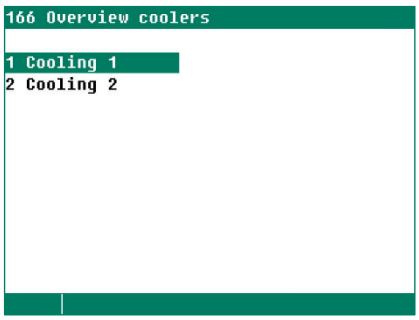
Overview Fan 4

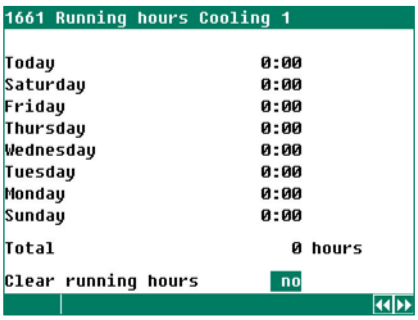
Outside temperature

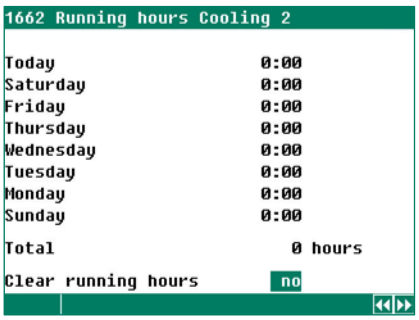


Outside temperature overview

Cooling



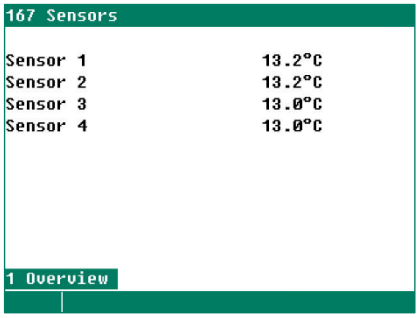


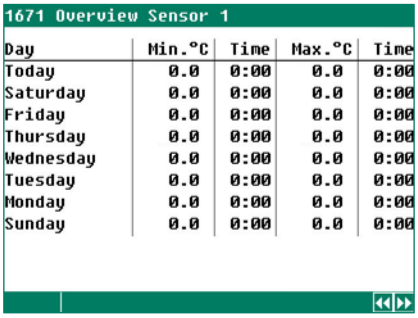


If the cooling is an on/off (non-modulating) control, the operating hours of the cooling system can be viewed. In addition to today's operating hours, you can also see the operating hours for the past seven days and the total number of operating hours.

Set *Clear running hours* to *yes* to delete the operating hours.

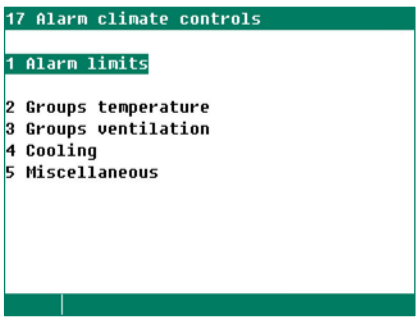
Sensors



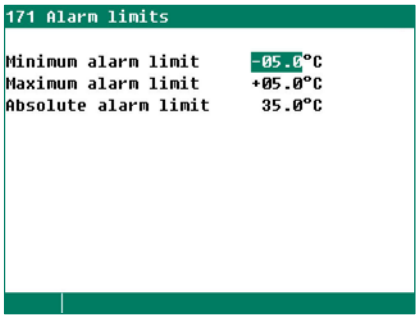


In the same way you can display the summaries for sensors 2 to 4.

5.8 Alarm

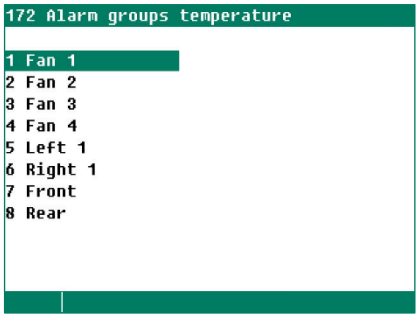


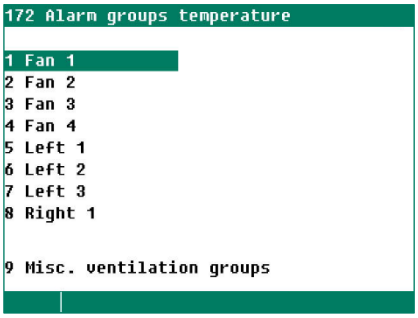
Alarm limits



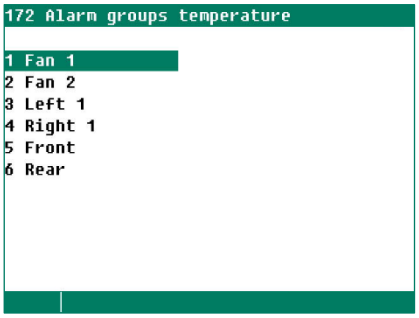
These temperature limits apply to *fan groups* and *ventilation groups*.

Temperature groups



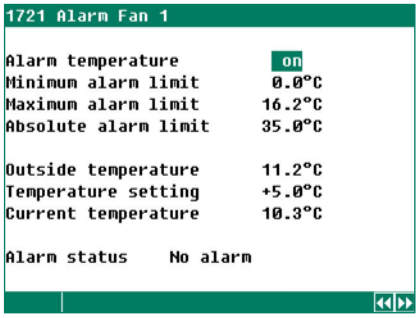


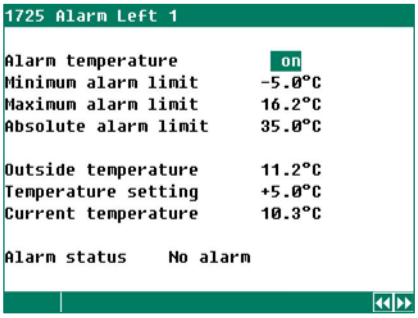
Menu No. 9 appears only for more than 9 temperature groups.



Menu 172 has a dynamic structure. Uninstalled controls are not shown.

