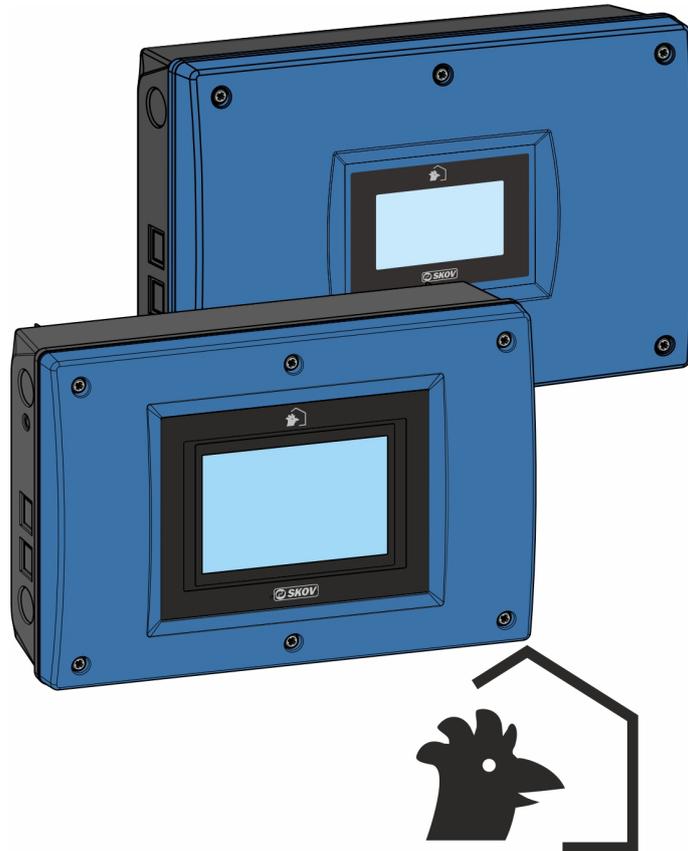


DOL 534 • DOL 539

Climate Controller

User Manual



English For other language variants of this document we refer to:

Español Para otras variantes del idioma de este documento, visite:

Français Pour les versions dans d'autres langues de ce document veuillez consulter:

<http://docs.skov.com/1017>



Product and Documentation Revision

SKOV A/S reserves the right to change this manual and the product described herein without further notice. In case of doubt, please contact SKOV A/S.

The last revision date appears on the front and back pages.

IMPORTANT!

Notes concerning the alarm system

Breakdowns, malfunctions or faulty settings may cause substantial damage and financial losses when regulating and controlling the climate in a livestock house. It is therefore essential to install a separate, independent alarm system that monitors the house climate concurrently with the climate and production controller. According to EU-directive No. 98/58/EU, an alarm system must be installed in all mechanically ventilated houses.

We would like to draw your attention to the fact that the product liability clause of general terms and conditions of sale and delivery specifies that an alarm system must be installed.



In case of an operating error or inappropriate use, ventilation systems can result in production losses or cause loss of lives among livestock.

We recommend that ventilation systems should be mounted, operated and serviced only by trained staff and that a separate emergency opening unit and an alarm system be installed as well as maintained and tested at regular intervals, according to terms and conditions of sale and delivery.

Installation, servicing and troubleshooting of all electrical equipment must be carried out by qualified personnel in compliance with the applicable national and international standard EN 60204-1 and any other EU standards that are applicable in Europe.

The installation of a power supply isolator is required for each motor and power supply to facilitate voltage-free work on the electrical equipment. SKOV does not supply the power supply isolator.

Note

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1	Guidelines	7
2	Product description	8
3	Operating instructions	9
3.1	Operation	9
3.2	Daily use	10
3.3	TrustMe	11
3.4	Activity log	11
3.5	Selecting default pages	13
3.6	Creating pages	13
3.7	Pages	16
3.7.1	House view	16
3.7.2	Program overview	17
3.7.3	Ventilation view	18
3.7.4	Daily view	19
3.8	Settings	20
3.9	Selection of Language	20
3.10	Password	21
4	Climate	23
4.1	Temperature	23
4.1.1	Temperature menus	23
4.1.2	Temperature settings	24
4.1.3	Two zone temperature adjustment	24
4.1.4	Temperature values	25
4.1.5	Settings	25
4.1.6	House heaters	26
4.1.6.1	Minimum heating	27
4.1.7	Stand-alone heating	28
4.1.8	Floor heating	28
4.1.9	Heating settings	31
4.1.9.1	Adaptive heating control	31
4.1.10	Additions	31
4.1.10.1	Comfort temperature	31
4.1.10.1.1	Advanced Comfort	32
4.1.10.2	Extra ventilation	32
4.1.10.3	Heat wave comfort	33
4.1.10.4	Day and night adjustment	35
4.1.11	Information	35
4.2	Humidity	36
4.2.1	Humidity menu	36
4.2.2	Humidification	37
4.2.3	Intelligent humidity control - at high outside temperature and outside humidity	38
4.2.4	Humidity control	39
4.2.4.1	Humidity ventilation	39
4.2.4.2	Temperature reduction	39
4.2.4.3	Humidity heat	40
4.2.5	Humidity settings	41
4.2.5.1	Adaptive humidity ventilation	41
4.2.5.2	Adaptive humidity heat	41
4.3	CO ₂	42
4.3.1	CO ₂ menu	42
4.4	NH ₃	43
4.4.1	NH ₃ menu	43
4.5	Pressure	44
4.5.1	Pressure menu	44

4.6	Heat recovery unit.....	45
4.6.1	Heat recovery unit menu.....	45
4.7	Ventilation.....	48
4.7.1	Ventilation menu.....	48
4.7.2	Ventilation status.....	50
4.7.2.1	Cycle timer at minimum air inlet.....	50
4.7.3	Zone controlled inlet.....	50
4.7.4	FreeRange.....	51
4.7.4.1	Pop holes.....	54
4.7.4.2	Winter garden.....	54
4.7.5	Inlet de-ice.....	54
4.8	Side cooling.....	56
4.8.1	Side cooling menu.....	56
4.8.2	Nozzle cleaning.....	57
4.8.3	Start cooling.....	57
4.8.3.1	Side cooling start based on ventilation level.....	57
4.8.3.1.1	Cooling priority.....	58
4.8.3.1.2	Cooling potential.....	59
4.9	Tunnel.....	59
4.9.1	Tunnel menu.....	59
4.9.2	Cycle timer at tunnel ventilation.....	62
4.9.3	Chill factor and chill effect.....	63
4.9.4	Combi-tunnel ventilation: change between side and tunnel.....	63
4.10	Tunnel cooling.....	64
4.10.1	Tunnel cooling menu.....	64
4.10.2	Start cooling.....	65
4.10.2.1	Tunnel cooling start based on a fixed air speed.....	65
4.10.2.2	Tunnel cooling start based on an adapted air speed.....	66
4.10.2.3	Tunnel cooling start based on inside temperature.....	67
4.10.3	Pad rinsing.....	67
4.10.4	Cooling potential.....	68
4.10.5	Adaptive tunnel cooling.....	68
4.11	Stir fan.....	68
4.11.1	Stir fan menu.....	68
4.11.1.1	Regulation via 24-hour clock.....	69
4.11.1.2	Regulation via temperature sensor.....	70
4.11.1.3	Regulation via heat source.....	70
4.12	Weather station.....	72
4.12.1	Weather station menu.....	72
4.13	User offsets.....	72
4.13.1	User offset menu.....	72
5	Management.....	73
5.1	House data.....	73
5.1.1	Active house - Empty house.....	73
5.1.2	Settings.....	73
5.1.2.1	Preheating by day number.....	74
5.2	History curves.....	74
5.3	Batch curves.....	76
5.3.1	Setting curves.....	76
5.4	In-between functions.....	78
5.4.1	Empty house.....	80
5.4.2	Settings.....	80
5.4.3	Preheating.....	81
5.4.4	Temperature surveillance.....	82
5.5	Ventilation boost.....	83
5.6	Catching.....	84

5.7	Auxiliary sensors	86
5.7.1	Auxiliary sensor menu.....	86
5.8	Consumption.....	87
6	Alarms	88
6.1	Stopping an alarm signal	88
6.2	Alarm test.....	89
6.3	Alarm menu.....	90
6.4	Alarm menu - Climate	90
6.5	Power failure alarm	92
6.6	Alarm settings	92
6.6.1	Temperature alarms.....	92
6.6.2	Humidity alarm	94
6.6.3	Inlet and outlet alarm	94
6.6.4	Sensor alarm.....	95
6.6.5	Tunnel cooling sensor alarm	95
6.6.6	Pressure sensor	95
6.6.7	Auxiliary sensor and CO2 alarm	96
6.6.8	NH3 alarm.....	96
6.6.9	Heat recovery alarm.....	96
6.6.10	Dynamic Air Alarm	96
6.6.11	Alarm for pop holes.....	96
6.6.12	Winter garden alarms.....	96
6.6.13	Catching.....	97
6.7	Emergency control	97
6.7.1	Emergency opening	97
6.7.2	Temperature-controlled emergency opening	97
6.7.3	Emergency inlet	98
7	Maintenance instructions	99
7.1	Cleaning.....	99
7.2	Recycling/Disposal.....	99

1 Guidelines

This user manual deals with the daily operation of the house controller. The manual provides the user with the fundamental knowledge about the functions of the controller that is required to ensure optimum use of it.

-  Some functions are optional and only used in specific set-ups of the house controller. These functions are shown with an optional icon.
- 
- 

If a function is not used, e.g. **24-hour clock**, it is not shown in the user menus of the controller. The manual may therefore contain sections that are not relevant to the specific setup of your controller. See also the **Technical Manual** or, if necessary, contact service or your dealer.

This manual's *Operating Instructions* consists of a general introduction, which describes briefly how to operate the house controller.

This is followed by descriptions of the house controller's functions, divided into four main sections.

2 Product description

DOL 53X is a series of one-house controllers specifically designed for poultry houses. The controller series includes several variants. Each of them meets the different requirements for climate and production control in connection with the production forms and geographical climatic conditions.

- DOL 534 climate controller
- DOL 535 production controller
- DOL 539 climate and production controller (obtained by combining DOL 534 and DOL 535)

DOL 534 is available in the following climate variants:

- LPV
- Tunnel
- Combi-Tunnel
- Natural ventilation

DOL 535 is available in the following production variants:

- Broiler (broiler)
- Breeder (parent stock)
- Layer (layers)

The controller is operated via a large touch display with graphical views of the ventilation status, icons and curves, among other things. The pages shown in the display may be adapted in accordance with the user requirements so that the most frequently used working procedures are easily accessible. In addition, a wide range of functions such as 24-hour clock, light, water meter, and extra sensor are named by the user, so the functions are easier to recognize in menus and alarms.

Along with two USB ports, DOL 53X provides two LAN ports for connection of the management program FarmOnline.

This manual describes the functionality of the variants DOL 534 and DOL 539 (hereafter called DOL 53X).

Curve regulation

DOL 53X can regulate the climate on the based on curves for temperature, heat, humidity, outside temperature, minimum and maximum ventilation. In daily operations it is therefore only necessary to make slight adjustments to the control parameters in relation to any possible production deviations, such as an outbreak of disease for example.

Optimized regulation

DOL 53X has a method for advanced climate control which improves the association between the humidity and temperature regulation in the house. The present climate is thus currently being optimized by using the collected historical data. The method provides much smoother and more uniform control.

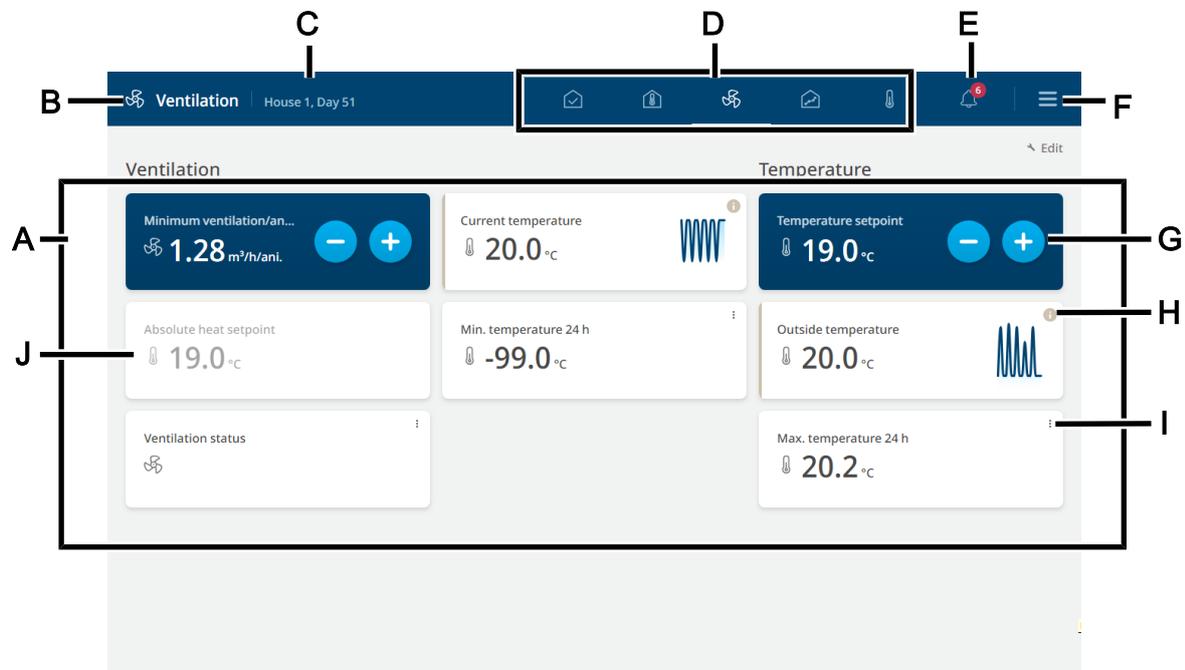
SKOV A/S congratulate you on your new
DOL 53X Climate Controller

3 Operating instructions

3.1 Operation

The controller is operated entirely by means of the touch screen.

The view in the display is called a page. One page can contain more information than what you can immediately see and you can scroll up and down on the page.



- A** Pages with selected key values and settings.
- B** The icon and name of the page.
- C** The selected house name and possibly week and day number.
- D** Shortcuts to pages. A maximum of 5 shortcuts can be shown here. The selected shortcut is highlighted.
- E** The Activity log of the controller. Activities comprise alarms and changes in settings.
- F** Survey of all pages, access to settings and language selection.
- G** Settings with direct adjustment access.
- H** Information on how the controller is currently working.
- I** The three dots indicate that pressing the card will display additional information.
- J** An inactive function has grayed-out text and icon.

3.2 Daily use

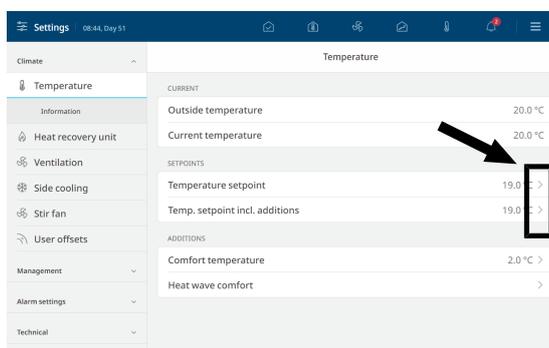
The controller is operated via created pages giving access to settings and information.

We recommend that you create pages with the content you need for daily operation. The pages provide status and information about the operation. Furthermore, the content of the pages works as shortcuts to the settings menu for quick and easy access to changing settings. See also the sections Creating pages [▶ 13] and Pages [▶ 16].

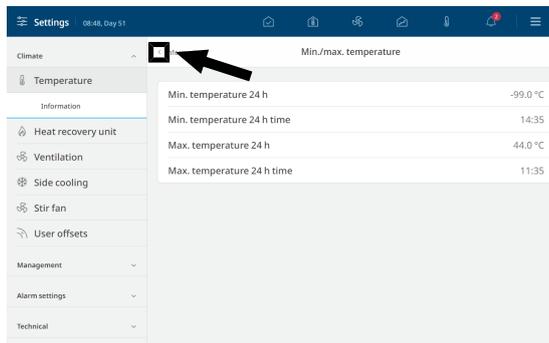
5 of these pages can be shown as shortcuts at the top of the controller display:



A Press the shortcuts to switch between the pages.



Sub-menus are opened by pressing the arrow pointing right >.

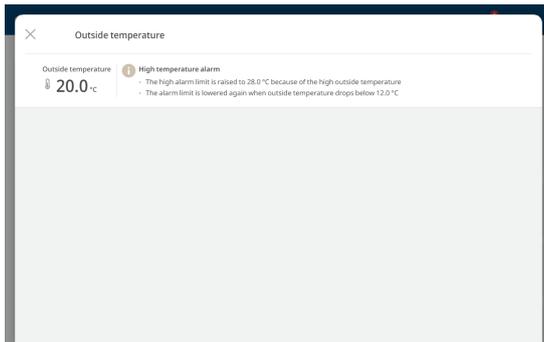


You can take a step back in menus by pressing the arrow pointing left < in the left corner.



In all menus and settings, changes can be canceled by pressing **Cancel** or confirmed by pressing **Confirm**.

3.3 TrustMe



TrustMe

For selected control areas the following is described:

- the current status.
- the reason for the current adjustment.
- what the next step in adjustment will be.

The information is available from pages with cards with the icon  in the right corner. Press the icon to see how the controller is currently working. Press the icon  in the left corner to close the window again.

The TrustMe information is meant to give the user understanding of how the controller is working.

3.4 Activity log

The controller registers operation, events and alarms with the information of when they took place and when they were deactivated. It often happens that several alarms follow each other because one defective function also affects other functions.

For instance, a flap alarm can be followed by a temperature alarm as the controller cannot adjust the temperature correctly with a defective flap. Thus, the previous alarms give you the possibility of following an alarm course back in time to detect the error that caused the alarms.

The activity log contains information about alarms such as:

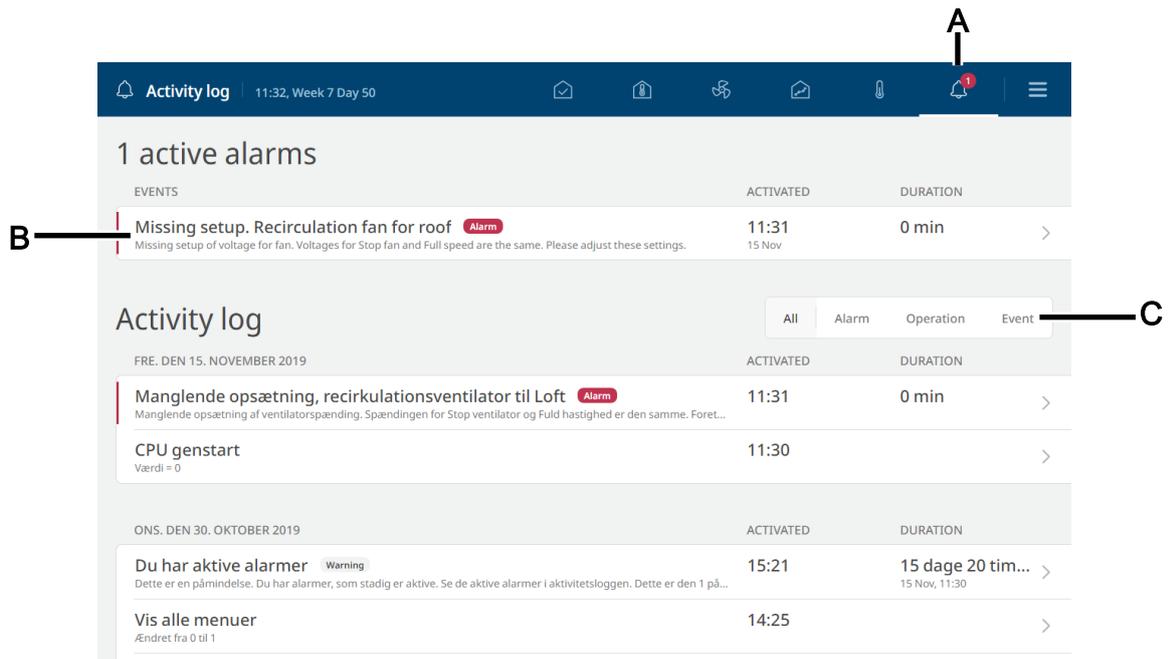
- When the alarm occurred.
- When it was deactivated (the state of alarm ceased).
- The value that triggered the alarm.