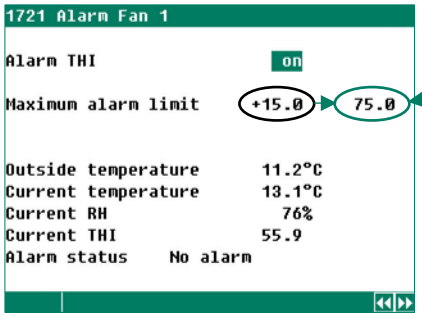
Temperature

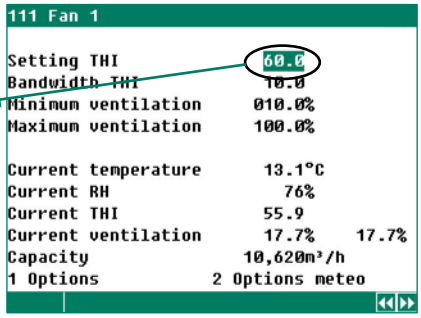




- The alarm can only be switched on or off.
- The alarm limits displayed are calculated alarm limits and depend, among other things, on the entered alarm limits (menu 171) and the temperature setpoint of the control.

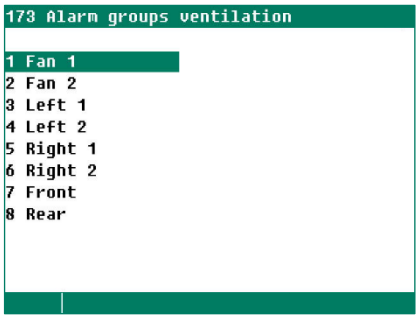
THI

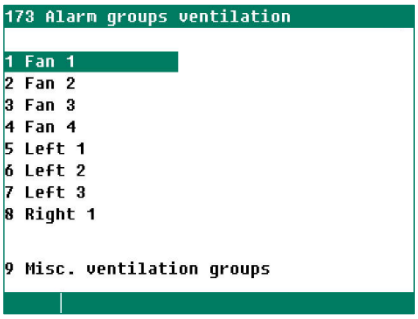




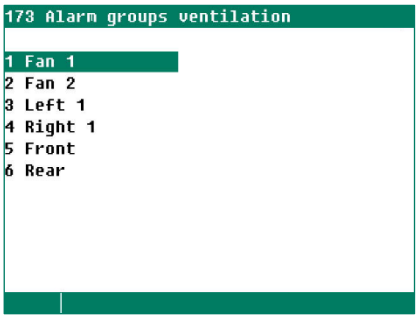
- The alarm can only be switched on or off.
- The alarm limit displayed is a calculated alarm limit and depends, among other things, on the entered *Maximum Alarm Limit* and the *THI setpoint* of the control. In this example: 15 + 60 = 75.

Ventilation groups

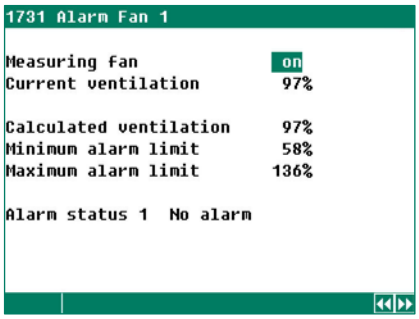


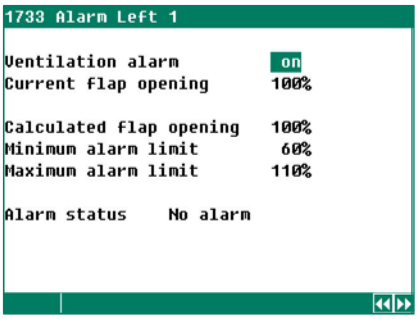


Menu No. 9 appears only if there are more than 9 ventilation groups.



Screen 173 has a dynamic menu structure. Controls without a measurement fan and uninstalled controls are not shown.





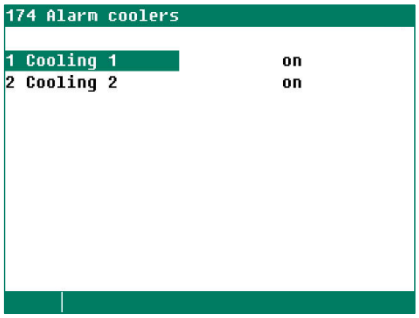
⚠ This menu appears only if a measuring fan is installed at the fan group.

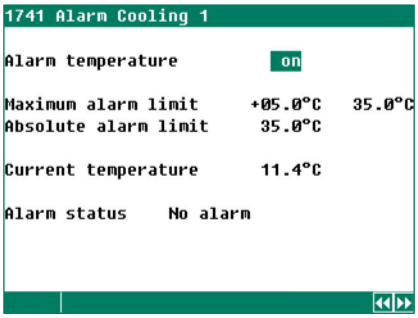
If the measuring fan is switched off, it no longer affects the control and the alarm of the ventilation group.

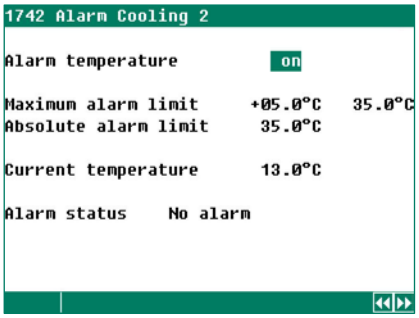
Only if you have connected air inlet valves on a DMS module, you can turn the ventilation alarm ON and OFF on the CL-5400.