Other active alarms are marked on the list.

- Hard alarms are marked in red.
- Soft alarms are marked in yellow.
- Deactivated alarms are gray.

The icon for activity log indicates the number of active alarms, as long as an alarm situation is not deactivated.

Furthermore, it is displayed when a value/setting was changed and when.



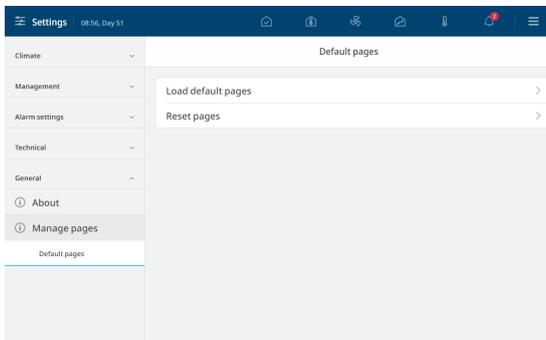
- A** Press the icon for the Activity log to open it.
- B** Press the line of an activity to see the details, such as when an alarm was activated and when the alarm was acknowledged.
Press **Close** to close the details window again.
- C** Select between different views of the various types of activities:
- All:** shows all types
 - Alarm:** shows alarms only
 - Operation:** shows operation of the controller
 - Event:** shows, for example, reset of the controller

3.5 Selecting default pages

The climate and production controller comes with a number of default pages that vary according to the ventilation system and animal type.

In order to simplify the set-up of controller, you can use default pages.

Remember to adjust the settings to the current conditions.



Press the **Overview**  and select **Settings** .

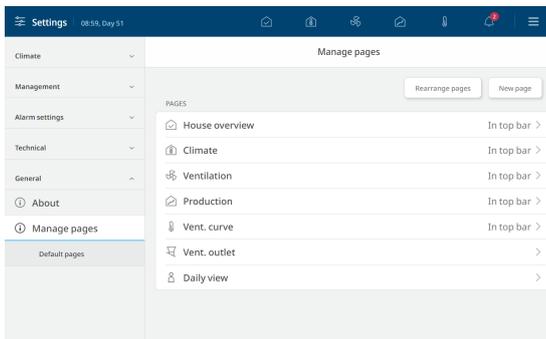
Then select **Manage pages | Default pages | Load default pages**.

Select the collection of pages you want.

3.6 Creating pages

We recommend that you create a number of pages to show exactly the functions and values used in the individual house and that cover the needs of the daily user.

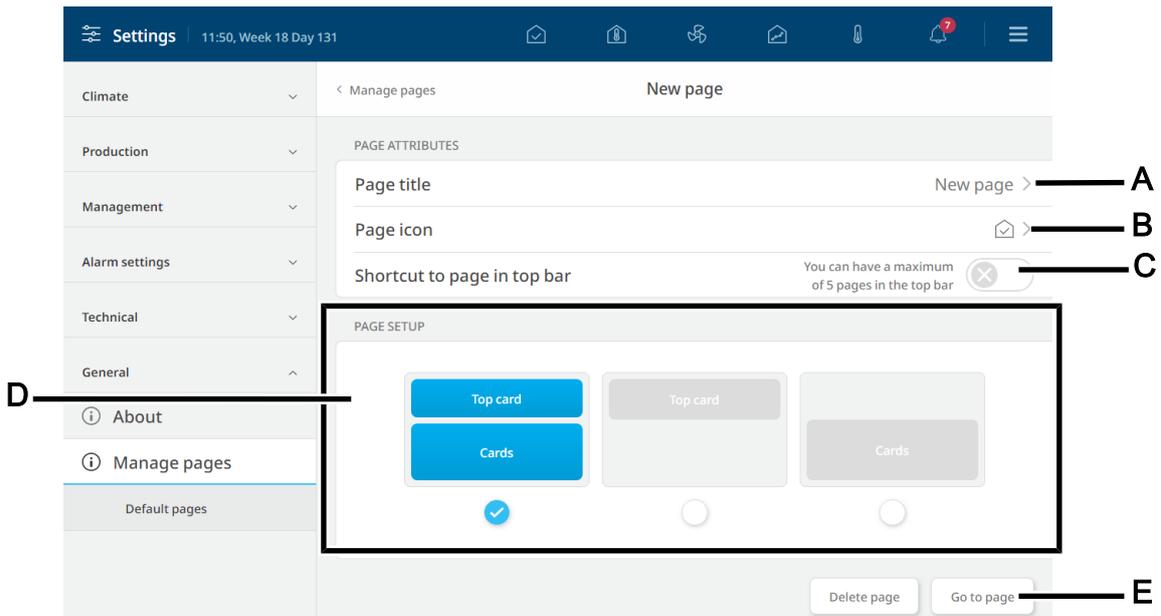
The pages work as shortcuts to the key values and settings and therefore gives you quick access to reading values and changing the settings you often need.



Press the **Overview**  and select **Settings** .

Select **General** and **Manage pages**.

Press **New page**.



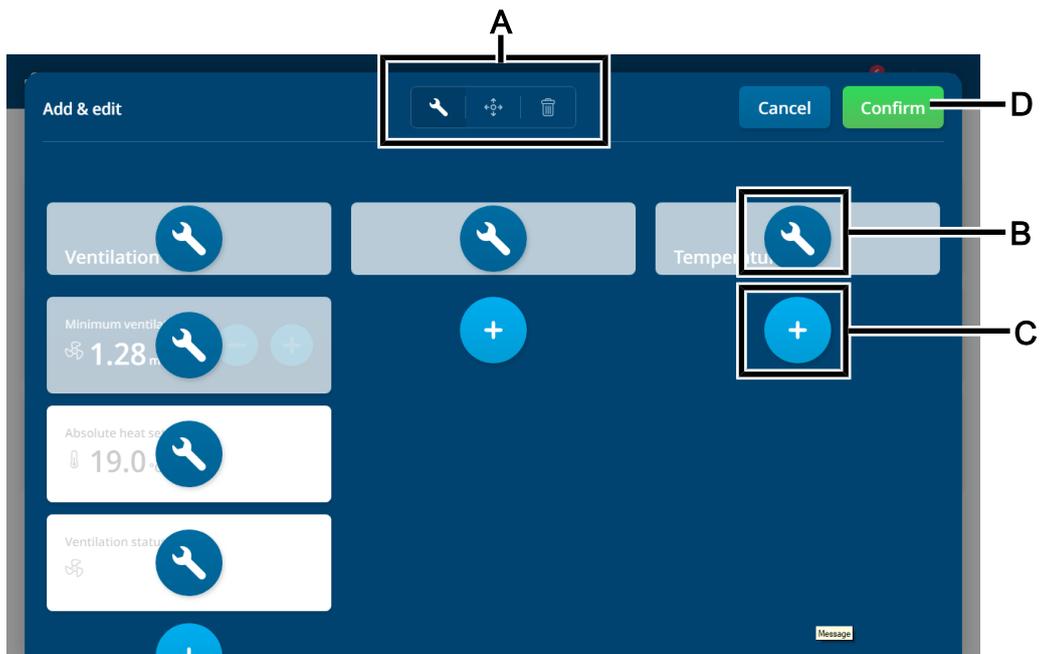
Pages can have different layouts. A top card can contain views and cards can contain key values.

Top card + cards makes it possible to select curves, house overview, program overview or daily view at the top of the page together with key values below the top card.

Top card makes it possible to select curves, house overview, program overview or daily view on the page.

Cards makes it possible to select a number of different key values to be displayed on the page. Key values are shown in columns and headlines can be added.

- A** The page can be named.
- B** Select a suitable icon for the page content to easily recognize it.
- C** Select if a shortcut for the page should be shown in the display.
- D** Select the layout for the page.
- E** To select the page content, press **Go to page**.



A Select one of the tools to edit headlines or card content, to move or delete the cards.

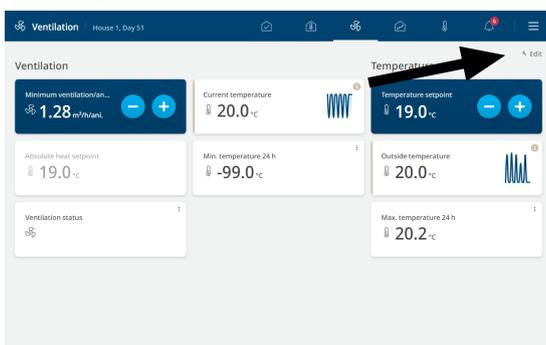
-  Edit
-  Move
-  Delete

B When a tool is selected, the icons on the cards change to reflect the tool.

C Add more cards.

D Finish the setup by pressing **Confirm**.

Edit pages



Press  **Edit** to the right to edit the selected page.

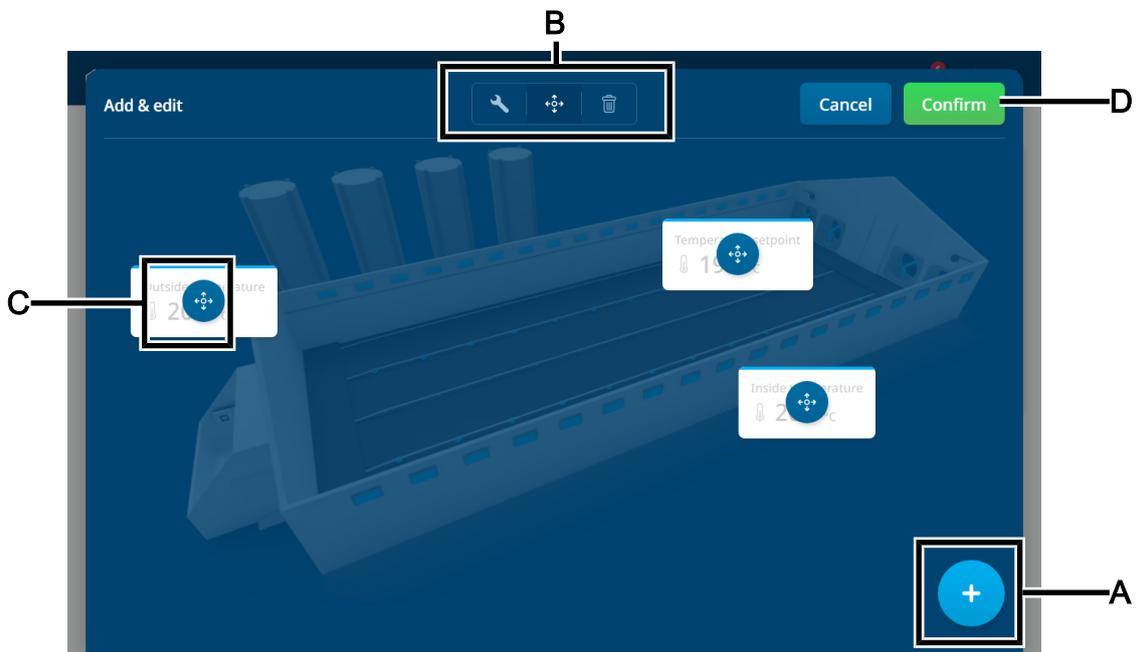
3.7 Pages

3.7.1 House view

This view provides a graphic overview of the house with selected values and settings.



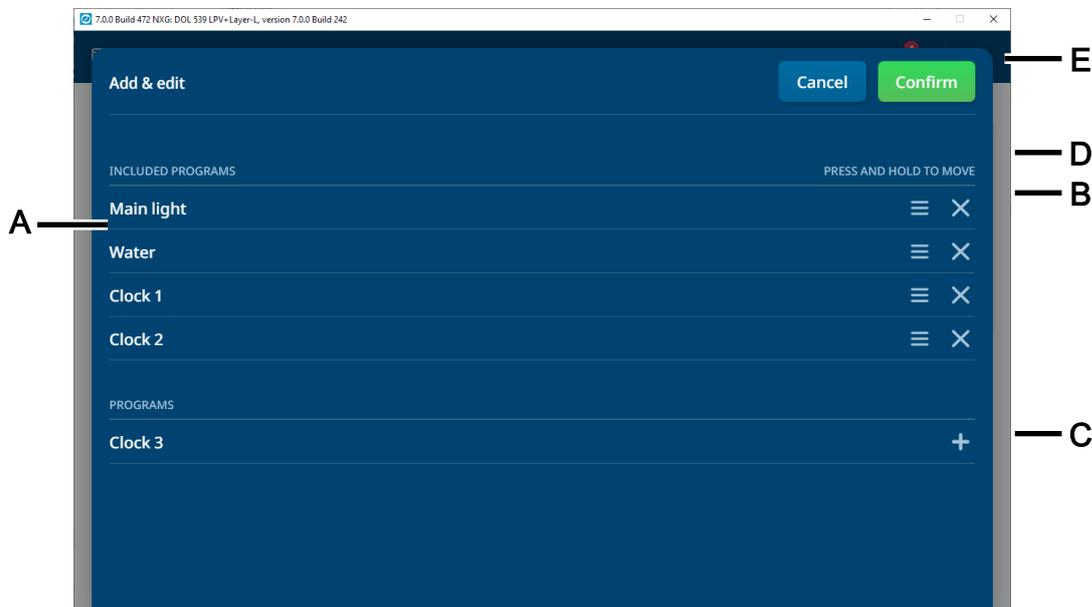
First select the angle of the house illustration. The illustration is shown in the small picture to the right. Then select to hide or display the house, the chimneys and the silos. Finally, save the layout by pressing **Confirm**.



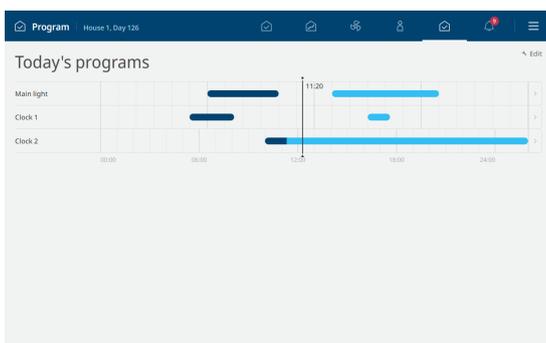
- A** Add key values.
- B** Select one of the tools to edit the key value.
- C** When a tool is selected, the icon of the key value reflects the selected tool.
- D** Finish the setup by pressing **Confirm**.

3.7.2 Program overview

This page makes it possible to see various types of programs on the same page. The graphic view makes it easy to gain an overview of how the programs have been setup in relation to each other.



- A** List of all the programs shown on the page.
- B** Press on the X to remove a program from the page.
- C** Press the plus sign to add a program.
- D** The order of the programs can be changed by pressing and holding a program while moving it up or down.
- E** Save the page by pressing **Confirm**.



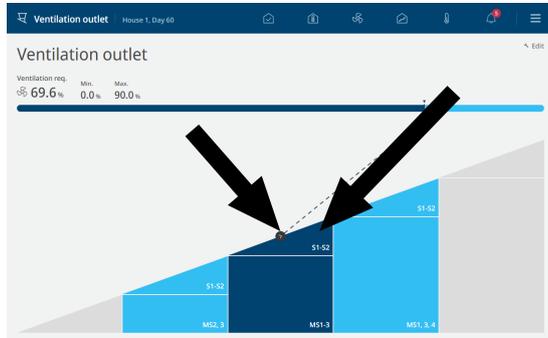
A program can be edited directly from the program overview. Just press the line of a program to edit it.

3.7.3 Ventilation view

The various graphic views of the ventilation system's status allow you to see which conditions are influencing the way the house is being ventilated at present.

It is not possible to perform user setups of these views.

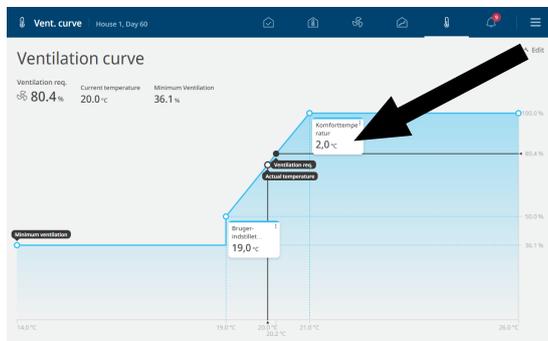
Some of the ventilation views can be selected when setting up pages with 'Top cards', others can be selected as 'Cards', see the section Creating pages [▶ 13].



Ventilation air outlet (Top card)

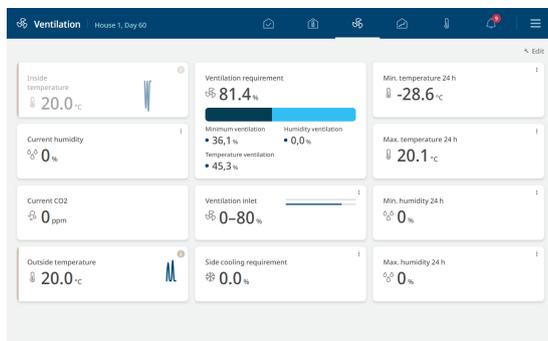
Displays the current ventilation level and which Stepless Multi-Steps are active for the individual ventilation levels.

View of current cooling requirement. The arrow indicates whether the ventilation level is increasing or decreasing.



Ventilation curve (Top card)

When key values are shown, there is also easy access to changing the setting by pressing the value.



Ventilation requirement (Card)

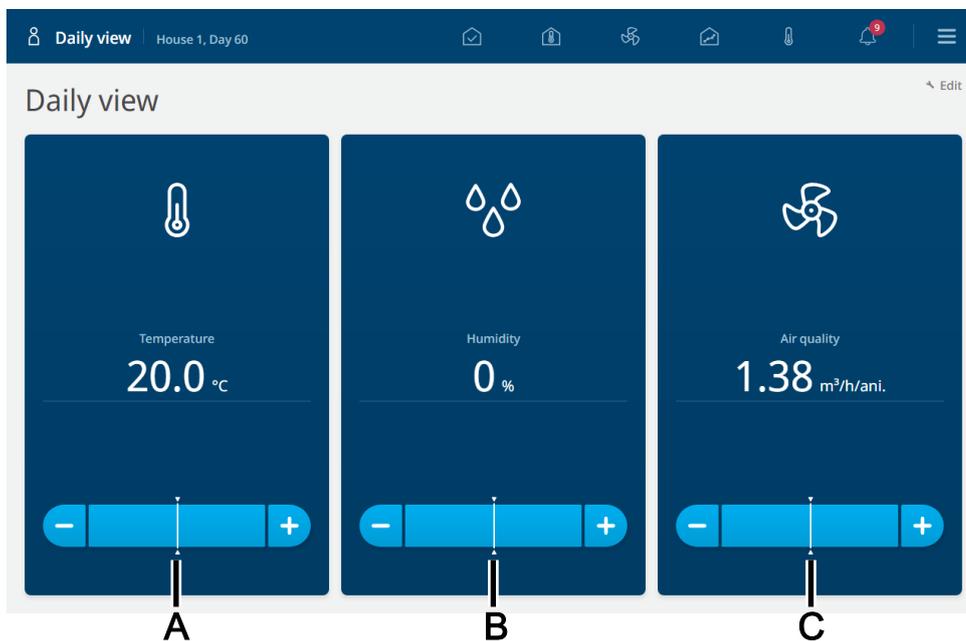
Displays which parameters contribute to the current ventilation.

Ventilation air inlet (Card)

Displays the current ventilation level and the status of the individual air inlets.

3.7.4 Daily view

The daily view allows easy access to and a quick overview of the functions most used. The contents of the menu depend on the type and the setup of the house controller.



A Temperature

The house controller displays the current inside temperature.

Click on **-** or **+** to adjust the inside temperature to the required temperature in the house.

Adjustment: +/- 0.5 °C

Next possible adjustment: in two hours.

B Humidity

The controller displays the current air humidity.

Click on **-** or **+** to adjust the humidity to the required air humidity in the house.

Adjustment: +/- 5%

Next possible adjustment: in 24 hours.

C Air quality

The controller displays the current minimum ventilation in the house.

Click on **-** or **+** to adjust the ventilation to the required air quality.

Adjustment: +/- 5%

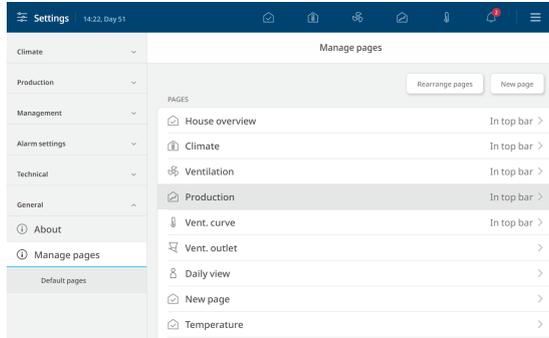
Next possible adjustment: in two hours.

3.8 Settings

The settings menu is opened by pressing the **Overview**  and then **Settings** .

The menu is divided into the following sub-menus: **Climate**, **Production**, **Management**, **Alarm settings**, **Technical** and **General**.

The display will show the menu that was last opened.



The menu opens to the left and settings are made to the right.

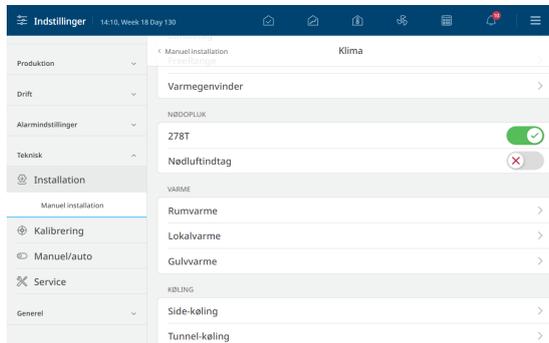


Changing the settings

Use the number keys to enter a value, or let your finger slide in the circle to select a value.

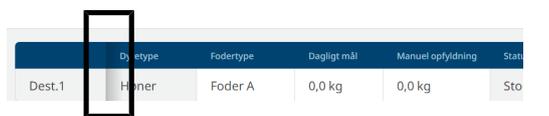
Minimum and maximum settings options are shown at the top of the circle. The new value is shown in the middle and the original setting is shown at the bottom of the circle.

Press **Cancel** to cancel the setting or press **Confirm** to confirm the new setting.



Activating/deactivating functions

Features and functions can be activated and deactivated by means of the toggle button.

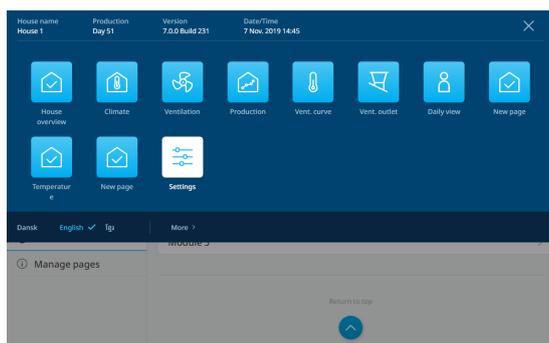


Scroll right/left

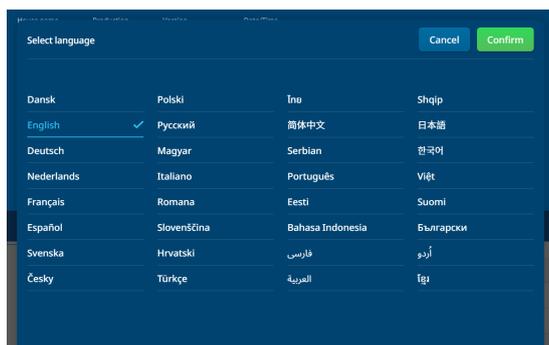
If the menu is wider than the display, you can scroll right/left.

The option of scrolling right/left can be seen by the shadow in the first column in the menu.

3.9 Selection of Language



Press **Overview**  to open the menu. The selected language is shown with a check mark.



If the requested language is not shown. Press **More** and select the language from the list. Press **Confirm**.

Note that names of functions (such as 24-hour clocks, water meters), pages and programs that can be named by the user are not translated.

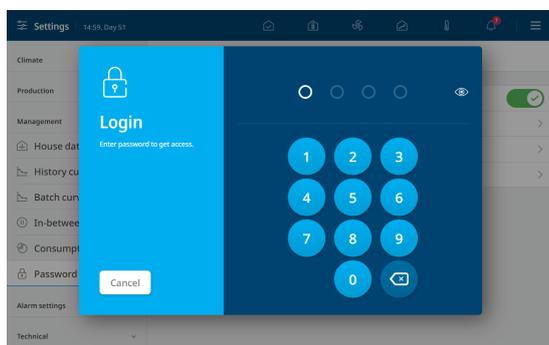
They have English names from the factory.

3.10 Password

- This section is relevant only to houses where the Password function is activated
-
-

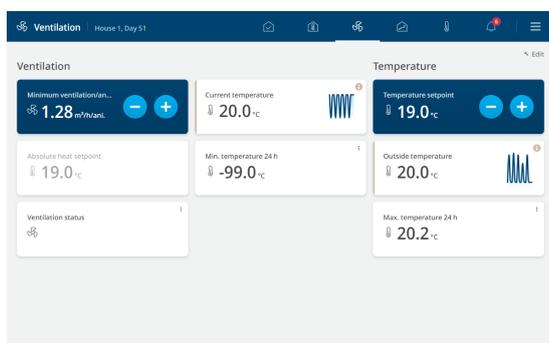
The controller can be protected against unauthorized operation with the use of passwords. This function can be activated in the menu | | **Management** | **Use password**.

In order to have access to changing a setting, you must enter a password that corresponds to the user level which the relevant function is found at (Daily, Advanced and Service).



Enter four digits.

After entering the password, the controller can be operated at the corresponding user level until it returns to a page after 10 minutes without activity.



Return the controller to a page after operation. After 1 minute, it will then need the password entering again.

You can change the password for each of the three user levels in the menu | | **Management** | **Passwords**.

In order to gain access to changing a password, you must first enter the valid password.

User level	Gives access to	Factory-set code
Daily view (without login)	Entering the number of animals Fine-tuning of temperature, humidity and air quality	
Daily	Daily: Changing of set values	1111

User level	Gives access to	Factory-set code
Advanced	Daily + advanced: Changing of curves and alarm settings Set the house controller in manual mode	2222
Service	Daily + advanced + service: Changing of settings under Technical menu	3333

**Limitation of access to operation of the house controller**

We recommend that you change the default passwords and subsequently change the password on a regular basis.

4 Climate

4.1 Temperature

The climate controller adjusts the inside temperature according to the **Temperature setpoint**.

4.1.1 Temperature menus

 Climate Temperature	Only applies to	
Current	Outside temperature Current temperature Experienced temperature Current tunnel temperature Experienced tunnel temperature	T, CT
Setpoints [▶ 25]	Temperature setpoint Temp. setpoint incl. addition Heating offset Absolute heating temperature Preheating setpoint FreeRange heat setpoint Tunnel temperature Heating temperature Stand-alone heating FreeRange stand-alone heat 1	T, CT
House heaters [▶ 26]	House heating active Outside temperature below Minimum heat Heat adaption time	
Stand-alone heating [▶ 28]	Active Stand-alone heating 1-4 active Heat adaption time	
Floor heating [▶ 28]	Current floor temperature Floor return temperature Floor temperature setpoint Floor heating requirement Minimum floor heating Activate minimum heating at outside temperature below Outside temperature Outside temperature control Stop heating at outside temperature above Control adaption time	LPV, CT, , Basic

Addition [▶ 31]	Comfort temperature	LPV, CT, , Basic
Advanced comfort Extra ventilation Heat wave comfort active Outside temperature limit Activation time		
	Heat wave comfort	Heat wave comfort active Outside temperature limit Activation time
	Day and night adjustment	Temperature Start time Stop time
Info [▶ 35]		LPV, CT, N Outside temperature Inside temperature Tunnel temperature House heaters Stand-alone heating

4.1.2 Temperature settings

When the inside temperature is too high, the controller increases the ventilation level to supply more fresh air. When the temperature is too low, the controller reduces the ventilation level to keep the heat in the house; the heating level is increased if needed.

4.1.3 Two zone temperature adjustment

Using zone control, front and rear have their own individual temperature setting. Thus, the temperature can be set separately in each individual zone; however, the two zones use the same temperature curve. If you want to change the temperature with the same number of degrees in both zones, you can apply the curve to change it.

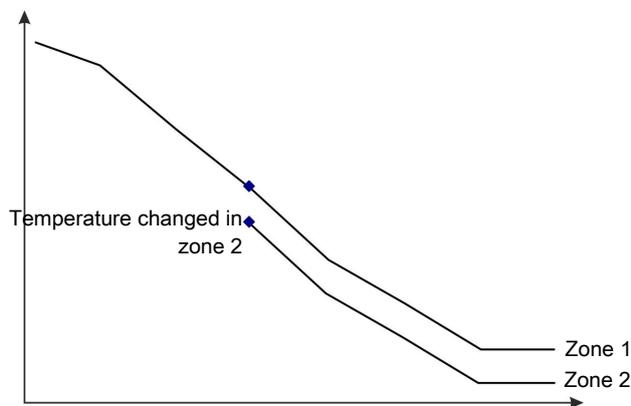
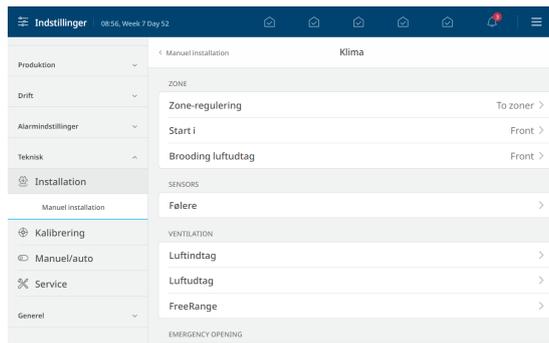


Figure 1: Temperature regulation at two-zone

If you only want to change the temperature setting in one of the zones or change both zones but with a different number of degrees in each individual zone, you have to do it through **Temperature setpoint**.

Brooding air outlet



You can set the ventilation to draw the air into the active zone and out through the empty zone in two-zone houses, where one half of the house is used as a brooding zone, and the other half is used for drying the bedding.

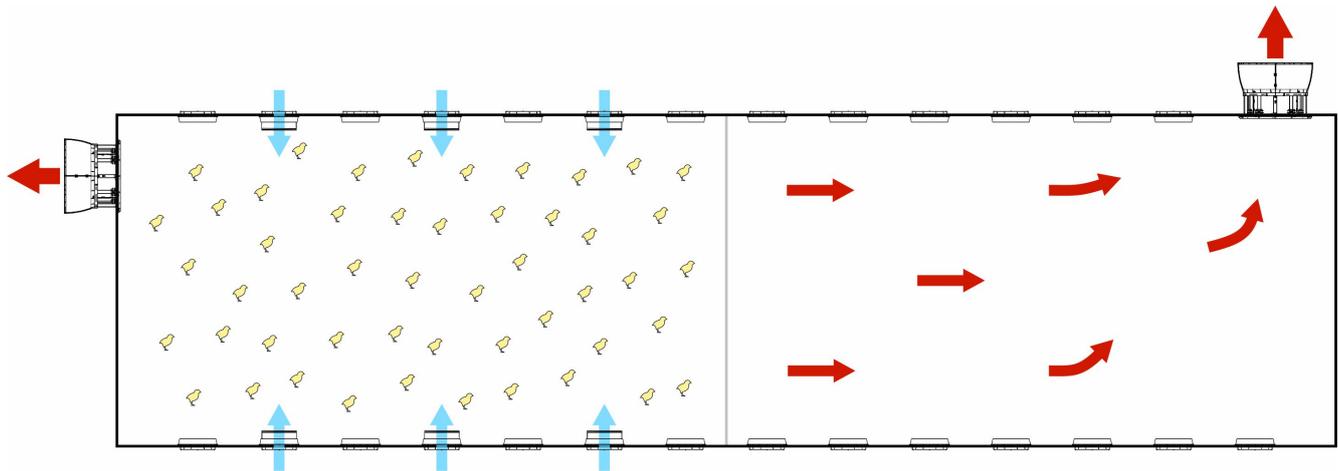


Figure 2: Brooding air outlet

4.1.4 Temperature values

Climate | Temperature | Current

Outside temperature	View of the current outside temperature.
Current temperature	Display of the current temperature measurement.
Experienced temperature	Indication of the temperature perceived by the animals, i.e., the experienced temperature. The controller continually calculates the current chill effect in the livestock house. The controller takes the chill factor into account when it adjusts the heat supply
Current tunnel temperature	Display of the current temperature measurement.
Experienced tunnel temperature	Indication of the temperature perceived by the animals, i.e. the effective temperature at tunnel ventilation. The controller continually calculates the current chill effect in the livestock house. When regulating the heat supply, the house controller takes the chill factor into account.

4.1.5 Settings

Climate | Temperature | Setpoints

Temperature	Upper temperature setpoint that activates ventilation.
--------------------	--

Temp. setpoint incl. addition

Display of a corrected temperature value for Temperature.

Temperature setpoint incl. addition is the starting point for the controller’s calculations of the ventilation requirement in the livestock house.

If the controller is set up with functions, such as comfort temperature, humidity control with temperature reduction, or day and night adjustment, the controller will correct the temperature setpoint by increasing or decreasing a few degrees and calculating the ventilation requirement accordingly.

4.1.6 House heaters

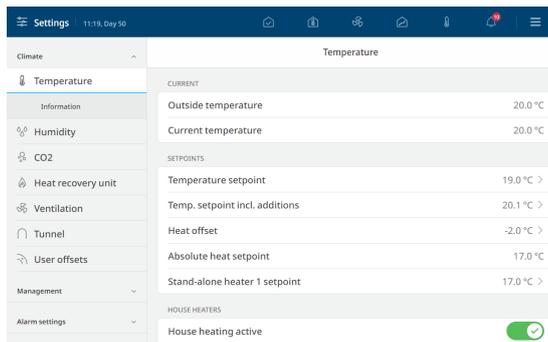
This section is relevant only to houses with heating systems.

Room heaters are used to heat the entire house and cold areas in the house. All heaters connected as room heaters are regulated according to the same temperature setpoint.

Room heating can be regulated as common or individual heating.

Common house heaters: Up to two heaters are regulated according to a common heating requirement.

Individual house heaters: For each heater, choose which sensors are to control the heating requirement.



Heat offset

In houses with heating systems, the house controller regulates the inside temperature according to the set temperature, **Temperature**, and according to a lower temperature limit, **Absolute heat setpoint**.

Climate | Temperature | Setpoints

Heat offset Set the number of degrees the inside temperature must drop below the required temperature before the house controller activates heat supply.

Absolute heat setpoint Display of the calculated temperature that activates the house heat supply (=Temperature - Heat offset).

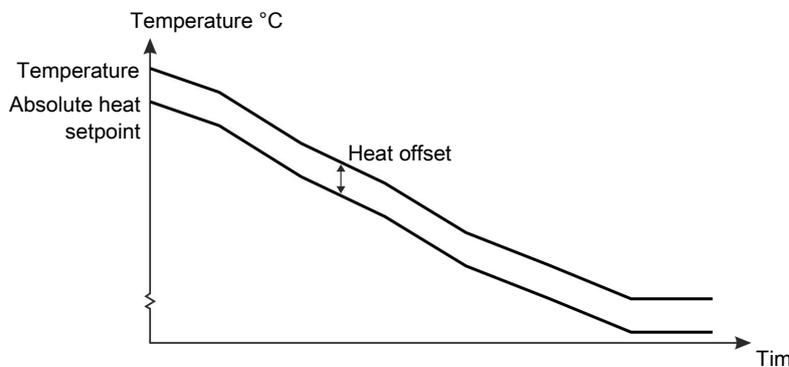


Figure 3: Set heat offset

If you want to increase the **Temperature setpoint** without increasing the **Absolute heat temperature**, you must first adjust the **Temperature setpoint** and then increase the **Heat offset** by the corresponding number of degrees.

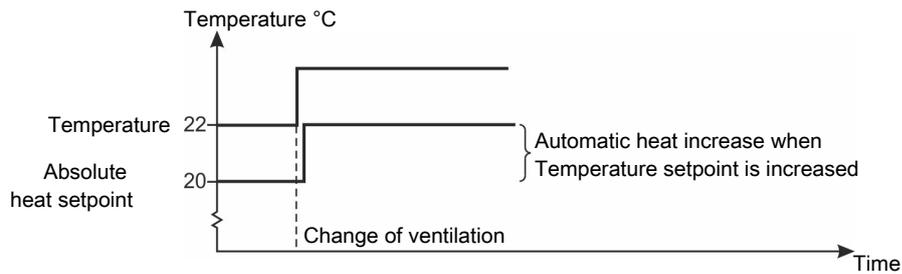


Figure 4: Heat supply

Note that when you increase the **Temperature setpoint**, the **Absolute heat temperature** will increase correspondingly so that the offset between the two values will always be the same.

Climate | Temperature | House heaters

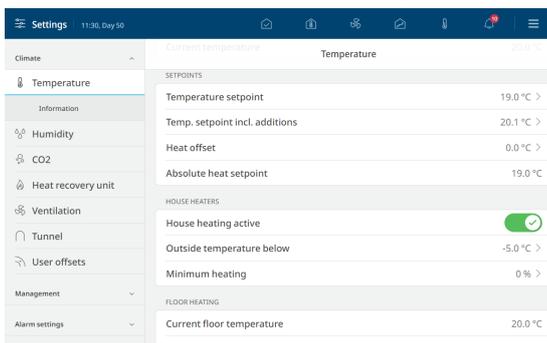
House heating active Connection and disconnection of house heaters.

When you want to stop the heat supply in the house, disconnect heating. The house controller will then automatically turn off the heat supply.

Inappropriate regulation

- If you turn off the heat supply manually without disconnecting heating on the house controller (House heating active), the regulation of the ventilation will be inappropriate as the controller will try to regulate based the assumption that heating is still available.

4.1.6.1 Minimum heating



Minimum heating is a function which the house controller activates in cold weather. Minimum heating can e.g. Minimize ice formation in the air inlet. When the outside temperature is set to **Outside temperature below**, the house controller constantly adds the minimum heat

Climate | Temperature | House heaters | Minimum heating

Outside temperature below Setting of the outside temperature that activates the **Minimum heating** function.

Minimum heating Setting of the percentage of the heating system capacity at which the system opens at minimum heating

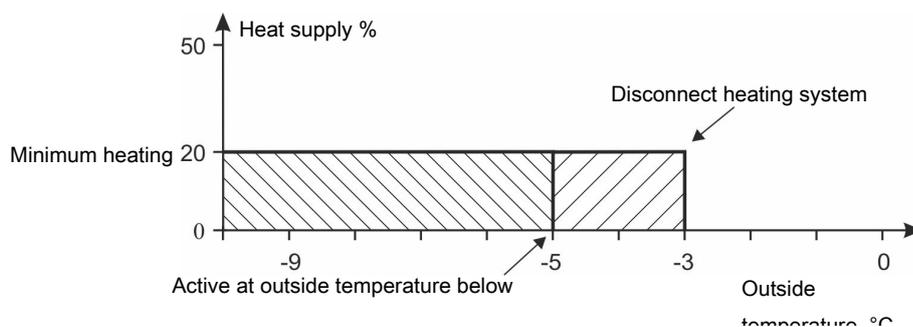


Figure 5: Minimum heating

Not until the outside temperature exceeds the **Outside temperature** by more than 2 °C, will the climate controller disconnect the heating again. This prevents the heating system from connecting and disconnecting continuously when the outside temperature fluctuates around the set temperature.