Cooling

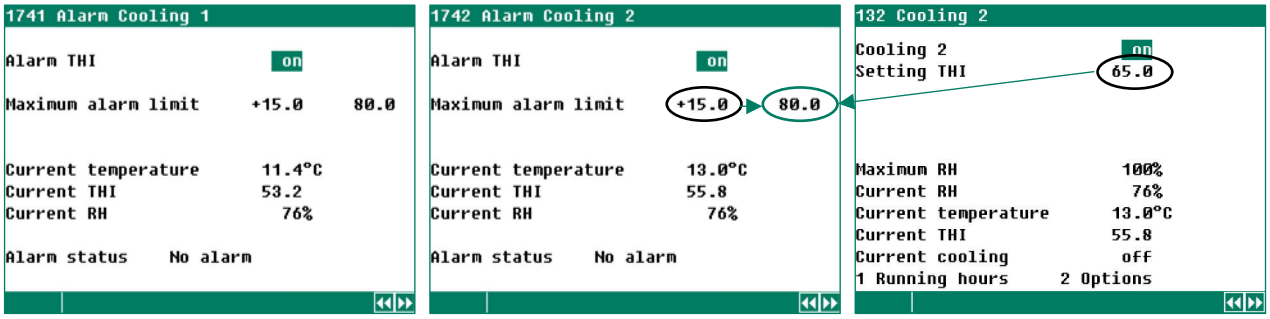
Temperature





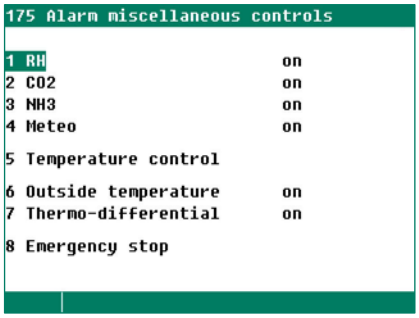


THI

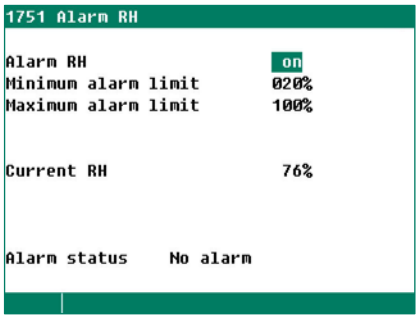


- You can enable and disable the alarm individually for each cooling unit.
- The alarm limit displayed is a calculated alarm limit and depends, among other things, on the *Maximum Alarm Limit* set and the *THI setting* at the control itself. In this example: 15 + 65 = 80.

Other

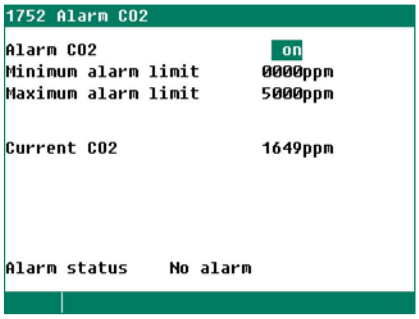


RH



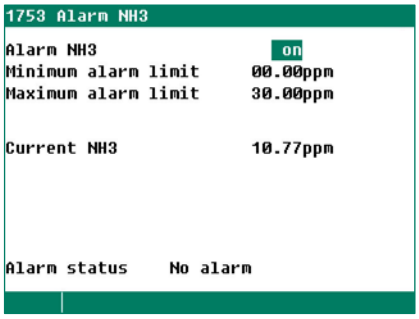
Here you can activate and deactivate the RH control alarm. At *Minimum alarm limit* you set the lower RH limit, at *Maximum alarm limit* the upper RH limit. Furthermore are displayed the current RH and the current alarm status of the RH control.

CO2



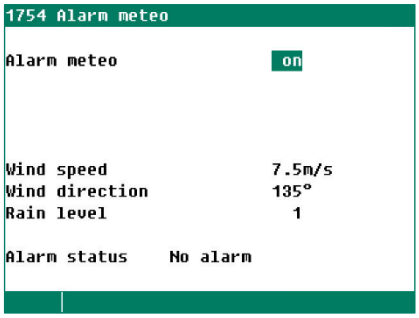
Here you can enable or disable the alarm for the CO_2 control. At *Minimum alarm limit* you set the CO_2 lower limit, at *Maximum alarm limit* you set the CO_2 upper limit. Furthermore are displayed the current CO_2 and the current alarm status of the CO_2 control.

NH3



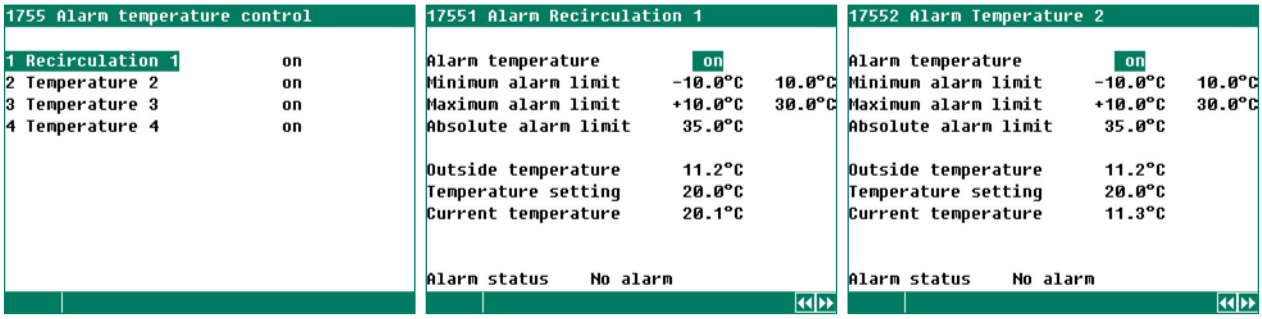
Here you can enable or disable the alarm for the NH_3 control. At *Minimum alarm limit* is set the NH_3 lower limit, at *Maximum alarm limit* you set the NH_3 upper *limit*. Furthermore are displayed the current NH_3 and the current alarm status of the NH_3 control.

Meteo



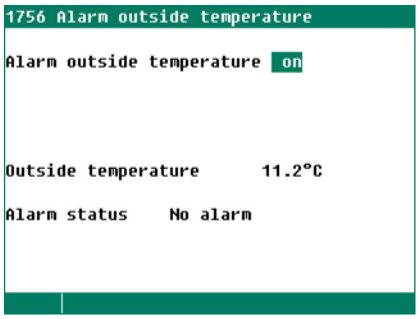
Here you can enable or disable the alarm for the meteo station. Furthermore are displayed the current wind speed and direction, the current rain level and the current alarm status of the meteo station.

Temperature control



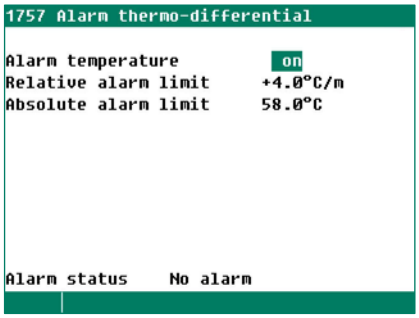
Here you can enable or disable the temperature control alarm. You can also set the alarm limits for the temperature control here. In addition to the current outside temperature, you can also see the set and actual measured values of the temperature control. *Alarm status* shows the current alarm status of the temperature control.

Outside temperature



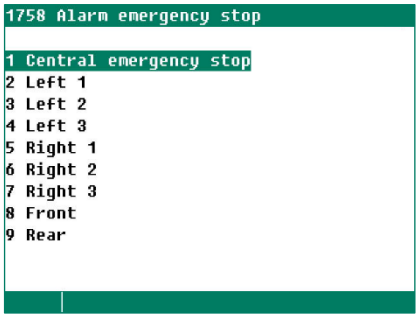
Here you can enable or disable the *Outside Temperature* alarm. In addition to the outside temperature, the current alarm status is displayed.

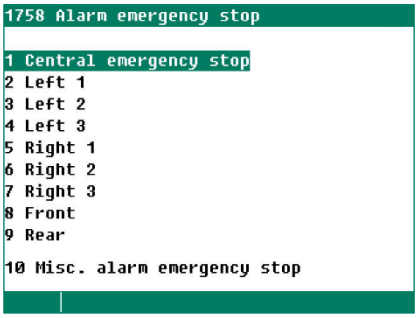
Thermo-differential



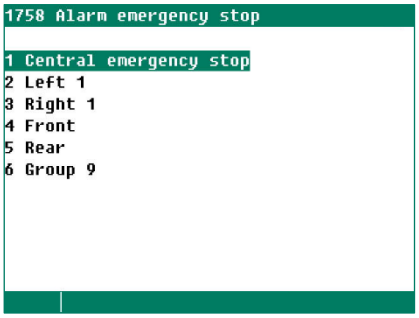
If you disable the temperature monitoring alarm, the current temperature measurement is deleted and the alarm is automatically reactivated.

Emergency stop

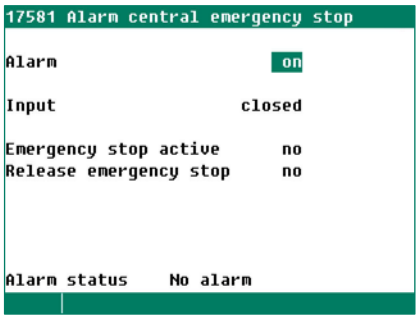


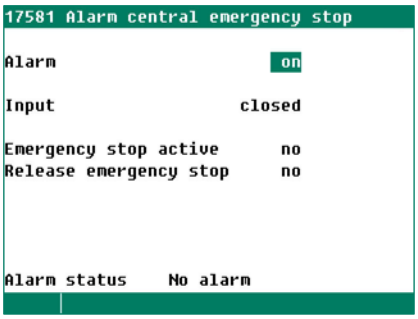


Menu No. 10 appears only for more than 9 emergency stop groups.



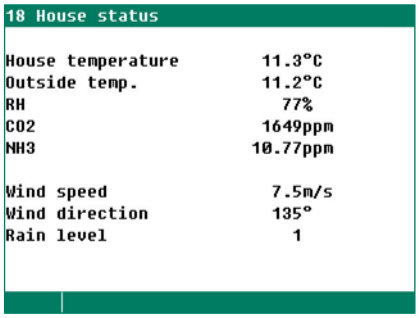
Menu 1758 has a dynamic structure; uninstalled controls or controls without an emergency stop are not shown.





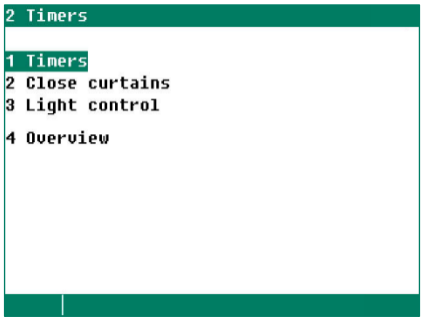
Alarm	*Central emergency stop*	Once the central emergency stop is active, all controls equipped with an emergency stop are stopped (frozen).
	Emergency stop control	If the emergency stop is activated for a control, only the control for which the emergency stop was activated stops.
Input	Current input status.	
Emergency stop active	Current status of the emergency stop.	
Release emergency stop	If the emergency stop was active, you can deactivate the alarm by setting *Release emergency stop* to *yes*. The alarm will be deleted and the text will automatically change to *no*).	
Alarm status	Current alarm status.	

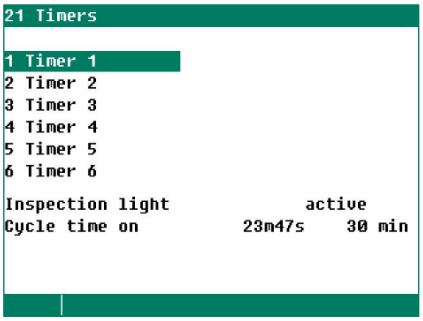
5.9 House status



Overview of current measurements.

6 Timers



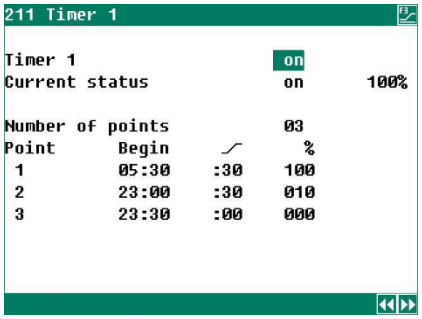


Inspection light

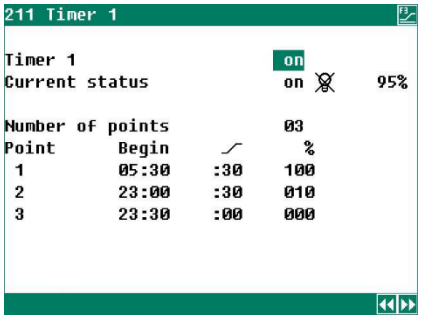
A push button allows you to manually turn on the light to inspect the houses. The light stays on for the time entered. Pressing the button again turns the light off.

6.1 Proportionally controlled timer

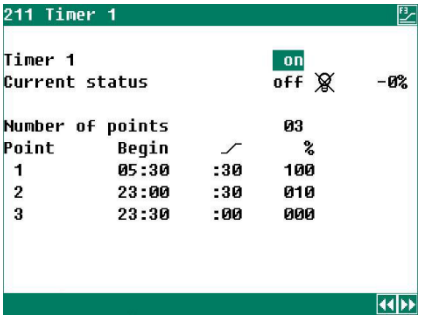
A proportionally controlled timer can be used for lighting control. The lighting can then be switched on and off gradually (dawn switching).