4.1.7 Stand-alone heating



This section is relevant only to houses with stand-alone heater

Stand-alone heaters are used e.g. in cold areas of the house to equalize temperature differences.

Settings 11:24, Day 50	
Climate	
Temperature	
Temperature	CURRENT
Information	Outside temperature 20.0 °C
Humidity	Current temperature 20.0 °C
CO2	SETPOINTS
Heat recovery unit	Temperature setpoint 19.0 °C >
Ventilation	Temp. setpoint incl. additions 20.1 °C >
Tunnel	Heat offset 0.0 °C >
User offsets	Absolute heat setpoint 19.0 °C
Management	Stand-alone heater 1 setpoint 17.0 °C >
Alarm settings	Stand-alone heater 2 setpoint 17.0 °C >
	HOUSE HEATERS

You can use up to four stand-alone heaters to which a local zone should be assigned at controller setup. The house controller regulates heating in the local zones of the house independently of room heating, and heats them by means of heaters located in each zone.



As heating is concentrated on the local zones, the inside temperature outside the zones can be kept down to reduce heat consumption.

Climate | Temperature | Setpoints

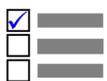
Stand-alone heaters	Setting of the temperature which is the lowest temperature allowed at the heater in question. When the inside temperature is lower than this setting, the heater supplies heat.
----------------------------	---

Climate | Temperature | Stand-alone heaters

Active	Connecting or disconnecting all stand-alone heaters.
---------------	--

Stand-alone heater 1 active	Connecting or disconnecting the individual stand-alone heater.
------------------------------------	--

4.1.8 Floor heating



This section is relevant only to livestock houses with floor heating.

For example, floor heating is used to limit the heat loss of the animals through the floor and to dry out the livestock house.

The climate controller can control the floor heating with or without a temperature sensor. The controller will keep the floor heating at a set floor heating temperature using a connected sensor. Without the sensor, the controller will supply heat based on a set percentage of the capacity of the floor heating system.

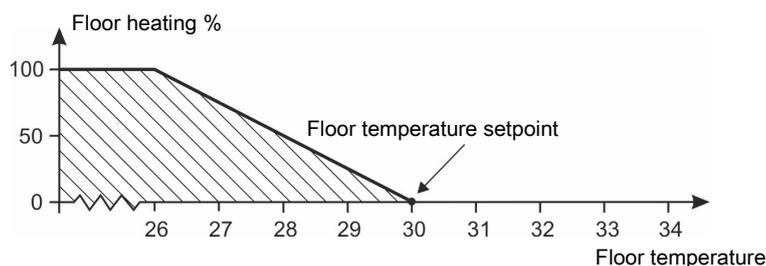


Figure 6: Floor heating, applying a temperature sensor

The floor heating system runs at 0-100% to keep the floor heating temperature at the set floor temperature.

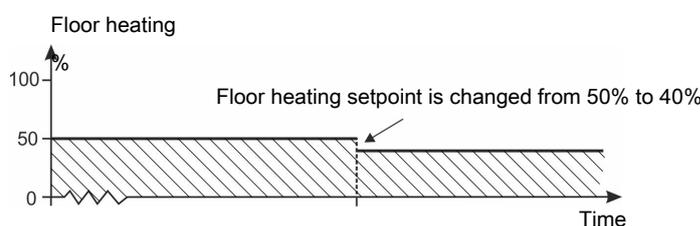


Figure 7: Floor heating, a temperature sensor is not applied

The floor heating works with a set percentage of the capacity of the heating system. Without the sensor, it is not possible to determine which temperature the floor should have.

Floor heating can also be adjusted through batch curves. See section Batch curves [▶ 76].

Common parameters (with and without sensor)

Climate | Temperature | Floor heating

Floor temperature (only with sensor)	View of the current outside temperature.
Floor return temperature	View of the return water temperature.
Floor temperature set-point (only with sensor)	Setting the floor temperature.
Floor heating setpoint (only without sensor)	Setting the percentage at which the floor heating system will operate.
Floor heating requirement	Current supply of floor heating in percentages.
Minimum floor heating	<p>Minimum floor heating is used in temperature-controlled floor heating.</p> <p>The function causes the floor heating system to run at least at the set percentage of the capacity of the heating system. Even if the current floor temperature is higher than the Floor temperature setpoint, the heating system will continue to provide floor heating.</p> <p>Minimum floor heating can be used to maintain a specific floor heating temperature in the livestock house and thus influence the distribution of the animals.</p>
Activate minimum heating at an outside temperature below	Setting an outdoor temperature that causes the controller to activate the minimum floor heating.
Outside temperature	View of the current outside temperature.
Outside temperature control	Connection and disconnection of outside temperature control.

The function is intended for areas with a high daytime temperature, where it renders possible to turn off the floor heat during the day.

Stop heating at an outside temperature above Setting an outdoor temperature that causes the controller to disconnect the floor heating.

Control adaption time The setting of how fast the adjustment should react (**Slow/Medium/Fast**).
It is not necessary to change the factory setting **Medium** unless the adjustment reacts too slowly (select **Fast**) or too fast (select **Slow**). This will depend on the system in question.

Also, see the Adaptive control section of the Technical Manual.

4.1.9 Heating settings

4.1.9.1 Adaptive heating control

SKOV A/S recommend that heat control is set up for adaptive control.

The factory setting is PID.

In the case of adaptive control, it is possible to fine-tune how fast it reacts when the conditions change.

Climate | Temperature | Room heating / Stand-alone heating / Floor heating

Heat adaption time	The setting of how fast the adjustment should react (Slow/Medium/Fast). It is not necessary to change the factory setting Medium unless the adjustment reacts too slowly (select Fast) or too fast (select Slow). This will depend on the system in question. Also, see the Adaptive control section of the Technical Manual.
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4.1.10 Additions

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	This section is relevant only to houses where additional temperature is used in relation to the temperature setpoint.
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4.1.10.1 Comfort temperature

If the controller increases the ventilation level on hot days in order to keep the temperature down, the increased air velocity in the livestock house will make the air feel cooler for the birds. So, for example, 20 °C under windless conditions feels warmer than 20 °C in windy weather.

To counteract the fact that the animals are chilled because of the higher air speed, the house controller increases the inside temperature by the set comfort temperature, before ventilation increases to maximum. The temperature increase counteracts the fact that the animals perceive the powerful ventilation as draft.

During continuous production, the house controller activates the comfort temperature function when the ventilation requirement is higher than the ventilation rate that the **Start ventilation** is set to.

Climate | Temperature | Additions

Comfort temperature	Setting of a number of degrees that the inside temperature must rise to compensate for the chill effect that the animals are exposed to at a high ventilation level.
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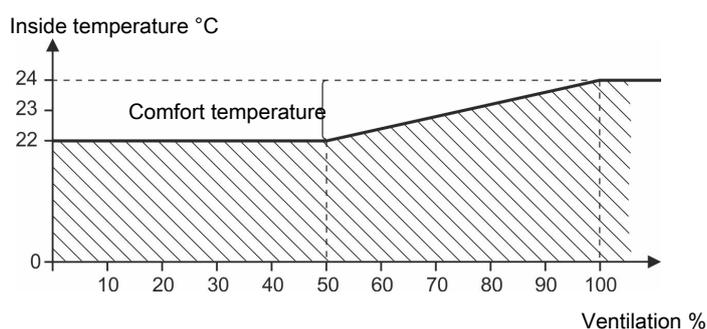


Figure 8: Comfort temperature at continuous production

In batch production the house controller activates the comfort temperature function, when ventilation requirement is higher than the ventilation rate that the **Comfort ventilation** is set to (in the menu **Technical | Service | Control parameters | Comfort | Comfort ventilation**).

At batch production, the comfort temperature can be set as a curve over two day numbers. Ventilation can thereby be increased when the animals get larger.

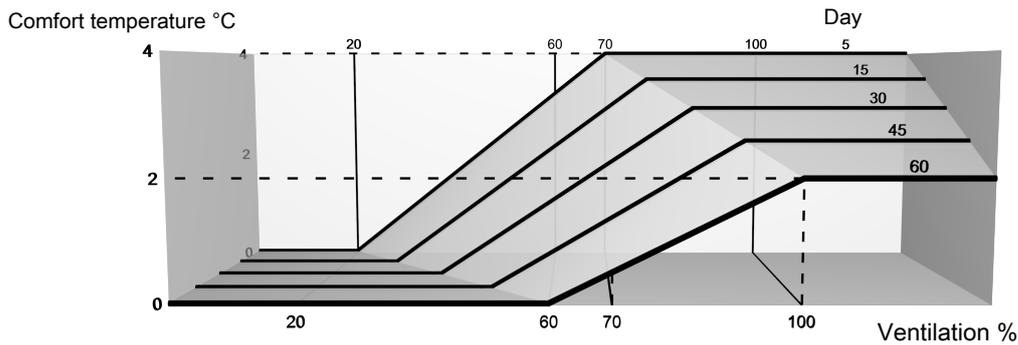


Figure 9: Comfort temperature at batch production

In the technical menu **Technical | Service | Control parameters | Comfort | Comfort ventilation**, the Comfort start and Max. ventilation values are also set so they equate to a time span of two day numbers.

4.1.10.1.1 Advanced Comfort

Climate | Temperature | Additions

Advanced Comfort The function Advanced Comfort enables the house controller to optimize the inside temperature in relation to the age of the animals, heat regulation and the climate in the house.

4.1.10.2 Extra ventilation

- The feature is only available in houses where tunnel ventilation is not installed.
-
-

Extra ventilation works by means of capacity in the ventilation system, which exceeds the calculated air requirement of the animals. It is not possible to bring the inside temperature below the outside temperature, but the increased air speed in the house will cool the animals

Extra ventilation is activated when the inside temperature is over **Temperature setpoint + Comfort temperature**, and ventilation is already at maximum. The house controller increases the extra ventilation gradually.

Climate | Temperature | Additions

Extra ventilation Setting of a number of degrees that the inside temperature must rise to compensate for the chill effect which the animals are exposed to at a high ventilation level (only Side).

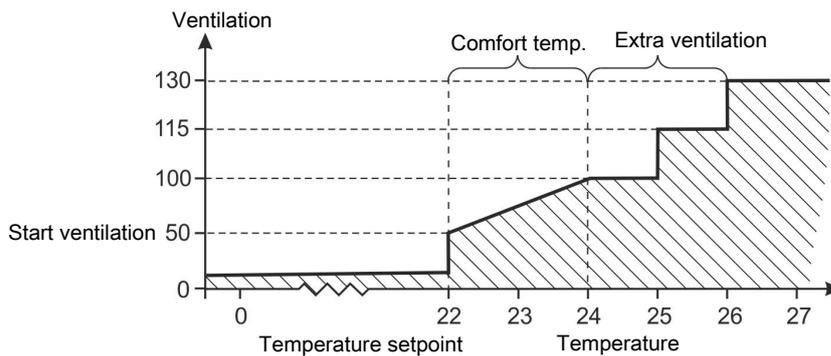


Figure 10: Extra ventilation



Air velocity is of great importance to the birds. The higher the air velocity, the more it cools. When the weather is hot, high air velocity feels like a pleasant breeze. When the weather is cold, even low air velocity feels like an unpleasant draft.

4.1.10.3 Heat wave comfort

A heat wave is a period of high outside temperatures both day and night. During a heat wave, it is essential to ensure the animals effective and cooling ventilation.

The heat wave comfort feature expunges the comfort temperature for quicker ventilation due to the high inside temperature. Also, see section Comfort temperature [► 31].

Climate | Temperature | Additions

Heat wave active	Connection and disconnection of the function.
Heat wave:	Showing whether the conditions for a heat wave are present or not.
Outside temperature limit	The setting of the outdoor day and night temperature to make it a heat wave.
Activation time	The setting of the amount of time the outdoor temperature must have exceeded the heat wave limit before the feature is activated.
Comfort reduction factor	The setting of a factor that determines how quickly the comfort temperature is to be reintroduced (°C/hour). The higher the factor, the faster the comfort temperature is reintroduced.
Heat wave ending time	View of how many hours will elapse before the entire comfort temperature is reintroduced. The ending time is changed by changing the Comfort reduction factor.

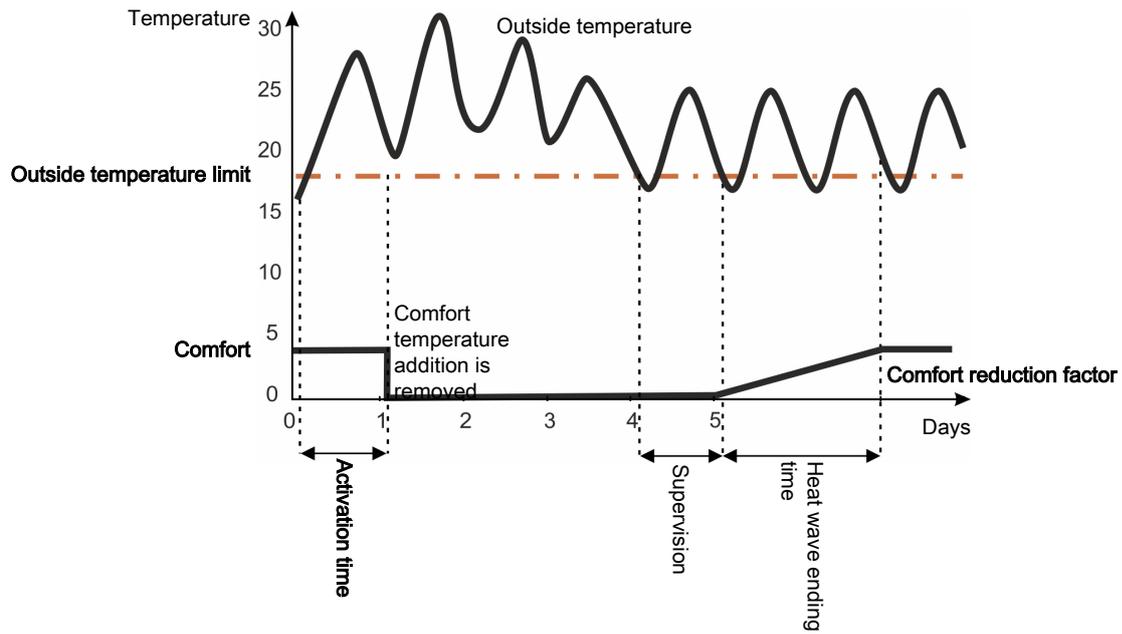


Figure 11: Heat wave comfort

During the heat wave, you remove the supplement of comfort temperature to the temperature setpoint.

When a heat wave stops, the climate controller monitors the outside temperature for 24 hours before the comfort temperature is gradually reintroduced.

For example, with a reduction factor of 0.06 °C/hour, it will last 50 hours until the full comfort temperature is introduced.

4.1.10.4 Day and night adjustment

Day and night adjustment is intended for changing the inside temperature over a set period every 24 hours in order to support the animals normal behavior. A lower inside temperature will make the animals experience a normal circadian rhythm. Furthermore, the ventilation level will be relatively higher, thus ensuring a better air quality.

You cannot activate day and night adjustment, when the house is set to **Empty house**.

Climate | Temperature | Additions

Day and night adjustment Setting of the number of degrees by which the inside temperature must change in relation to the **Temperature setpoint**.

Start time Time when the day and night function starts.

Stop time Time when the day and night function stops.

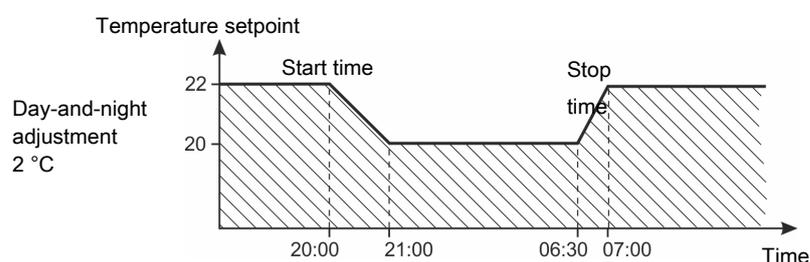


Figure 12: Day and night adjustment

The inside temperature will gradually adapt to day and night adjustments within the period the reduction in temperature is set to last.

This function is designed for a nightly temperature setback but can be set for running at any time and for letting the temperature rise (by setting the value at a positive figure).

In batch production mode, the function can be set to lower the temperature automatically during the processing of the batch. See the menu **Management | Batch curves | Climate** to set a curve for day and night adjustments.

4.1.11 Information

Climate | Temperature | Info

Actual day-and-night adjustment Current change of temperature in relation to Temperature setpoint.

4.2 Humidity

 This section is relevant only to houses with a humidity sensor.
 
 

4.2.1 Humidity menu

  Climate Humidity		Only applies to	
Status	Humidity control not active in tunnel mode	CT	
	Blocked by high outside humidity		
Current	Current humidity		
	Humidity ventilation	LPV, CT	
	Outside humidity		
	Humidification requirement	LPV, CT	
Setpoints	Humidity setpoint		
	Humidification	LPV, CT	
	Humidification last day	LPV, CT	
Settings	Humidity control mode [▶ 39]		
	Humidity control enabled		
	Maximum humidity ventilation		
	Ventilation adaption time	Fast Moderate Slow	Humidity ventilation [▶ 39]
	Heat adaption time	Fast Moderate Slow	Humidity heating [▶ 40]
	Switch humidity control on batch day		
	Switch humidity control setup		
	Info	Min. humidity 24 h Max. humidity 24 h Individual humidity sensors Humidity control status	

The climate controller regulates the air humidity of the livestock house according to the set humidity. Humidity is supplied to the housing air partly from the animals, feed, drinking water and litter, and partly from the cooling and humidification functions.

 Be aware that the climate controller only regulates according to humidity when the temperature control allows it.

When air humidity is higher than the set humidity, the controller will increase the ventilation to reduce the humidity level or increase the heat supply depending on the selected humidity control mode.

When the air humidity is lower than the set humidity, the controller will first reduce the ventilation and then activate the humidification if the installation includes a humidifier.

Climate | Humidity

Current humidity	View of the current humidity level.
Humidity ventilation	Display of just how much is being ventilated due to humidity.
Outside humidity	Current outside humidity level.
Humidity	Setting the upper air humidity limit.
Humidity control mode	Selecting type of humidity control. Also, see section Humidity control [▶ 39].
Humidity control status	View of the current humidity control. See section Intelligent humidity control - at high outside temperature and outside humidity [▶ 38].
Regulation activated	Connection and disconnection of the humidity control. When humidity control is disconnected, the ventilation is regulated solely based on the inside temperature.
Maximum humidity ventilation	In the case of humidity ventilation. Setting of the degree of ventilation where the humidity ventilation stops.
Control settings	
Adaption time	The setting of how quickly the adjustment should react at adaptive humidity control. See section Adaptive humidity ventilation [▶ 41] and Adaptive humidity heat [▶ 41].
Switch humidity control on batch day	It is possible to automatically change the humidity control principle on a specific day of the batch. Selecting the humidity control principle, the batch should start with and which to switch to, as well as the selected day number on which day the shift takes place.
Switch humidity control setup	Selecting the humidity control principle the batch should switch to, as well as the selected day number on which day the shift should take place.
Min. humidity 24 h	The lowest humidity during the last 24 hours and the time it occurred.
Max. humidity 24 h	The highest humidity during the last 24 hours and the time it occurred.