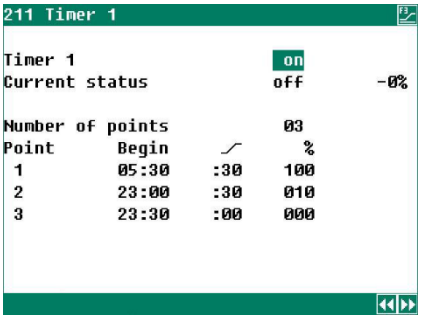
1. At the first time setpoint (05:30), the lighting switches on. The intensity is controlled to 100% in 30 minutes (:30).
2. Dimming starts at the second time setpoint. In 30 minutes (:30), the lighting is reduced to 30% and the after-burning period starts.
3. At the third time setpoint, the lighting switches off and:
   - switches on again based on time or
   - switches on again based on time and the twilight switch is on.



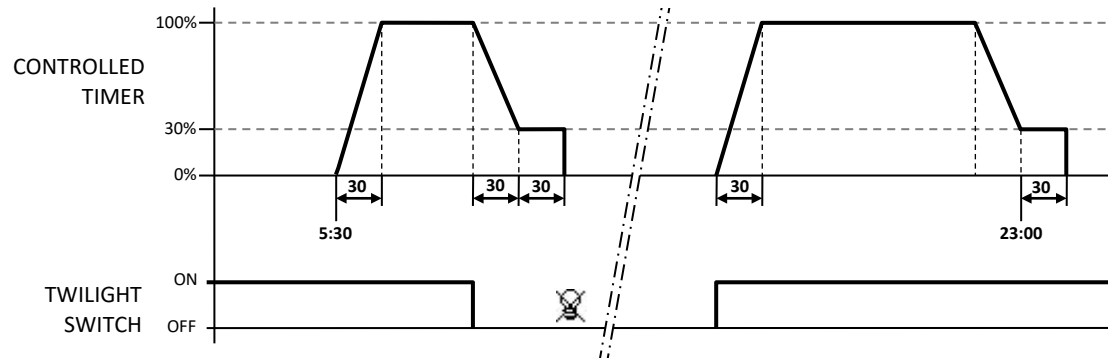
switches ON to reduce light intensity based on the twilight switch



switches OFF based on the twilight switch

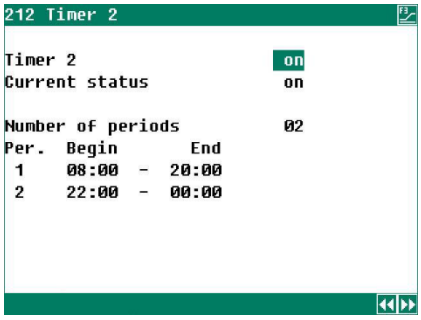


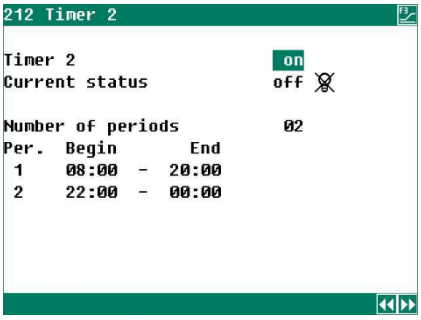
switches OFF based on time

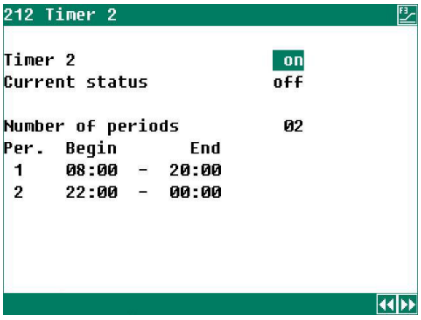


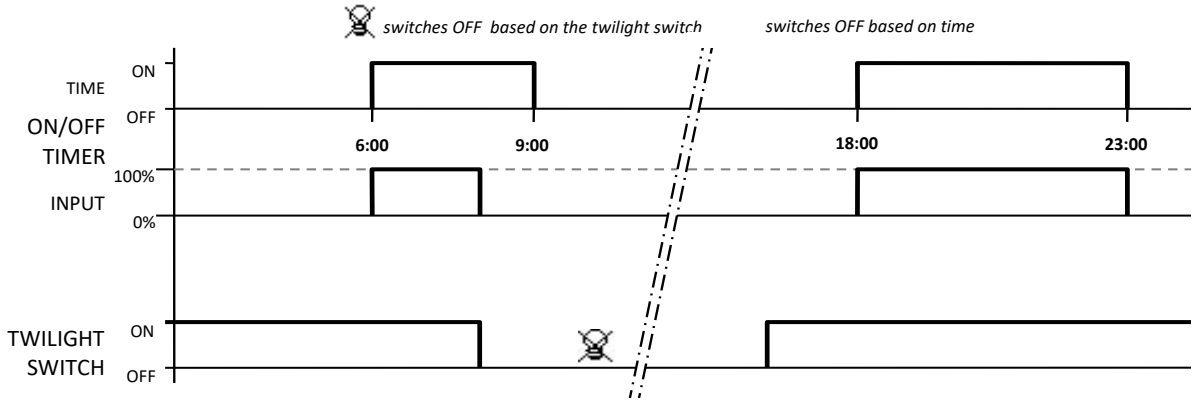
With a twilight switch, you can switch the light on and off in between.

6.2 On/Off timer



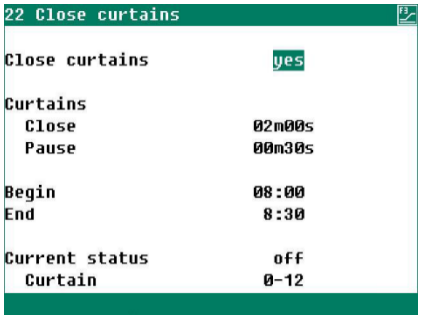


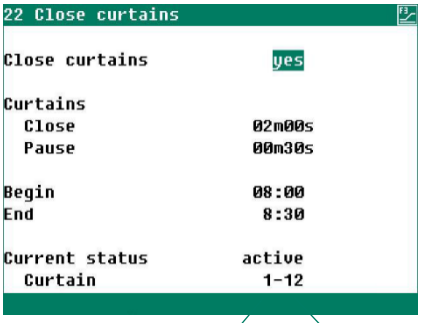


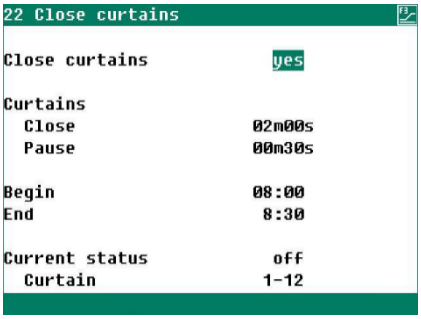


6.3 Closing the curtains

You can gradually open and close the curtains each day to prevent mice or other vermin from nesting between them. Each curtain is opened slightly one by one, and after the pause time, they return to their previous positions.





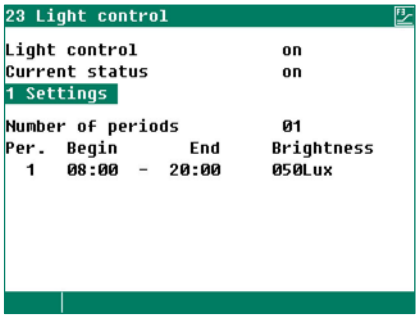


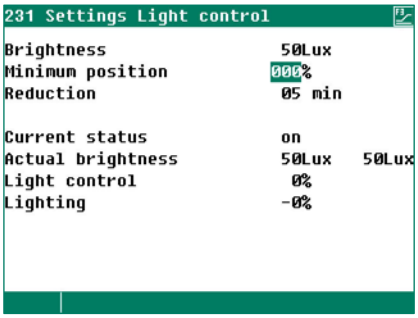
Pause time active

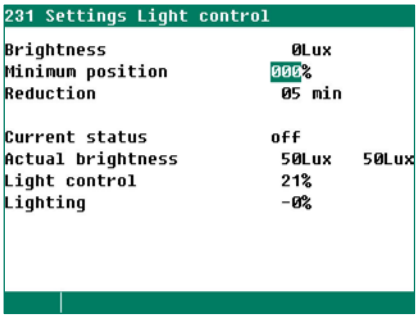
Active curtain

Number of curtains

6.4 Lighting control



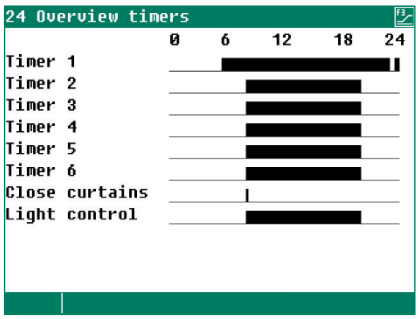




If the light control is active and the brightness in the barn falls below the set value, the control will keep switching the lights off until the desired brightness is achieved. If the brightness remains too low when the system is completely switched off, the lights will turn back on until the set brightness level is reached.

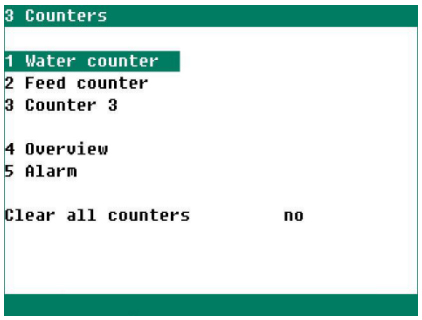
Lighting control	Switching the *lighting control* on and off.
Current. status	The current status of the lighting control system. It is determined from the times entered at *Start* and *End.*
Number of periods	Number of lighting control periods; up to 24 periods.
Per.	Period number.
Start	Start time of the period number concerned.
End	End time of the period number concerned.
Brightness	Required light intensity in the house.
Minimum position	Minimum output (%) of the lighting control.
Completion	Time in which the lighting controls are output from minimum to maximum.
Current status	Current status of the lighting control.
Actual brightness	Current brightness in the house
Lighting control	Current status of lighting control in %.
Lighting	Current lighting output; 0% = off.

6.5 Overview



The graphical overview of the time switches shows the times when the installed timers are active.

7 Counters

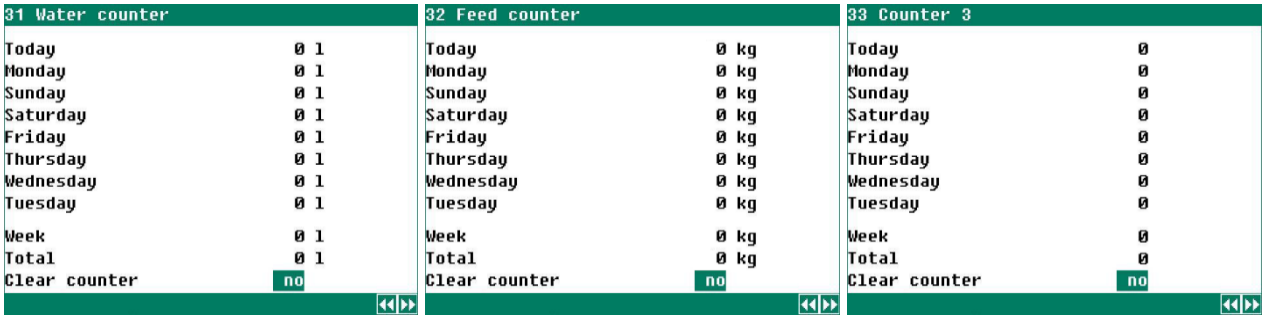


7.1 Clearing all counters

In this screen you can clear all counter readings with a single operation.
This is in contrast to the *Clear counter* setting for individual counters, which only clears the positions of the counter selected.

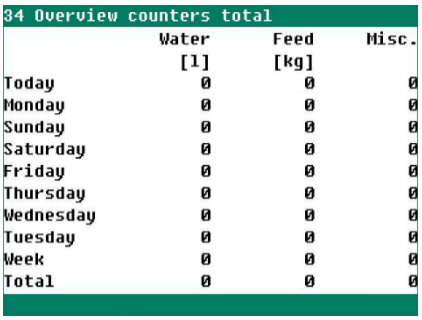
When clearing a counter, today's data is also cleared. In addition, the overviews of the quantities fed and the feeding times are cleared.

7.2 Water, feed and other counters



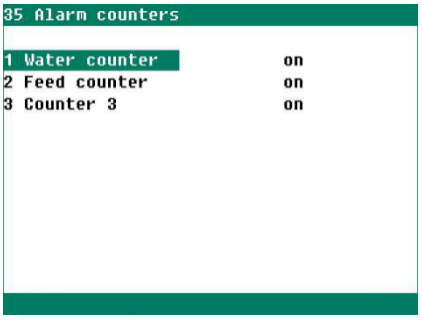
For each counter, you see an overview of the last seven days, the calculated weekly total and the total from the last time you cleared this counter. Furthermore, you can clear the counter readings of the individual counters here.