4.2.2 Humidification

Humidification increases the air humidity of the house by supplying atomized water to the air. It is important to maintain a certain air humidity, among other things to prevent dehydration of the animals' mucous membranes. The house controller increases humidification as long as the air humidity is below the humidification setpoint.

Climate | Humidity

Humidification	Setting of lower air humidity limit.
Humidification last day	Setting of the day number when the house controller deactivates humidification. The house controller thus humidifies only at the start of the batch, until the natural humidity level in the house has reached the desired level.
Humidification requirement	Display of current humidification requirement.

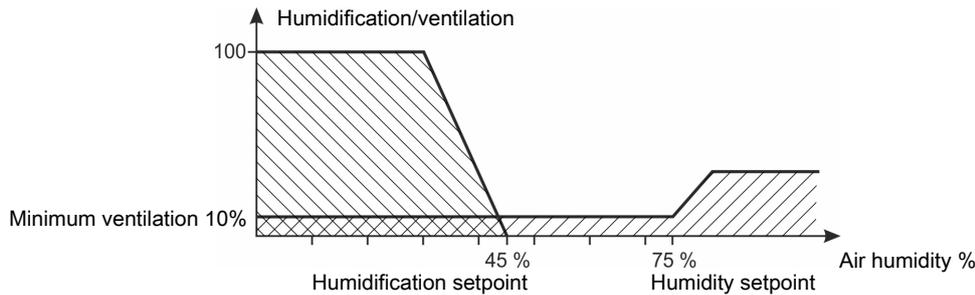


Figure 13: Humidity and humidification setpoint

When the inside temperature is below the **Temperature setpoint**, the climate controller is factory preset to limit the humidification. Humidification will be disconnected if the inside temperature is 1° C below **Temperature setpoint**. Humidification could otherwise make the inside temperature drop further.

4.2.3 Intelligent humidity control - at high outside temperature and outside humidity

As an alternative to the standard setup of the controller, the humidity control can be changed so that a high air humidity in the livestock house is reduced by raising the inside temperature. The intelligent humidity control regulates both inside and outside temperature, as well as inside and outside humidity, and thus optimizes the humidity control according to current climatic conditions.

It is intended for areas with a high outside temperature and a high outside humidity, whereas humidity, at high humidity via increased ventilation, is less suitable.

This feature is only available when an outside and inside humidity sensor is installed.

The intelligent humidity control takes over when the following conditions are met:

1. High inside humidity (higher than Humidity setpoint)
2. High outside humidity (exceeds the limit for Outside humidity)
3. High outside temperature (higher than the Temperature setpoint of 6°C)

Example values for when Intelligent humidity control takes over

Current conditions	Requirements
Inside humidity 85%	1. High inside humidity $85\% > 75\%$
Humidity setpoint 75%	2. High outside humidity $82\% > 80\%$
Outside humidity 82%	3. High outside temperature $17^{\circ}\text{C} > (19^{\circ}\text{C} - 6^{\circ}\text{C})$
Outside temperature 17°C	
Temperature setpoint 19°C	

The function can be used in two ways:

Stop the standard humidity control (well suited for broilers).

Stop the standard humidity control and increase the temperature setpoint (well suited for layers).

Select the method of operation in the menu **Technical | Service | Control parameters | Humidity control | High outside temperature and humidity**.

Climate | Humidity | Current

Inside humidity is above/below the limit	The menus show how the current values are relative to the setpoints. This way, one gains insight into how close the regulation is from switching.
Outside humidity is above/below the limit	
Outside temperature is above/below the limit	

Climate | Temperature | Setpoints | Temp. setpoint incl. addition

Increase by humidity	View of how much the temperature setpoint increased due to humidity. The maximum temperature increase is 3°C, which is equivalent to a humidity reduction of 15% A rule of thumb states that for every 5%, the humidity is reduced, the temperature rises by 1°C.
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4.2.4 Humidity control

If you want to regulate the relative air humidity in the house, you can either increase or decrease the ventilation level, or increase or decrease the heat supply.

The warmer it is, the more water vapor can be contained in the air. The relative humidity will therefore fall when the temperature rises, and conversely will rise when the temperature falls. For each 1 °C the temperature falls, the air humidity will increase by 5 %. If the temperature falls so much that the relative air humidity reaches 100 %, the water vapor will start to condense (dew point).

4.2.4.1 Humidity ventilation

This function is not active at tunnel ventilation.

Consequences	Method of Operation
Maintains the set humidity	Increases ventilation. The humidity is ventilated out of the house. When the temperature drops, the heat is increased in order to maintain the inside temperature.

When the climate controller has been set to control humidity according to the humidity heat principle, it will reduce a too high humidity level by gradually increasing the heat supply. The increased air change will make the inside temperature fall. To maintain the temperature of heating temperature, the heating system will gradually supply more heating.

Humidity ventilation makes it possible to keep the house air humidity at the set humidity.

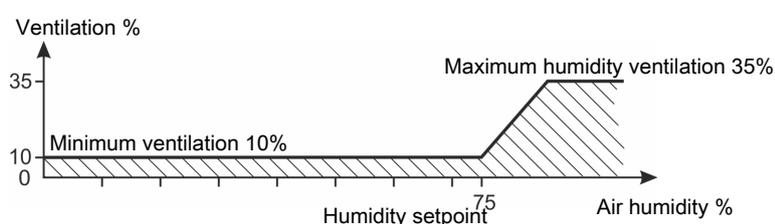


Figure 14: Humidity ventilation

4.2.4.2 Temperature reduction

The house controller can control the house humidity according to the humidity control principle with temperature reduction when the animals can tolerate a temperature drop at high air humidity. This function limits the use of heating in the house but cannot keep the air humidity at the humidity setpoint.

In your daily work, you should only adjust humidity via Humidity setpoint.

Consequences	Method of Operation
Less heat consumption Possible to regulate humidity without heat Does not maintain the set humidity The animals must be able to tolerate the temperature drop at high humidity.	The inside temperature that is controlled as it is reduced so that ventilation can be increased.

Temperature reduction with heat supply

When the house controller is set to control humidity according to the temperature reduction principle, the controller will adjust a too high humidity level by reducing the inside temperature by a few degrees (reduction).

At a lower temperature setting, the house controller will thus increase ventilation and consequently the change of air. When this has made the inside temperature drop, ventilation will decrease to minimum ventilation in order to limit the heat loss from the ventilation.

If this is insufficient to maintain the reduced House heater setpoint, the controller will gradually supply more heat.

Temperature reduction without heat supply

The humidity control process is the same as for heat supply until the point at which ventilation is reduced to minimum ventilation. Without heat supply, the inside temperature could continue to drop below the **Heat setpoint**.

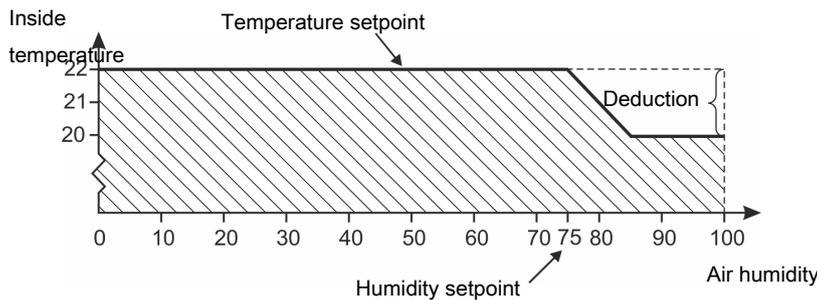


Figure 15: Humidity control with temperature reduction

The house controller will lower the set temperature by 1° C each time the air humidity exceeds the humidity setpoint by 5 %.

4.2.4.3 Humidity heat

When the house controller has been set to control humidity according to the humidity heat principle, it will reduce a too high humidity level by gradually increasing the heat supply. The increased heat supply will make the inside temperature rise. In order to maintain the temperature, the ventilation system will gradually increase ventilation.

Humid heat makes it possible to keep the house air humidity at the set humidity.

Consequences	Method of Operation
Highest heat consumption Maintains the set humidity	Increases heat supply. Humidity and heat are removed through ventilation when the temperature gets too high.

! Heating costs

- Check the heat consumption at regular intervals when using the principle of humidity heating to regulate the house humidity. Settings for heating and humidity control should be checked to avoid excessive heating costs.

4.2.5 Humidity settings

4.2.5.1 Adaptive humidity ventilation

SKOV A/S recommends that humidity control is set up to adaptive control.

The factory setting is PID.

In the case of adaptive control, it is possible to fine-tune how fast it reacts when the conditions change.

Climate | Humidity | Settings

Ventilation adaption time The setting of how fast the adjustment should react (**Slow/Medium/Fast**).

It is not necessary to change the factory setting **Medium** unless the adjustment reacts too slowly (select **Fast**) or too fast (select **Slow**). This will depend on the system in question.

Also, see the Adaptive control section of the Technical Manual.

4.2.5.2 Adaptive humidity heat

SKOV A/S recommends that humidity control is set up to adaptive control.

The factory setting is PID.

In the case of adaptive control, it is possible to fine-tune how fast it reacts when the conditions change.

Climate | Humidity | Settings

Heat adaption time The setting of how fast the adjustment should react (**Slow/Medium/Fast**).

It is not necessary to change the factory setting **Medium** unless the adjustment reacts too slowly (select **Fast**) or too fast (select **Slow**). This will depend on the system in question.

Also, see the Adaptive control section of the Technical Manual.

4.3 CO₂

- This section is relevant only to houses with a CO₂ sensor.

4.3.1 CO₂ menu

  | Climate | CO₂

Current CO₂

CO₂ setpoint

CO₂ minimum ventilation

Apply CO₂ minimum ventilation

Using a CO₂ sensor, you can monitor the current CO₂ level in the livestock house and use it as an indicator of the air quality.

The feature either increases or lowers the minimum ventilation and the current ventilation level, depending on the atmospheric CO₂ content. i.e., if it was higher or lower than the set CO₂.

Before day 10, the CO₂ ventilation can be limited to 0%. After day 10, the CO₂ ventilation cannot be less than 25% of the minimum ventilation.

Climate | CO₂

Current CO₂	Current CO ₂ level.
CO₂ setpoint	The upper limit of CO ₂ in the air. When the CO ₂ in the air exceeds the set CO ₂ , the function increases the ventilation. The controller reduces the minimum ventilation if the CO ₂ level in the livestock house is below the CO ₂ setpoint.
CO₂ minimum ventilation	Current ventilation requirement (a percentage of the capacity of the ventilation system) to keep the CO ₂ level below the CO ₂ setpoint.
Use CO₂ minimum ventilation	You can connect and disconnect the CO ₂ minimum ventilation function that is active when the minimum ventilation is active.



Lack of ventilation in the case of CO₂ alarm

In the case of CO₂ sensor errors or high CO₂ alarm, the controller deactivates the CO₂ function and enables Minimum ventilation. It is to avoid a defective CO₂ sensor causing a too low or too high ventilation level.

It is therefore essential that **Minimum ventilation** and **Number of animals** are correctly set, even when using CO₂ minimum ventilation.

4.4 NH₃

-  This section is relevant only to houses with a NH₃ sensor.
 
 

4.4.1 NH₃ menu

  | Climate | NH₃

Current NH₃
 NH₃ ventilation
 NH₃ setpoint
 Apply NH₃ ventilation

Using an NH₃ sensor, the current NH₃ level (ammonia) in the livestock house can be monitored and used as an indicator of air quality.

The feature increases the ventilation and the current ventilation level, depending on the atmospheric NH₃ content. i.e., if it is higher than the NH₃ setpoint.

Climate | NH₃

Current NH₃	Current NH ₃ level.
NH₃ ventilation	Current ventilation requirement (a percentage of the capacity of the ventilation system) to keep the NH ₃ level below the NH ₃ setpoint.
NH₃ setpoint	The upper limit of NH ₃ in the air. When the NH ₃ content of the air exceeds the NH ₃ setpoint, the function increases the ventilation.
Apply NH₃ ventilation	You can connect and disconnect the NH ₃ ventilation function.

Incorrectly set NH₃ setpoint

- Note the setting of the **NH₃ setpoint**.

As long as the NH₃ level is too high, the controller will increase the ventilation to reduce the level.

A too low setting can result in very high heat consumption or a temperature drop in the livestock house if there is no heat supply available.

4.5 Pressure

-  This section is relevant only to houses with active pressure control.
 
 

4.5.1 Pressure menu

| Climate | Negative pressure

Current	Current negative pressure
Setpoints	Pressure setpoint
Settings	Active at side control
	Active at tunnel control
	Info
	Pressure control stopped
	Pressure inlet requirement

By means of a pressure sensor, the house controller can control the pressure level in the house. On the basis of the sensor measurements, the house controller controls the opening of the flaps; this way, it maintains the required pressure level in the house.

Climate | Pressure

Pressure sensor	Display of the current pressure level in the house.
Pressure setpoint	Setting of the pressure level.
Active in side mode	Connection and disconnection of pressure control at side ventilation.
Active in tunnel mode	Connection and disconnection of pressure control at tunnel ventilation.
Pressure inlet requirement	Percentage indication of how much the flaps must be open to maintain Pressure setpoint .

4.6 Heat recovery unit

-  These functions are only accessible in houses with heat recovery units. The availability of the functions described depends on the structure of the heat recovery unit in question.
- 
- 

4.6.1 Heat recovery unit menu

| Climate | Heat recovery unit

Status	<p>The heat recovery unit is stopped due to a high outside temperature</p> <p>The heat recovery unit is stopped due to a low outside temperature</p> <p>Heat recovery unit is anti-icing</p>	
Current	Heat recovery unit	
Settings	Activate heat recovery unit	
Efficiency	Heat recovery unit efficiency	
Outside temperature limits	Low outside temperature limit	<p>Activate low outside temperature limit</p> <p>Outside temperature</p> <p>Allow heat recovery unit</p> <p>Abandon heat recovery unit</p>
	High outside temperature limit	<p>Activate high outside temperature limit</p> <p>Abandon heat recovery unit</p> <p>Allow heat recovery unit</p> <p>Disable heat recovery unit below set point</p>
Cleaning programs	Cleaning program	<p>Cleaning program status</p> <p>Remaining cleaning time</p> <p>Cleaning programs</p> <p>Cleaning relay</p>
Anti-ice	<p>Anti-ice</p> <p>Anti-ice active at outside temperature below</p> <p>Outside temperature Anti-ice</p> <p>Anti-ice sensor</p> <p>Heater enable</p>	
	Info	<p>Anti-ice sensor</p> <p>Inlet temperature</p> <p>Dehumidification</p> <p>Heat recovery unit inlet 1 fan</p> <p>Heat recovery unit inlet 1 flap</p> <p>Heat recovery unit outlet 1 fan</p> <p>Heat recovery unit outlet 1 flap</p>

The heat recovery unit can be controlled as an integrated part of the house ventilation system. It is used to recover heat in the low ventilation area for a number of days at the beginning of a batch. When a higher air output is needed than the capacity of the heat recovery unit, the ordinary ventilation system will gradually take over.

The heat recovery unit has two fans. One of the fans removes warm, humid air from the house. The other fan draws fresh, preheated air into the house.

Climate | Heat recovery unit

Heat recovery unit	The heat recovery unit's current air output shown as a percentage of total output.
Activate heat recovery unit	Connection and disconnection of heat recovery unit. When the heat recovery unit is disconnected, the other components of the ventilation system take over.
Heat recovery unit efficiency	View of the efficiency, indicating how much the air in the inlet is heated in relation to the outside temperature. The value should be taken as an estimate as it is based on the average temperature of the air in the air intake.
Heat recovery unit energy efficiency	View of the calculated value of how much energy is currently being recovered (power). The value should be taken as an estimate as it is based on estimated values of air volume and average temperature of the air in the air intake.
Low outside temperature limit enable	
Low outside temperature limit enable	Connection- and disconnection of the heat recovery unit in the event of low outside temperature. The purpose of this function is to prevent the heat recovery unit from icing at very low outside temperatures.
Outside temperature	View of the current outside temperature.
High outside temperature limit enable	Connection and disconnection of heat recovery unit at high outside temperature. The purpose of this function is to prevent the heat recovery unit from running when the difference between the outside and inside temperatures is too small for heat recovery to be effective. The heat recovery unit disables when the outside temperature gets close to the temperature setpoint. Set the number of degrees for the minimum difference between outside and inside temperature
Abandon heat recovery unit	Setting the outside temperature at which the heat recovery unit disconnects.
Allow heat recovery unit	Setting the outside temperature at which the heat recovery unit engages.
Disable heat recovery unit below set point	Setting degrees. When the outside temperature is closer to the temperature setpoint than the set degrees, the heat recovery unit disconnects.

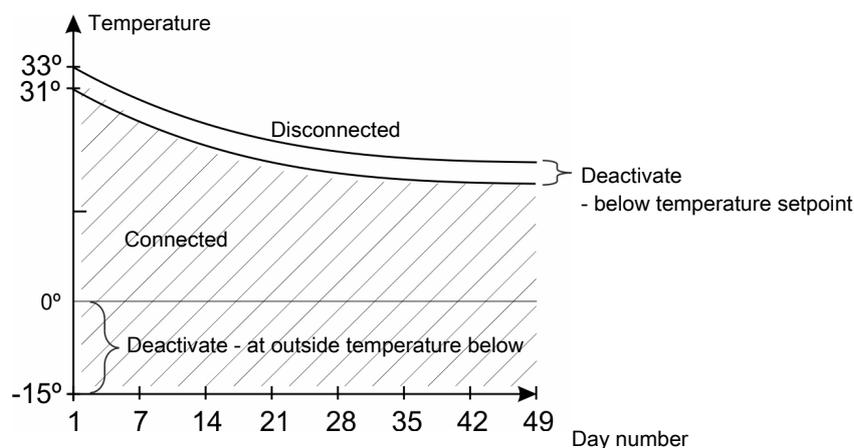


Figure 16: Heat recovery unit – low and high outside temperature limits

Anti-icing function

Anti-ice	View of whether the function is active or not.
-----------------	--

When the anti-ice function is active, the air inlet of the heat recovery unit alternately turns on and off to prevent ice from forming in the unit.

Anti ice active at outside temperature below Setting the outside temperature which activates the anti-ice function.

Anti-ice sensor View of current temperature at the anti-ice sensor. The sensor value is not used for controlling the anti-ice function.

Activate heat Connection and disconnection of an external heat source in connection with the heat recovery unit.

Cleaning program

Cleaning programs When the heat recovery unit used has a built-in cleaning system, the house controller can run up to three cleaning programs per 24 hours.

Setting of number of cleaning programs per 24 hours.

Setting the start and stop times for the cleaning programs.

Info Status views of the heat recovery unit's individual parts.

4.7 Ventilation

4.7.1 Ventilation menu

  Climate Ventilation			
Status	Active ventilation mode		
Current	Ventilation requirement		
	Minimum ventilation		
	Maximum ventilation		
Minimum ventilation settings	Minimum ventilation/animal		
	Reduced minimum ventilation	Start at outside temperature Max. reduction at this outside temperature	
Maximum ventilation setpoints	Maximum ventilation		
FreeRange	FreeRange start level		
	FreeRange stop level		
	FreeRange/Side delay		
	Absolute minimum ventilation		
	Fans will start at		
	Fans temperature offset		
	Ramping time		
	FreeRange CO2 setpoint		
	Heating with FreeRange		
	Reduce heat set point		
	Humidification		
	FreeRange status	Open hours today	
		Open hours yesterday	
		Open hours per day on average	
	Pop holes	Pop holes status	
Pop holes program			
Winter garden	Winter garden status		
	Winter garden program		
Zone controlled inlets ▶ 50	Temperature deviation		
	Inlet correction factor		
Inlet de-ice ▶ 54	Outside temperature below		
Info ▶ 50	Ventilation status		
	Dynamic Air stepless		
	Air outlet		
	FreeRange		
	Minimum ventilation		
	Humidity ventilation		
	Tunnel status		

The house ventilation consists of air intake and an air outlet. Apart from supplying fresh air to the house, ventilation is to remove humidity and excess heat, if any.

The house controller continuously adjusts the ventilation according to a calculation of the current ventilation requirement. Thus, the controller will increase or limit ventilation according to whether the inside temperature and air humidity are too high or too low.

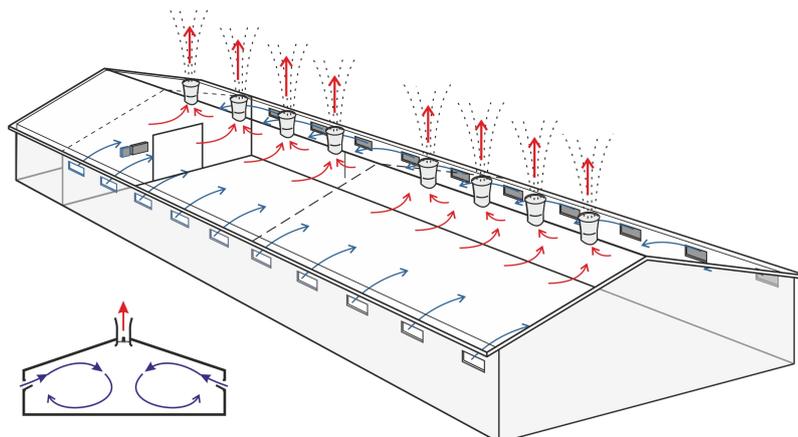


Figure 17: Side ventilation principle

Minimum Ventilation

Climate | Ventilation

Minimum ventilation	The lower limit for how little is ventilated in relation to the air requirement of the animals.
----------------------------	---

The minimum ventilation function supplies the exact amount of air to the house, which ensures an acceptable air quality. The function is particularly relevant in periods with cold weather when it is not necessary to ventilate to keep down the inside temperature.

The house controller calculates the necessary minimum ventilation according to the animals' need for fresh air.

The animals' fresh air requirement varies according to the type of animal and weight. You must indicate the requirement as cubic meters per hour (m³/h) per animal. You can find the correct figure in the technical literature or ask your consultant if in doubt.

Note that the correct number of animals must be set in the menu **Management | Animals**.

Maximum Ventilation

Climate | Ventilation

Maximum ventilation	Upper limit for how much of the system's capacity the controller can activate.
----------------------------	--

Maximum ventilation sets a limit to how much of the capacity of the ventilation system (in percentage) the controller can activate. 100% ventilation corresponds to the animals' calculated requirement, while ventilation utilizing the total system capacity may reach e.g. 160% (see also the section on extra ventilation).

The function can be relevant to use during very high outside temperatures. Ventilation utilizing the total system capacity would make the inside temperature exceed the required temperature, as large amounts of warm air is added. The function can also prevent young animals from being exposed to a level of ventilation which they do not tolerate.

When you want to disregard the function, you should set the **Maximum ventilation** to the maximum value (factory setting 300 %). By doing so you ensure that there is not actually a limit on how much of the ventilation system's capacity can be used.

Reduced minimum ventilation

In houses where a high minimum ventilation is required to avoid high CO₂ and ammonia levels, it may be relevant to use the Reduced minimum ventilation function. This function allows the minimum ventilation to follow the outside temperature.

Climate | Ventilation | Minimum ventilation settings | Reduced minimum ventilation

Start at outside temperature	Setting the outside temperature that will activate a reduction of the minimum ventilation.
Maximum reduction at outside temperature	Setting the outside temperature so that the minimum ventilation is not further reduced.

This function is an alternative to reducing the minimum ventilation via a CO₂ sensor. However, if CO₂ minimum ventilation is also used, it will take precedence as long as the CO₂ level determines the ventilation requirement. Also see Technical Manual.

4.7.2 Ventilation status

Stepless and MultiStep position

The air outlet in the house consists of partly one or several stepless exhaust units, partly groups of ON/OFF exhaust units. The stepless exhaust unit is variable, as the controller can adjust motor performance and flap opening of the fan, while the fans in the other exhaust units are either on or off.

The ventilation system connects the stepless exhaust unit first. When the ventilation requirement exceeds the capacity of the stepless exhaust unit, a group of the other exhaust units are connected and the stepless exhaust unit decreases its output simultaneously. This way, the controller ensures stepless transition from one ventilation level (MultiStep) to the next. If the ventilation requirement increases further, the stepless exhaust unit will perform up to its maximum until it reduces its output when the next group of ON/OFF exhaust units is connected.

All exhaust units in the house bear a sign showing if it is a stepless or an ON/OFF exhaust unit. The latter are numbered according to which MultiStep they belong. This way, it is possible to recognize the individual exhaust units and compare their actual output with the status that you can read in the Ventilation menu. This is particularly relevant in connection with fault finding.

Shutter position

The flap position is a percentage indication of how much the flaps of both air inlet and air outlet are open. If you are in doubt about the actual ventilation output, you can compare the reading of the Ventilation status in the ventilation menu with the output that you can actually observe in the house. The percentage indications are relevant particularly in connection with troubleshooting.

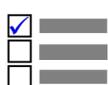
4.7.2.1 Cycle timer at minimum air inlet

The objective of the cycle timer function is to enable the control of air currents in the house at a very limited ventilation requirement. The function opens and closes the air inlets alternately thus sending a more powerful air current through the house. This ensures a thorough replacement of housing air. See also the Technical Manual for the production controller.

Climate | Ventilation | Info

Cycle timer minimum inlet	When the controller regulates minimum ventilation with cycle timer, the flaps alternately open and close.
	Next change: indicates the time until the flap position changes the next time.

4.7.3 Zone controlled inlet



This section is relevant only to houses with zone controlled inlets.

In order to neutralize possible temperature differences in very large one-zone houses, the air inlets can be grouped in up to six zones and each group is adjusted according to the temperature measured by the climate controller in that particular zone. When the temperature in an air inlet zone deviates from **Temperature setpoint**, the house controller adjusts the shutter position of the air inlet.

Climate | Ventilation | Zone controlled inlet

Temperature deviation	Temperature span from Temperature setpoint in relation to which the house controller adjusts the flap position of the air inlets. The temperature setting specifies the level of adjustment to be carried out by the controller. The higher the Temperature deviation is set, the slower the correction.
Inlet correction factor	Factor for zone regulation of the inlets flap position. The higher the factor is set, the more the flap position is adjusted.

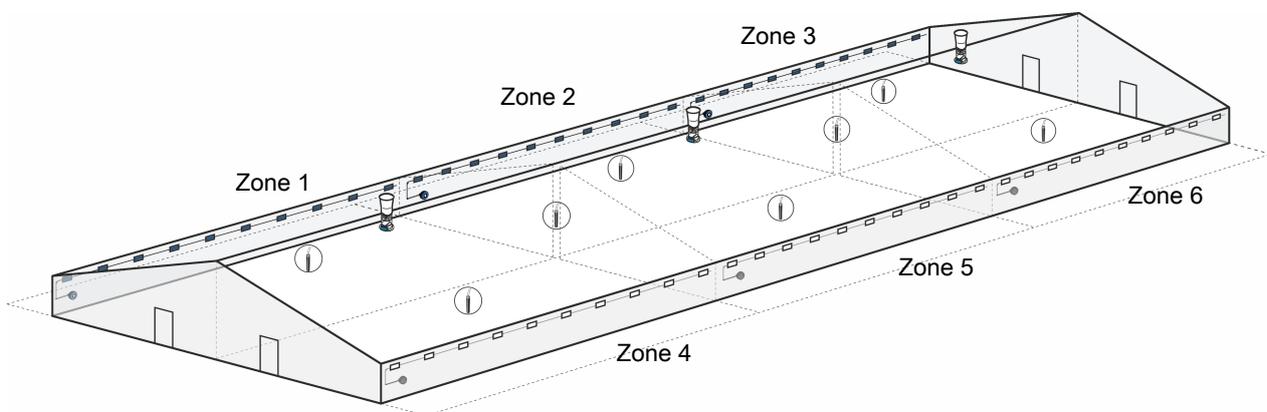


Figure 18: Example of house with zone controlled inlets.

4.7.4 FreeRange

In FreeRange houses, the birds have access to the outside areas through pop-holes. Depending on local climatic conditions, it can be an advantage to establish the FreeRange houses with negative or equal pressure ventilation respectively.

FreeRange with negative pressure ventilation is used in hot regions. The house is ventilated by a natural air current that passes through the wall inlets and pop-holes, and out through the exhaust units. The fans are stopped, and the flaps open.

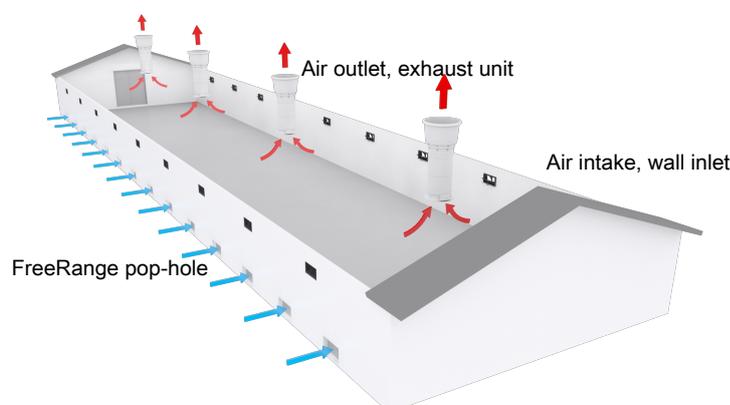


Figure 19: FreeRange ventilation in a negative pressure system

FreeRange with equal pressure ventilation is primarily used in temperate regions. The livestock house is ventilated by fresh air coming in through roof inlets with fans, and out through chimneys with activated fans. When the system is properly regulated for equal pressure, it minimizes the amount of incoming air.

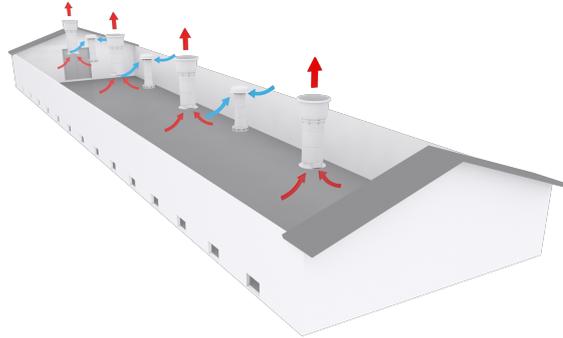


Figure 20: FreeRange ventilation in a equal pressure system

When FreeRange is active, the temperature setpoint and the heat setpoint are adjusted with an offset. If the inside temperature becomes too high or too low, the controller will adjust with ventilation or heat supply. Alarm limits are also adapted.

Climate | Temperature | Setpoints

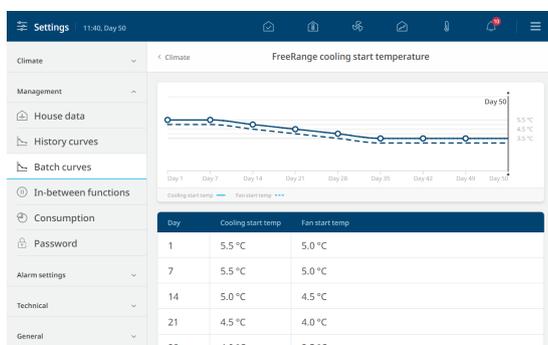
FreeRange heat setpoint	Display of the calculated temperature that activates the room heating at FreeRange (= Temperature – Heating offset).
FreeRange stand-alone heat 1	Setting the temperature that activates room heating at FreeRange.

Climate | Ventilation | FreeRange

Absolute minimum ventilation	Setting of the lower limit for how little is ventilated in relation to the air requirement of the birds.
Fans will start at	Display of the calculated inside temperature that starts the fans in air outlets (Temperature setpoint + Fan temperature offset).
Fans temperature offset	Setting an offset in relation to the batch curve FreeRange fan start temperature . The value is reset at batch start.
Ramping time	Setting how long it should take to change from FreeRange back to active ventilation. Here a gradual activation of the fans takes place.
FreeRange CO2 set point	Setting of a maximum level of CO2 in the house when the pop-holes are open. In FreeRange houses, the CO2-level is often seen to rise quickly when the birds reenter the house at end of day. The controller starts the fans in the air outlets once this setting is exceeded. The fans stop again once the CO2-level is reduced to approx. 250 ppm below the setting
Heating with FreeRange	Activation and deactivation of heat supply when the pop-holes are open.
Reduce heat set point	Setting an offset to the temperature that activates room heating.
Humidification	Connection and disconnection of humidification at FreeRange ventilation.
FreeRange status	State of how many hours the pop-holes have been open (today, yesterday and for the batch on average).

Climate | Side cooling | Settings

FreeRange start cooling	Setting an offset to the batch curve FreeRange cooling start temperature . The value is reset at batch start.
--------------------------------	---



Batch curves are set in the menu **Management | Batch curves | Climate**.

FreeRange fan start temperature is an offset to the **Temperature setpoint**. FreeRange allows the inside temperature to increase when the pop holes are open. The controller starts the fans once this setting is exceeded.

FreeRange cooling start temperature is an offset to the **Temperature setpoint**. The controller starts the cooling when the settings are exceeded.

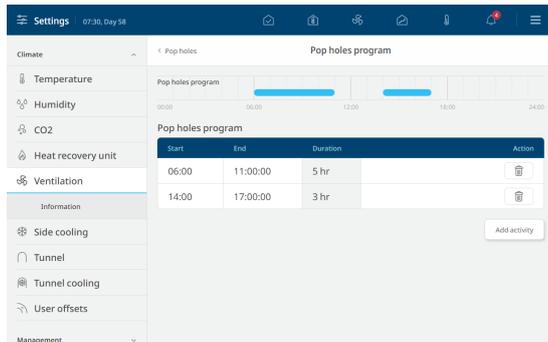
Also, see section Setting curves [▶ 76].

4.7.4.1 Pop holes

This function is used together with FreeRange ventilation. Also, see section FreeRange [▶ 51].

Pop holes are openings in the house where the animals have access to a winter garden or the outdoors. Because of the climate control in the house, the climate controller must know if the pop holes are open or closed. By means of a day program the controller can automatically open and close the pop holes. Also it can send an alarm if the door of the pop holes does not reach the required position. Also, see section Alarm for pop holes [▶ 96].

To ensure that the animals have sufficient time to get back inside, the pop holes close slowly by alternating between closing and pausing.



In each program you must set the following:

- Number of openings/closings per day (1-4)
- Opening time of day
- Closing time of day

The program shows the period where the pop holes are open.

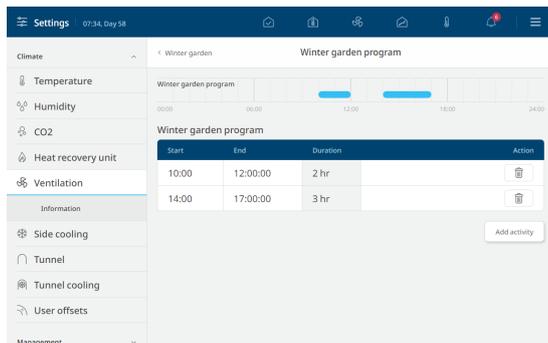
4.7.4.2 Winter garden

This function is used together with FreeRange ventilation and pop holes. See also the sections FreeRange [▶ 51] and Pop holes [▶ 54].

In some houses the animals have access to a winter garden. Because of the climate control in the house, the climate controller must know if the door to the winter garden is open or closed.

By means of a day program the controller can automatically open and close the door. Also it can send an alarm if the door does not reach the required position. Also, see section Winter garden alarms [▶ 96].

To ensure that the animals have sufficient time to get back inside, the door closes slowly by alternating between closing and pausing.



In each program you must set the following:

- Number of openings/closings per day (1-4)
- Opening time of day
- Closing time of day

The program shows the period where the animals have access to the winter garden.

4.7.5 Inlet de-ice



This section is relevant only to houses with de-ice for air inlet.

De-icing is a function that changes the regulation of ventilation at low outside temperatures to cycle time in order to avoid ice formation in the air inlet.

The house controller activates de-icing when the outside temperature falls below the setting for Outside temperature below.

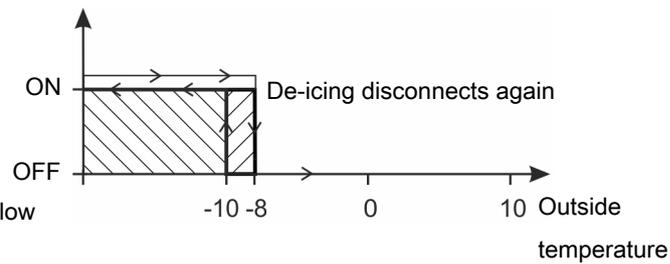


Figure 21: Activation of de-icing

Climate | Ventilation | Inlet de-ice

Outside temperature below	Setting of a lower limit for the outside temperature. If the outside temperature drops below the lower limit, the controller activates the de-icing function.
----------------------------------	---

4.8 Side cooling

 This section is relevant only to houses with side cooling systems.
 
 

4.8.1 Side cooling menu

☰  Climate Side cooling		Only applies to
Current	Side cooling requirement	
	Requirement incl. humidification	LPV, CT, T
Setpoints	Start cooling	
	Humidity to stop side cooling	
	Cooling is gradually removed 10% before humidity limit	
Nozzle cleaning [▶ 57]	Nozzle cleaning active	
	Nozzle cleaning interval	
	Nozzle cleaning time	
Cooling before max. ventilation	Cooling before max. ventilation	Cooling priority
		Maximum
		Medium
		Minimum
Required ventilation to start cooling:		

Cooling is used in houses where ventilation alone cannot reduce the inside temperature sufficiently.

Cooling has the advantage over ventilation in that it can bring the inside temperature down below the outside temperature. On the other hand, cooling will also increase the air humidity in the house.



The combination of a high inside temperature and high air humidity can be life-threatening to the animals. As cooling makes the house humidity increase, the controller automatically disconnects cooling when the house humidity exceeds Humidity to stop side cooling (normally 75-85%, factory setting: 85 %).

Climate | Side cooling | Current

Side cooling requirement	Reading of current cooling requirement.
Requirement incl. humidification	This reading is displayed when humidification is also connected to the relay for side cooling system. The reading shows how big a percentage of the side cooling system's capacity that is currently active. This feature is particularly useful in hot and dry areas where side cooling will run alternately to the humidification, respectively to cool and increase humidity.

Climate | Side cooling | Settings

Start cooling	The number of degrees by which the temperature is to exceed Temp. setpoint incl. additions before cooling starts.
Humidity to stop side cooling	The air humidity percentage that makes the controller stop the cooling function. Furthermore, a humidity limit can be set for the tunnel cooling.

Cooling is gradually removed 10% before humidity limit

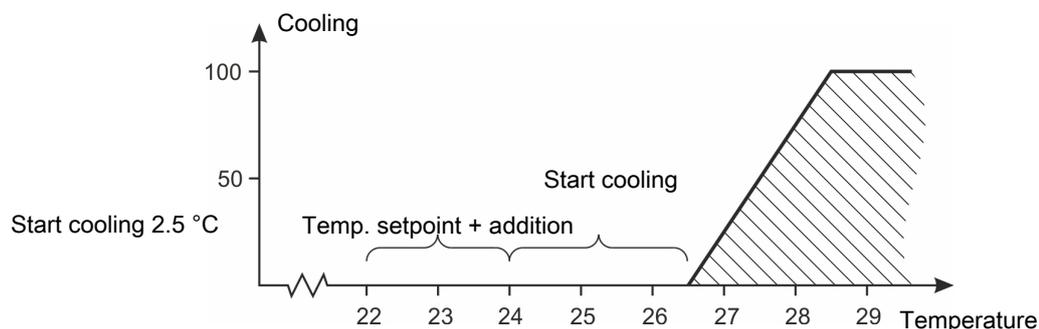


Figure 22: Cooling

A prerequisite for cooling to be able to start however is that ventilation is set to **Maximum ventilation** or that the outside temperature is over **Temperature setpoint**. The controller gradually increases cooling.