7.3 Overview

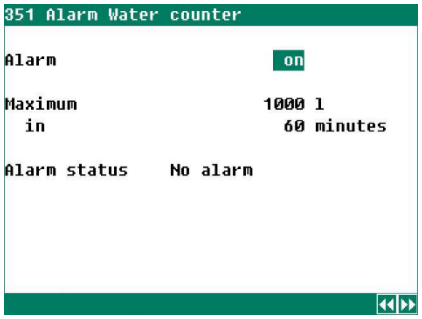


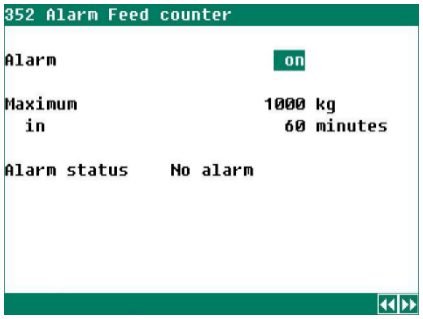
Total overview of the three counter positions.

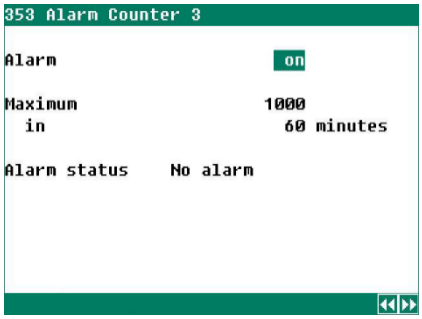
7.4 Alarm



You can switch the dosing alarm on and off per counter

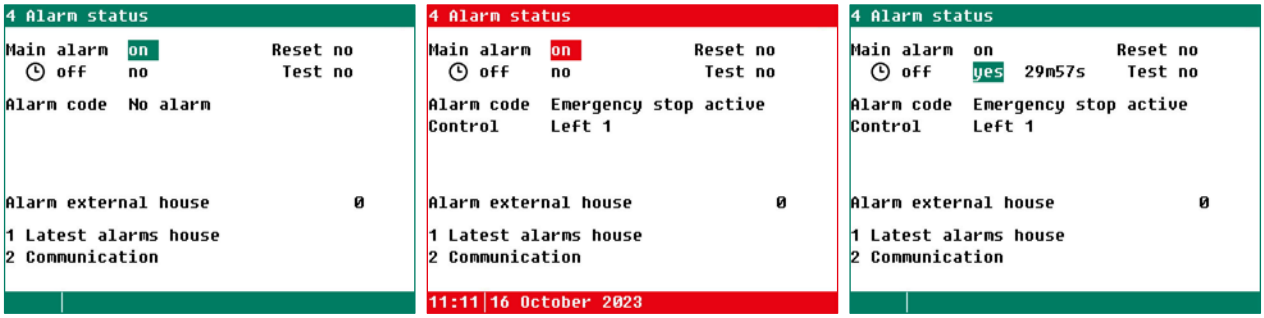






These screens allow you to set the maximum amount of water/feed that can flow through the water/feed pipes during the set period. If this maximum is exceeded, an alarm is triggered. In this way, you can detect possible pipe breaks or leaks at an early stage.

8 Alarm



When you want to turn the main alarm on/off, a pop-up window appears to confirm your selection.

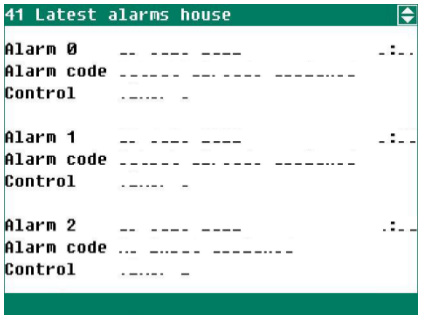
Main alarm	Switching the main alarm on and off.
off	Temporary alarm switch-off function. By setting *off* to *yes* you can temporarily turn off the alarm (siren). Hardware alarms cannot be turned off. The main alarm will be switched off for 30 minutes; the alarm LED will blink irregularly. After 30 minutes, the main alarm will be switched on again automatically. If the alarm cause has not been eliminated, the alarm relay will trip again (alarm).
Reset	All alarm messages are cleared.
Test	Here you can test the function of the alarm relay (siren). Set *Test* to *yes* to activate the siren for 10 seconds. Set *Test* to *no* to stop testing.
Alarm code	Description of the alarm.
Control	The control to which the alarm code relates.
Terminal	The terminal number to which the alarm refers.
Control	The second control to which the alarm code relates.
Alarm external house	If an alarm occurs at another control, the address of that control is displayed here.
1 Latest alarms house	An overview of the last five alarm codes that have activated the alarm relay.
2 Communication	This option only appears on the main station. A screen will appear where you can enable or disable the communication alarm.

⚠ Installation errors such as *Output already assigned, Output type incorrect, Input already assigned*, etc. must be resolved before the system can be put into operation.

⚠ Do not forget to turn the alarm back on after solving a malfunction.

Preferably use the *off* function to solve a malfunction.

8.1 Last alarms in the house

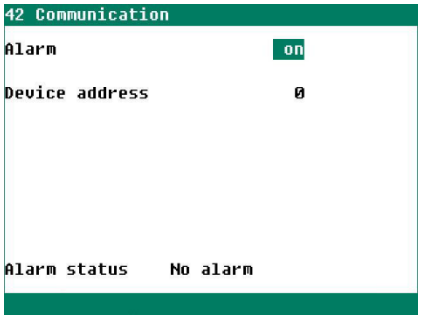


Overview of the last five alarm causes that caused the alarm relay to de-energize. The dates and times of the alarms are displayed in addition to their causes.

Alarm 0 The cause of the most recent alarm and the time until which this alarm has been/was active.

Use ▼ to access the data of the previous alarms.

8.2 Communication alarm



Enabling and disabling the communication alarm

A communication alarm can only occur with a CL-5400 set as the main station. If the main station does not receive data from a device in the same communication loop, a communication alarm occurs.