4.8.2 Nozzle cleaning

To clean the nozzles, the controller can activate side cooling independently of the house's cooling requirement.

Climate | Side cooling | Nozzle cleaning

Nozzle cleaning active	Connection and disconnection of nozzle cleaning.
Nozzle cleaning interval	Setting the time between when side cooling was active to when the nozzle cleaning function starts.
Nozzle cleaning time	Setting of the time when side cooling shall run.

4.8.3 Start cooling

As a standard the climate controller will adjust for an increasing inside temperature by increasing the ventilation. The cooling does not start until the climate controller is unable to maintain the temperature by ventilating.

4.8.3.1 Side cooling start based on ventilation level

The function **Cooling before max ventilation** makes it possible to start cooling at a lower ventilation level.

An early start of the cooling is particularly relevant in hot and dry areas. When you increase the ventilation level, you get hot outdoor air into the livestock house. A smaller air volume needs cooling if you activate the cooling at an earlier stage. It reduces both power and water consumption.

This feature is only available when outside and inside humidity sensor is installed.

With this setting the climate controller will continuously calculate the ventilation level at which the side cooling must start.

The calculations are based on the current outside humidity and outside temperature and indicate a so-called cooling potential. Also, see section Cooling potential [► 59].

Climate | Side cooling | Cooling before max ventilation

Cooling before max. ventilation	Activation and de-activation of the function. From the factory the function is not activated.
Cooling priority	Selecting how early in the ventilation sequence, cooling should start (Minimum/Medium/Maximum). See section Cooling priority [► 58].

Required ventilation to start cooling: Displays the calculated ventilation level at which cooling will start (in percent of **Maximum ventilation**). Maximum ventilation is either determined as batch curve or set in the menu **Technical | Service | Settings | Climate | Air output**.

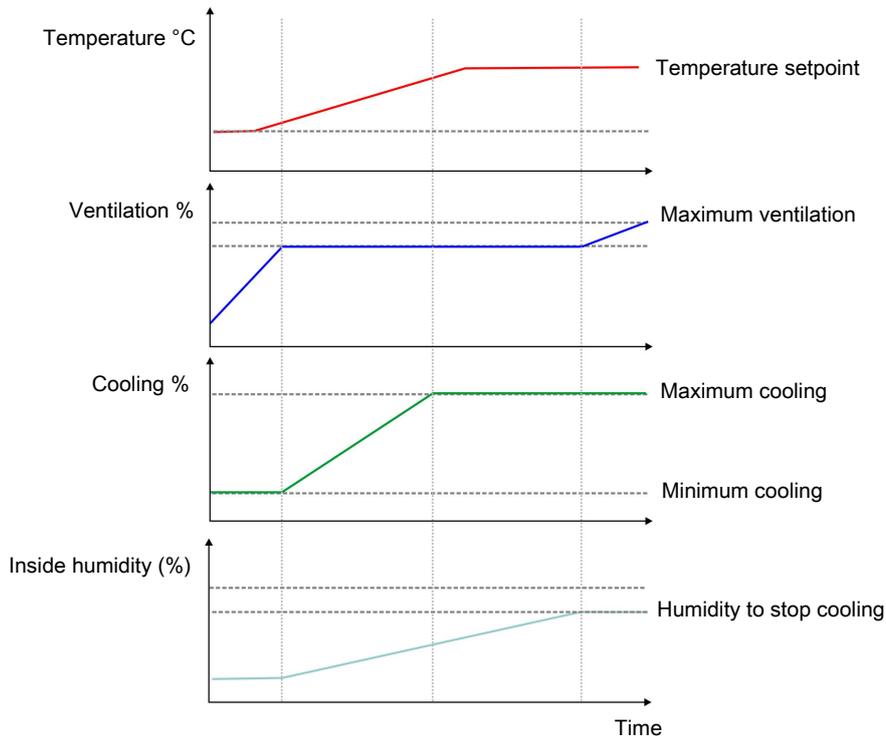


Figure 23: To maintain the required inside temperature, cooling starts before the ventilation level has reached Maximum ventilation. When cooling can no longer maintain the temperature, the ventilation is increased again.

4.8.3.1.1 Cooling priority

It is possible to select the priority of cooling starting early: minimum, medium and maximum.

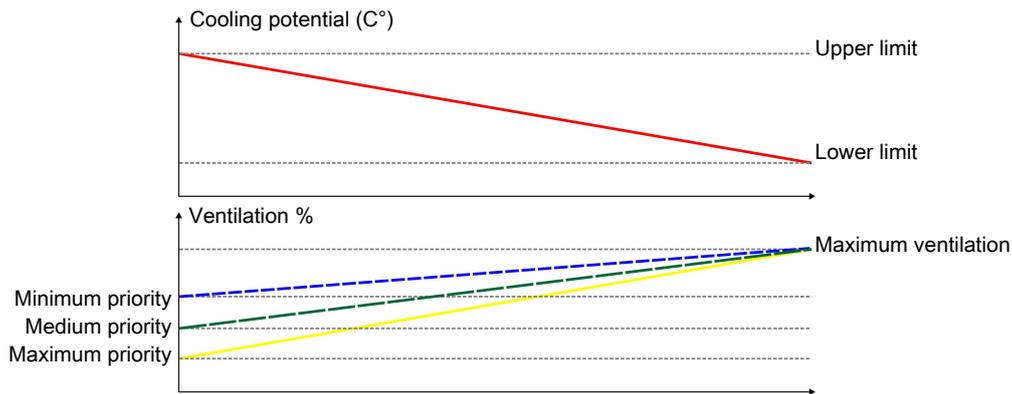


Figure 24: The higher the cooling potential, the higher priority of early cooling start.

Minimum:

Used in areas where the temperature is primarily maintained by means of ventilation and where the cooling potential is low.

At a cooling potential of 15 °C, cooling will, for example, start at 80 % of the maximum ventilation.

Medium:

Factory setting. Usually the factory setting should not be changed. It may be necessary to change the cooling priority, if the adjustment takes place too slowly or too quickly.

At a cooling potential of 15 °C, cooling will, for example, start at 70 % of the maximum ventilation.

Maximum:

Used in areas where the temperature is primarily maintained by means of cooling and where the cooling potential is high.

At a cooling potential of 15 °C, cooling will, for example, start at 60 % of the maximum ventilation.

4.8.3.1.2 Cooling potential

The cooling potential is a way to describe how much the air temperature can be lowered by adding water-based cooling.

The cooling potential for water-based cooling thus depends on the humidity and the outside temperature.

In general there is a higher cooling potential in hot areas than in cold areas. Furthermore, there will usually be a very high cooling potential in areas with very low humidity.

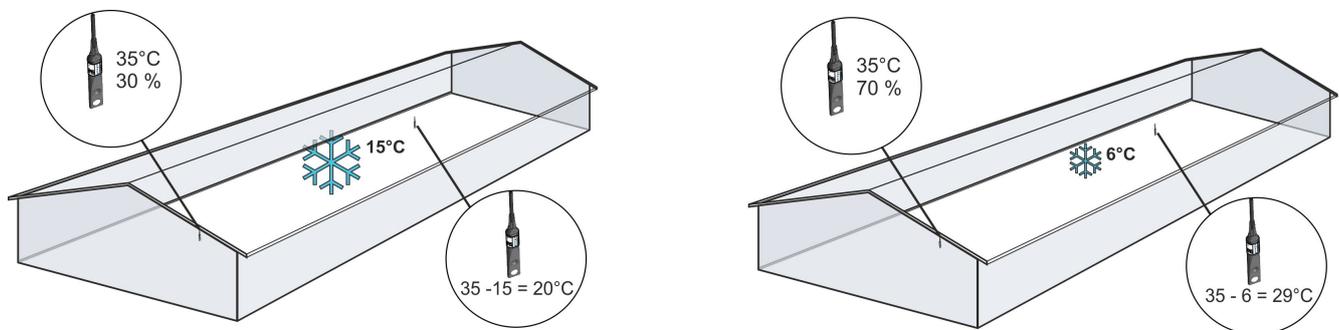


Figure 25: The lower the outside humidity, the higher the cooling potential.

A rule of thumb states that for each 5 % increase in air humidity, the temperature drops by 1 °C.

4.9 Tunnel

- This section is relevant only to houses with tunnel ventilation.
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-

4.9.1 Tunnel menu

☰ | Climate | Tunnel

Status	Tunnel blocked	Tunnel ventilation blocked by day no. Tunnel control is no longer blocked Side ventilation not at maximum Side cooling is not at maximum Too low outside temperature Too low temperature for minimum air speed Tunnel cannot start before Tunnel start temperature Outside temperature
--------	----------------	--

	Tunnel stop conditions	Ventilation does NOT run in tunnel mode Tunnel started at outside temperature Tunnel stopped at outside temperature below Outside temperature Closes in Delayed closing in progress Side inlets are less than 80% open The tunnel inlets are more than 30% open
	Experienced tunnel temperature	
Current	Current air speed Air speed requirement Chill effect	
Setpoints	Stop speed cycle timer Minimum air speed Maximum air speed Chill factor Force tunnel exit Accepted experienced temperature drop Tunnel outside temperature limit Min. vent./animal	
Settings	Last day that tunnel is blocked	
Info	Air speed status	Air speed locked by the tunnel cooling Tunnel cooling Tunnel cooling maximum Air speed blocked by drying pads Possible max. air speed User limited max. air speed
	Tunnel requirement	Cycling stopped Next change: Tunnel inlet Side inlet Stepless tunnel Tunnel MultiStep

Tunnel ventilation is used at high temperatures. The air is let in through a tunnel opening at one end of the livestock house, and the air is exhausted through several wall fans at the other end of the house. This makes the air move fast in a lengthwise direction in the livestock house, and the air, therefore, feels cooler.

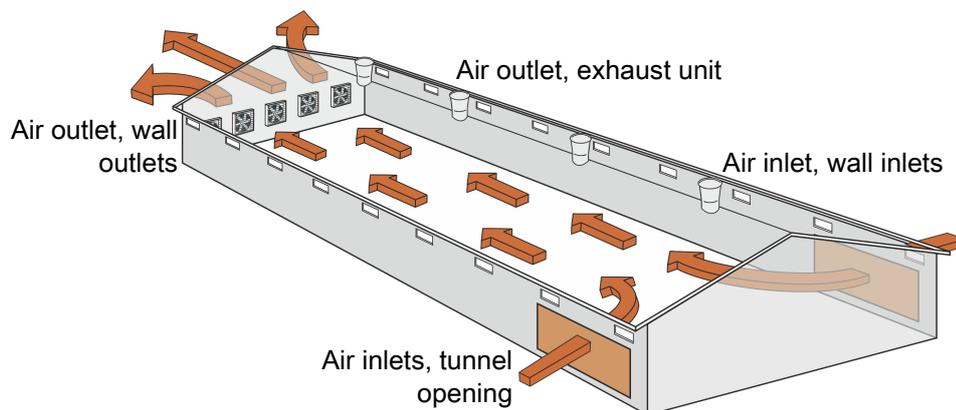


Figure 26: Tunnel ventilation principle

The tunnel ventilation cannot be activated until both the outside and inside temperatures are sufficiently high.

Climate | Tunnel | Status

Tunnel blocked	Indication of the reason why it is not possible to apply tunnel ventilation.
Tunnel stop conditions	View of which conditions must be present to stop the tunnel ventilation.

Climate | Tunnel | Current

Current air speed	Reading of the calculated air speed in the livestock house. The current air speed is a calculated value (meters/sec). The climate controller calculates the current air speed through the house based on the cross-sectional area (m ²) of the house and the current capacity of the tunnel fans.
Air speed requirement	The current ventilation requirement (only tunnel).
Chill effect	The controller's calculation of the degree of cooling in °C which an animal of a given age and breed will experience.

Climate | Tunnel | Setpoints

Stop speed cycle timer	Setting of the highest acceptable air speed when tunnel ventilation is running cycle timer (only Combi-Tunnel). Above this level, ordinary tunnel ventilation without cycle timer is used to ventilate. See also the section Cycle timer at tunnel ventilation [▶ 62].
Minimum air speed	Setting the lowest air speed that can be accepted in tunnel mode. At low air speed, there is too much temperature difference from one end of the house to the other. Therefore, you need to set a lower limit for air speed in tunnel mode.
Maximum air speed	Setting the highest air speed that can be accepted in tunnel mode. To avoid small animals being ventilated too vigorously, it is possible to set an upper limit for the air speed in the house, Maximum air speed .
Chill factor	The degree of cooling which an animal of a given age and breed will experience at 1.0 m/s. See also the section Chill factor and chill effect [▶ 63].
Force tunnel exit	It is possible to force the ventilation from the tunnel to side mode. This may be desirable in the case of mechanical failure or repair thereof.

Tunnel outside temperature limit	The lower outside temperature limit for activation of tunnel ventilation. The limit is set in the batch curve by the name of the Chill curve – outside temp. (only combi-tunnel)
Min.vent. Per animal	The lower limit for how little is ventilated relative to the air requirement of the animals (m ³ /h per animal).

Climate | Tunnel | Settings

Last day on which tunnel is blocked	Setting of day number. The ventilation can only be switched to tunnel ventilation after this day, regardless of all other climate parameters. This function is intended for Combi-tunnel houses in which you, out of consideration for small animals, wish to use tunnel ventilation after a specific day number.
--	--

Climate | Tunnel | Info

Air speed locked by the tunnel cooling	View when the air speed is locked by tunnel cooling.
Tunnel cooling	Reading of the current cooling requirement at tunnel ventilation.
Tunnel cooling maximum	Display of the maximum cooling requirement at the current inside humidity.
Air speed blocked by drying pads	View when the air speed is locked by the drying-pads procedure.
Possible maximum air speed	Reading of the maximum air speed of the ventilation system.
User limited max. air speed	Reading of the maximum air speed setpoint (Max. air speed) of the ventilation system.
Humidity ventilation	Ventilation from humidity control.
Tunnel outlet	Display the low/high mode status of Dynamic Multistep.
Tunnel inlet	Display the status for air inlets.
Tunnel status	Menu for status for air intake, MultiStep, and Dynamic MultiStep.

4.9.2 Cycle timer at tunnel ventilation

When tunnel ventilating at low ventilation requirement (e.g. below 0.8 m/s), the distribution of air in the house can be ensured by means of a cycle timer. The controller will alternately switch the fans on and off. This will prevent temperature differences.

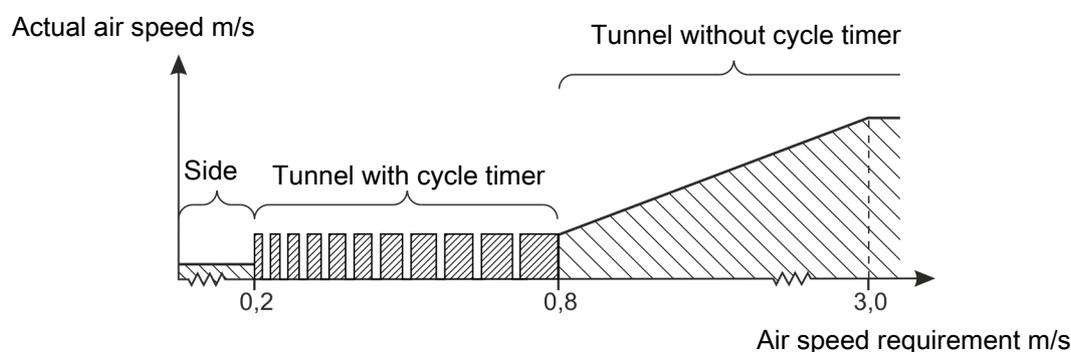


Figure 27: Ventilation sequence with cycle timer at tunnel ventilation

When a cycle timer is used at tunnel ventilation, the air speed will cycle between 0.0 and 0.8 m/s. The setting for **Min. air speed** will as always function as a start condition for tunnel, but now with the possibility of starting at a lower setting, e.g. 0.2 m/s.

4.9.3 Chill factor and chill effect

The chill factor reflects the fact that the cooling effect of the air is dependent on the age and breed of the animals. The younger the birds, the colder they feel the temperature at a given air velocity.

The controller calculates the current cooling effect on the basis of speed inside the livestock the house and the current chill factor.

Air speed	1.5 m/s	1.5 m/s
Chill factor	3	8
Chill effect	4.5 °C	12 °C
30 °C feels like	25.5 °C	18 °C

Table 1: Chill factor and chill effect

The controller calculates which inside temperature is required in order to activate tunnel mode (only combi-tunnel).

- To make the change to tunnel at a lower inside temperature you must reduce the chill factor.
- To make the change to tunnel at a higher inside temperature you must increase the chill factor.

4.9.4 Combi-tunnel ventilation: change between side and tunnel

Change from side to tunnel

The controller changes to tunnel-ventilation automatically when the following conditions have been fulfilled:

- Side ventilation is set at maximum.
- Side cooling is set at maximum.
- The inside temperature (tunnel temperature) is high enough for the inside of the tunnel to be ventilated by minimum air velocity.
- The limit for the outside temperature has been exceeded.

Change from tunnel to side

The controller changes to side ventilation automatically when the following conditions have been fulfilled:

- The outside temperature is more than 1 °C below the outside temperature present when the change to tunnel was made
- The perceived temperature is 1 °C below the temperature setpoint and the air velocity is on minimum.

4.10 Tunnel cooling

 This section is relevant only to houses with tunnel cooling.
 
 

4.10.1 Tunnel cooling menu

  | Climate | Tunnel cooling

Status	Cooling blocked by:	Air speed Temperature Tunnel cooling temperature Humidity Humidity sensor error
Current	Tunnel cooling requirement	
	Start based on: Fixed air speed	
Setpoints	Calculated start Start air speed Humidity to stop tunnel cooling Cooling gradually stops 10% before reaching the humidity limit Bleed off active Time for bleed off (Pad rinsing)	
	Start based on: Adjusted air speed	
	Calculated start Lowest start air speed Current start air speed Humidity to stop tunnel cooling Cooling gradually stops 10% before reaching the humidity limit Bleed off active Time for bleed off (Pad rinsing)	
	Start based on: Temperature	
	Start temperature Humidity to stop tunnel cooling Humidity to restart tunnel cooling Bleed off active Time for bleed off (Pad rinsing)	
Start based on:	Fixed air speed Adjusted air speed Temperature	
Control adaption time	Fast Medium Slow	

Info	Current tunnel cooling temperature (<i>with DOL 10 tunnel cooling sensor</i>)
	Starts yesterday
	Running time since last drainage (pad cleaning)
	Total running time
	Relay
	Remaining time relay

Tunnel cooling can be set to start either at a given air speed, at a given temperature or at an adapted air speed.

Climate | Tunnel cooling | Start based on

Start based on:	Selecting which factor is to activate tunnel cooling (Fixed air speed / Adaptive air speed / Temperature).
	See sections Tunnel cooling start based on a fixed air speed [▶ 65], Tunnel cooling start based on an adapted air speed [▶ 66] and Tunnel cooling start based on inside temperature [▶ 67].

Climate | Tunnel cooling | Info

Cooling blocked by:	In order to ensure that the cooling system does not run under inappropriate conditions (not desirable due to the well-being of the birds), the controller will stop the cooling even though the inside temperature is high. Thus cooling can be blocked by air speed, temperature, tunnel cooling temperature, humidity and humidity sensor error.
Tunnel cooling requirement	Reading of the current cooling requirement at tunnel ventilation.
Tunnel cooling control temperature	Reading of the temperature that the tunnel cooling is controlled by when a dedicated tunnel cooling sensor is used.
Starts yesterday	Reading of how many times the cooling has been started yesterday.