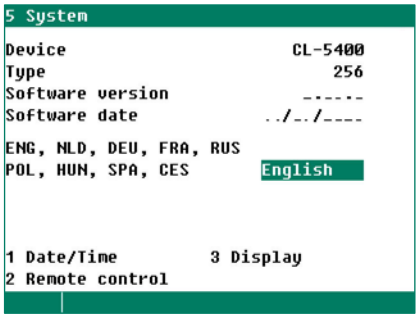
8.3 Alarm codes

Alarm code	Description
Alarm unknown (xxx)	This alarm code cannot be translated into a text. Write down the number displayed and contact your supplier.
CO_2 too high	The CO_2 measured is higher than the maximum alarm limit calculated
CO_2 too low	The CO_2 measured is lower than the minimum alarm limit calculated
CO_2 sensor defective	The CO_2 sensor value measured is outside the preset limits.
Counter already assigned	The counter has been assigned to two or more controls.
Invalid input	The input number does not exist on the module.
Invalid period (x) *x = period number*	▪ The times of a timer must be incremental and the difference between *Begin* and *End* and between two periods must be at least 1 minute. ▪ With a *lighting control*, the starting time plus running times must not be after the next starting time. The time may coincide with the next starting time.
Invalid output	The output number does not appear on the module.
Invalid wind direction vg: x	The corners of the wind directions must not overlap. In case of overlap, the error message *Invalid wind direction vg:x* will appear. For example: vg:1 = ventilation group 1.
Input already assigned	The input has been assigned to two or more controls.
Meteo faulty	Meteo station measurement (wind direction, wind speed and/or rain level) is outside the set limits; these limits depend on the type of sensor: ME-54 or PL-MWA.
Module x changed	Module configuration (inputs/outputs etc.) changed. Read in the module number again.

Alarm code	Description
Module not found	▪ The module number set for the terminal does not exist. ▪ Poor or no connection between CL-5400 and module.
Module not responding	Meteo station measurement (wind direction, wind speed, rain level) outside set limits. These limits depend on the type of transducer ME-54 or PL-MWA.
Module reset alarm	Module keeps resetting due to a fault. Check the module.
NH_3 too high	The NH_3 measured is above the maximum alarm limit calculated.
NH_3 too low	The NH_3 measured is below the minimum alarm limit calculated.
NH_3 sensor faulty	The NH_3 sensor value measured is outside the preset limits.
No outside sensor	You have installed a control that requires an outside sensor. However, the outside temperature sensor has not been installed.
No comm. address	Device address CL-5400 computer is missing.
No input assigned	No input terminal number has been entered.
No output assigned	No output terminal number has been entered.
Output already assigned	The output is already used for another control.
Outside sensor faulty	Outside temperature sensor measurement < -50.0°C or > +50.0°C
Potentiometer faulty	Value measured by potentiometer outside limits (EGM 100P, winch motors ..)
RH too high	The RH measured is above the maximum alarm limit calculated.
RH too low	The RH measured is below the minimum alarm limit calculated.
RH sensor faulty	The RH sensor value measured is outside the preset limits.
Sensor faulty	Sensor measurement (temperature, RH, rain, etc.) is outside set limits.
Temperature too high	The temperature measured is above the maximum alarm limit calculated.
Temperature too low	The temperature measured is below the minimum alarm limit calculated.
Temp. sensor faulty	Measurement temperature sensor < -50.0°C or > +100.0°C
Thermo-differential Sensor x	The temperature difference between the last two readings from the sensor exceeds the maximum permissible difference or the sensor temperature is above the absolute limit.
THI too high	▪ Too high RH and/or temperature ▪ RH or temperature sensor faulty ▪ Entered alarm limit too low
Unknown terminal type	The terminal type selected does not exist.
Ventilation too high [1]	The ventilation measured is above the maximum alarm limit calculated.
Ventilation too low [1]	The ventilation measured is below the minimum alarm limit calculated.
Wind sensor faulty	▪ If the wind speed exceeds 10m/s, the ME-54W meteo station will display the message *Invalid wind speed*. ▪ Faulty wind sensor
Wrong input type	The input type entered does not match the input type on which the control is based.
Wrong output type	The output type entered does not match the output type on which the control is based.
Wrong terminal setting	Incorrect assignment. The function assigned to the terminal is not supported by the module.

[1] In case of a valve control, first check that the valve is not in manual mode.

9 System

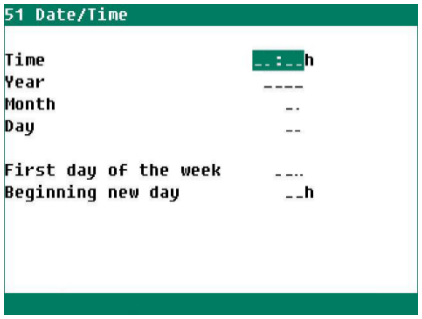


The first four lines show the device name, the device type (256 = CL-5400), the program version number and the program date.

You can set the language in which texts appear on the screen.

The language can be changed by holding down function key F1 and pressing the left or right cursor key at the same time.

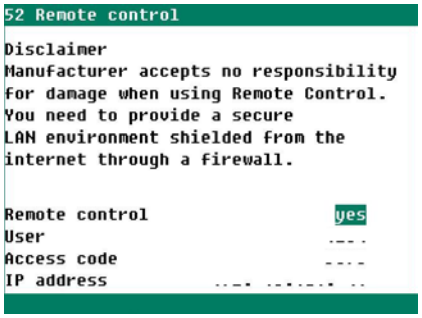
9.1 Date/Time



In addition to date and time, you can set the *First day of the week* here. The *first day of the week* is used to calculate the weekly totals. For example, if you set the *First day of the week* to *Su* (*Sunday*), the weekly totals will be calculated on Sunday. A weekly total is the sum of the past seven weekdays; Sunday, Saturday through Monday.

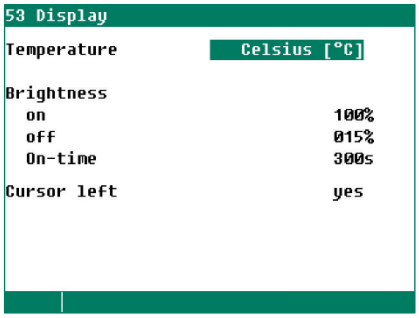
You can also set the start of a new day by entering the time at which the new day should start at *Beginning new day*. At *Beginning new day* all day-dependent data (overviews, counters, etc.) are moved forward one day. The data of today will be cleared afterwards.

9.2 Remote control



ANote-Remote-N-ENxxxxx

9.3 Display



Temperature — Setting the temperature unit: Celsius or Fahrenheit.

Brightness — Backlight brightness.

- *on* — Brightness during the screen-on period.
- *off* — Brightness during the screen-off period.
- *On-time* — Number of seconds the backlight stays on since the last key press. 0 seconds = backlight does not turn off.

Cursor left

- *yes* — When editing, the cursor is placed on the far left digit.
- *no* — When editing, the cursor is placed on the far right digit.