The combination of a high inside temperature and high air humidity can be life-threatening to the animals. As cooling makes the house humidity increase, the controller automatically disconnects cooling when the house humidity exceeds **Humidity to stop tunnel cooling** (normally 75-85%, factory setting: 85 %).

4.10.2 Start cooling

As a standard the climate controller will adjust for an increasing inside temperature by increasing the ventilation. The cooling does not start until the climate controller is unable to maintain the temperature by ventilating.

4.10.2.1 Tunnel cooling start based on a fixed air speed

Climate | Tunnel cooling | Setpoints

Calculated cooling start	Calculation of the inside temperature starting the tunnel cooling, when the launch is based on air speed.
Start air speed	Setting the air speed that starts the tunnel cooling.
Humidity to stop tunnel cooling	The percentage of air humidity that makes the controller stop the tunnel cooling. The tunnel cooling restarts at 3 % below the humidity limit. Furthermore, you can set a humidity limit for side cooling.

4.10.2.2 Tunnel cooling start based on an adapted air speed

The function makes it possible to start the cooling at a low ventilation level.

An early start of the cooling is particularly relevant in hot and dry areas. When you increase the ventilation level, you get hot outdoor air into the livestock house. A smaller air volume needs cooling if you activate the cooling at an earlier stage. It reduces both power and water consumption.

This feature is only available when outside and inside humidity sensor is installed.

With this setting, the controller will continuously calculate at which air speed the tunnel cooling should start.

The calculations are based on the current outside humidity and outside temperature and indicate a so-called cooling potential. Also, see section Cooling potential [► 68].

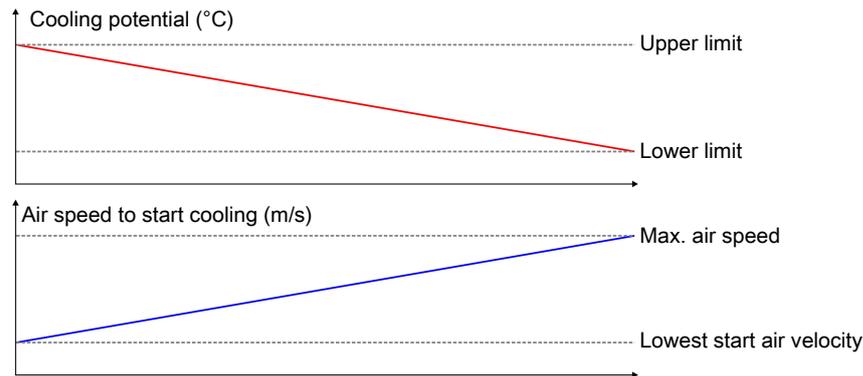


Figure 28: In areas with low outside humidity and great cooling potential, the cooling can start at a lower air speed. Conversely, in areas with low cooling potential, you would wait as long as possible to start the cooling so that it starts at maximum air speed.

Climate | Tunnel cooling | Setpoints

Calculated cooling start	Calculation of the inside temperature starting the tunnel cooling, when the launch is based on air speed.
Lowest cooling start speed	Setting the air speed required before the tunnel cooling can start. The purpose is to ensure that there is a certain air speed in the livestock house when the cooling is active. The value is set as a batch curve in the menu Management Batch curves Climate Tunnel cooling start speed .
Current cooling start speed	View of the air speed at which the tunnel cooling may start at this moment. The value is calculated based on the current cooling potential. Also, see the figure above.
Humidity to stop tunnel cooling	The percentage of air humidity that makes the controller stop the tunnel cooling. The tunnel cooling gradually stops 10% before reaching the humidity limit and restarts 3% below the humidity limit. Furthermore, you can set a humidity limit for side cooling.

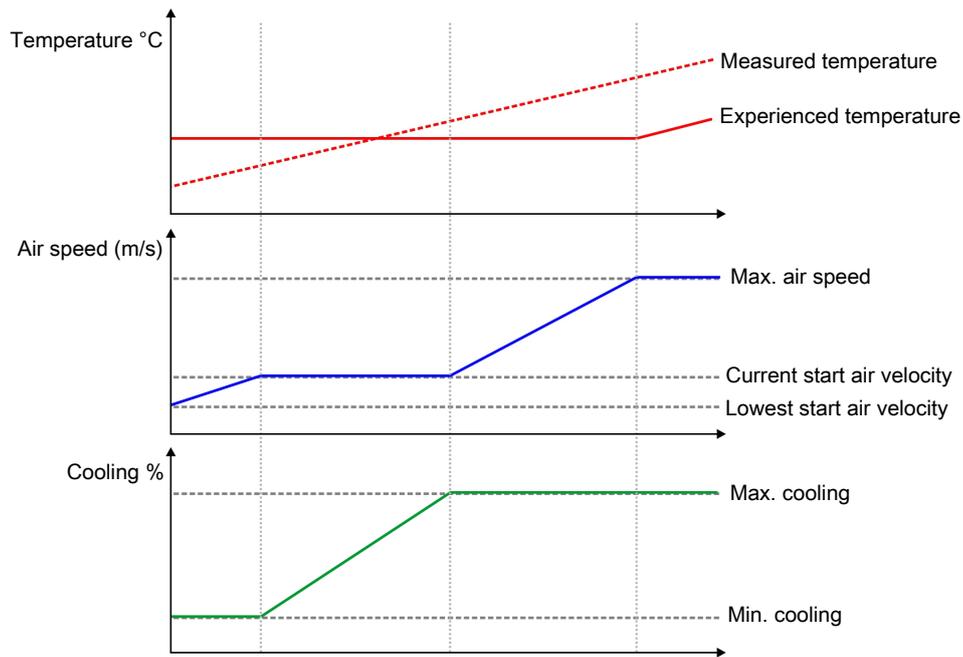


Figure 29: The cooling starts already at low air speed to maintain the required inside temperature. When the cooling cannot maintain the temperature, the air speed is increased again.

4.10.2.3 Tunnel cooling start based on inside temperature

Climate | Tunnel cooling | Setpoints

Start temperature Setting the number of degrees which the experienced temperature - at maximum tunnel ventilation - must exceed the **Temperature setpoint**, before the tunnel cooling starts.

Humidity to stop tunnel cooling Setting the percentage of air humidity that makes the controller stop the tunnel cooling.

Humidity to restart tunnel cooling View of the calculated air humidity where the tunnel cooling starts again. This would be 3% below the humidity limit.

4.10.3 Pad rinsing

Climate | Tunnel cooling | Setpoints

Bleed off active Connection and disconnection of pad cleaning.

Time for bleed off (Pad rinsing) The time when the bleed off function starts after tunnel cooling has run for a set interval (Running time between bleed off intervals).
Bleed off does not start while tunnel ventilation is active.

Climate | Tunnel cooling | Info

Runtime since last bleed off (Pad rinsing) Reading of the time tunnel cooling has been running since the last bleed off.

Total runtime Reading of total bleed off running time. Can be used as an indicator of whether cooling pads need to be replaced.

4.10.4 Cooling potential

The cooling potential is a way to describe how much the air temperature can be lowered by adding water-based cooling.

The cooling potential for water-based cooling thus depends on the humidity and the outside temperature.

In general there is a higher cooling potential in hot areas than in cold areas. Furthermore, there will usually be a very high cooling potential in areas with very low humidity.

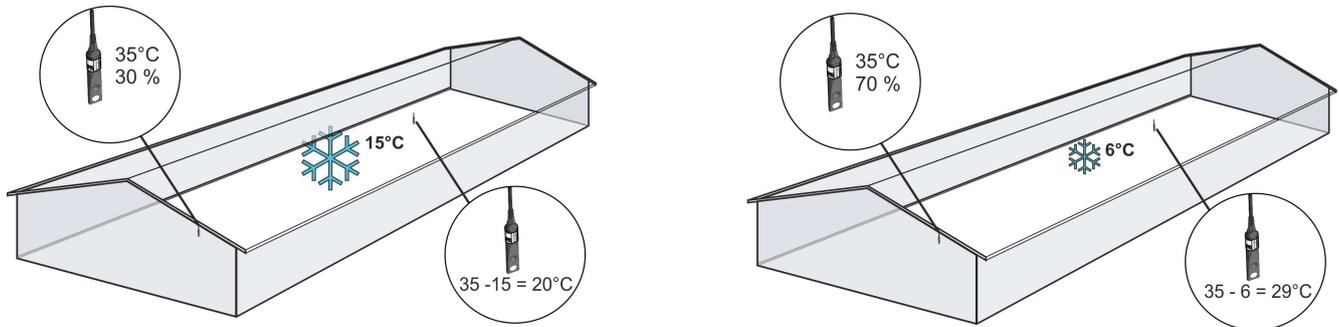


Figure 30: The lower the outside humidity, the higher the cooling potential.

A rule of thumb states that for each 5 % increase in air humidity, the temperature drops by 1 °C.

4.10.5 Adaptive tunnel cooling

SKOV A/S recommend that heat control is set up for adaptive control.

The factory setting is PID.

In the case of adaptive control, it is possible to fine-tune how fast it reacts when the conditions change.

Climate | Tunnel cooling

Control adaption time	Setting how fast the regulation should react (Slow/Medium/Fast). It is not necessary to change the factory setting Medium unless the adjustment reacts too slowly (select Fast) or too fast (select Slow). This will depend on the system in question. Also, see the Adaptive control section of the Technical Manual.
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4.11 Stir fan

This section is relevant only to houses with stir fans.

4.11.1 Stir fan menu

| Climate | Stir fan

Stir fan	
Control	24-hour clock Temperature Heating
	24-hour clock Start time

	Stop time	
	ON time	
	OFF-time	
	Start at ventilation	
	Stop at ventilation	
Temperature	Start at ventilation	
	Stop at ventilation	
	Control	One sensor/ Two sensors
	Sensors installed	
	Sensor no.	
	Temp. 1-2 sensor no.	
	Stir fan temperature	
	Stir fan difference temperature	
	ON time	
	OFF-time	
Heating	Start at ventilation	
	Stop at ventilation	
	Control	With heating / After heating
	Start delay	
	Stop delay	
	ON time	

A stir fan improves the circulation of air and thus provides a more uniform temperature in the house. The controller can regulate up to four stir fans at a time.

Climate | Stir fan

Start at ventilation/ Stop at ventilation The stir fans are only active within designated ventilation levels.

Mode Each stir fan can be regulated in connection with a heat source, one or two temperature sensors or a 24-hour clock.

4.11.1.1 Regulation via 24-hour clock

The stir fan operates according to a set ON/OFF time and the time setting as to when it should start and stop.

Start time: 14:00 hh:mm

Stop time: 16:00 hh:mm

ON time: 00:05:00

hh:mm:ss

OFF time: 00:05:00

hh:mm:ss

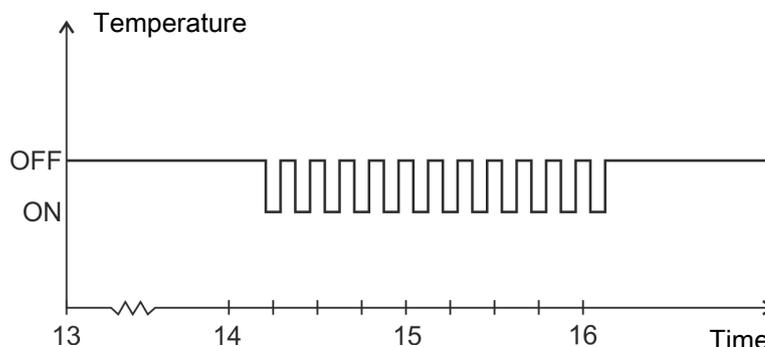


Figure 31: 24-Hour regulation

4.11.1.2 Regulation via temperature sensor

When a stir fan should operate in connection with temperature sensors, you have to set how many (one or two) and according to which sensors the controller should control and the temperature activating the stir fan.

The stir fan runs for a set ON/OFF time

- One temperature sensor: Stir fan temp. is a deviation from Temperature setpoint.
- Two temperature sensors: Stir fan diff. temp. is a temperature difference between the two sensors

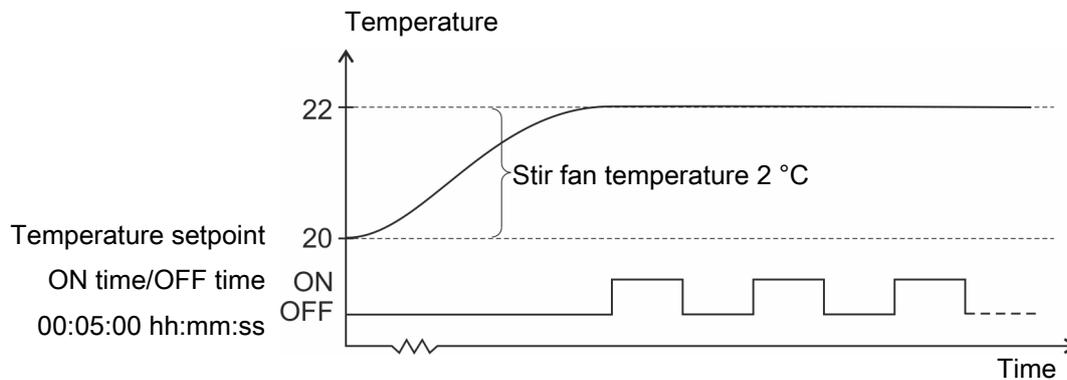


Figure 32: Temperature sensor regulation

4.11.1.3 Regulation via heat source

When the stir fan is to operate in connection with heat sources, you must opt for a way to control and set the start and stop time of the fan

Control:

With heater: The stir fan runs while the heat source supplies heat, but starts and stops with a set time delay (Start delay/ Stop delay).

After heater: The stir fan runs after the heat source has supplied heat. It starts with a time delay (Start delay) and runs for a set period of time (ON time).

This function is active only when heating is required.

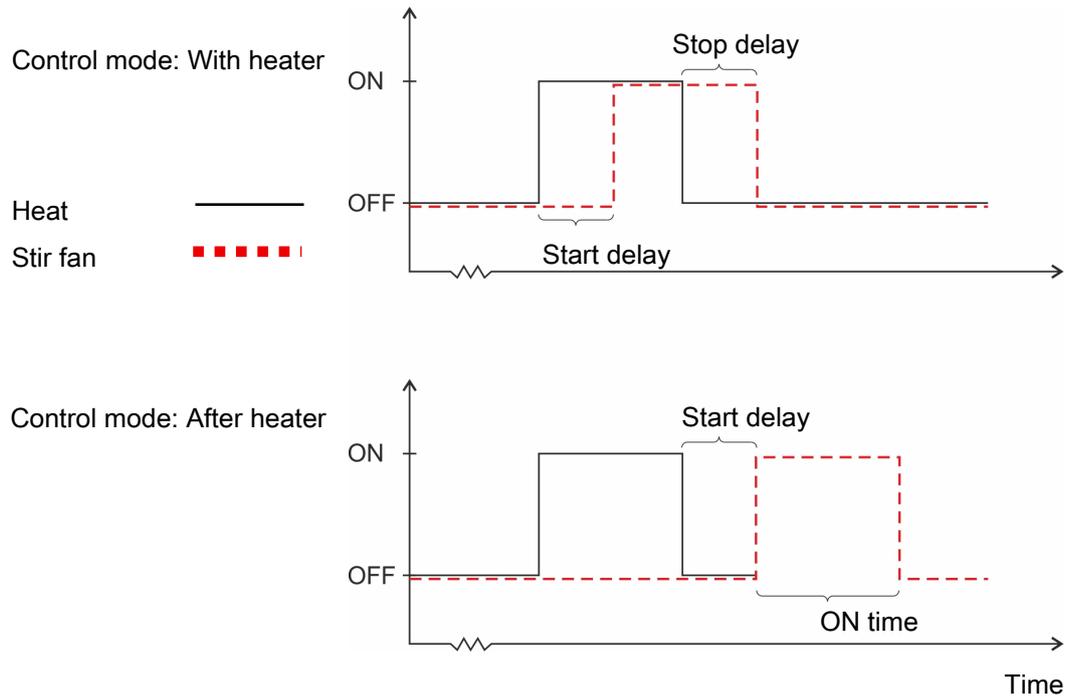


Figure 33: Control with heater

4.12 Weather station

4.12.1 Weather station menu

| Climate | Weather station

Weather station	Wind direction absolute
	Wind direction relative
	Wind speed

The weather station is used to record wind direction and speed.

Climate | Weather station

Wind direction	Display of current wind direction.
Wind speed	Display of current wind speed

4.13 User offsets

4.13.1 User offset menu

| Climate | User offsets

		Only applies to
Temperature	Combi diffuse setpoint	CT
	Temperature	
	Comfort temperature	LPV, CT, Basic
	FreeRange cooling start temperature	
	Day and night temperature	LPV, CT
	Heating	
Heating	Heating temperature	
	Stand-alone heating	
Ventilation	Minimum ventilation	
	Maximum ventilation	
Tunnel	Chill factor	LPV, CT, T
	Tunnel outside temperature limit	
	Lowest air start speed	
	Minimum air speed	
	Maximum air speed	
		Tunnel cooling start air speed
Other	Tunnel cooling stop air speed	
	Humidity	
	CO2	

Climate | User offsets

User offsets	View of the current user offset for standard curve values.
---------------------	--

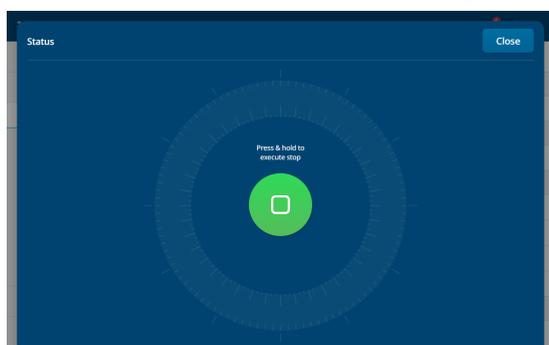
5 Management

5.1 House data

Management | House data

House status	Status	Active house/Empty house
Date	Adjust date and time	
	Day number	
	Day of the week	
	Start at day	
Other	House name	
	Service Access activated	

5.1.1 Active house - Empty house



Set batch status to **Active house** the day before stocking the animals so that the controller has time to adapt the climate to the animals' requirements. The day number then switches to day 0, and the controller operates in accordance with the automatic settings.

Set the status to **Empty house** after depopulating the house.

When set to empty house, the controller disconnects the adjustment and controls according to the in-between functions empty house and preheating.

This function protects the animals in case a house is set to **Empty house** by mistake.

On the other hand, if you want the system to close when status is **Empty house**, you should reset the settings of the in-between function empty house.

In status **Empty house**, the controller will also reset all changes of curves, which you may have made in the previous batch course.

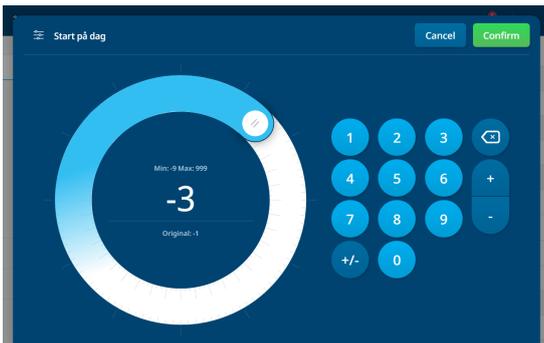
5.1.2 Settings

Management | House data

Status	Reading status (Active house / Empty house).
Adjust date and time	Setting of current date and time. Correct setting of the clock is important, both as regards several control functions and as regards the registration of alarms. The clock will not stop in the event of a power failure.
Day number	Setting of the day number. The Day number counts 1 up for every 24 hours that pass after the house has been set to active house. Day number can be set as low as -9 so the climate and production controller can control the preheating of the house prior to the animals being stocked.
Week number	Display of current week number (only breeder).
Day of the week	Display of day of the week.
Stocked animals	Setting the number of animals (only DOL 534).

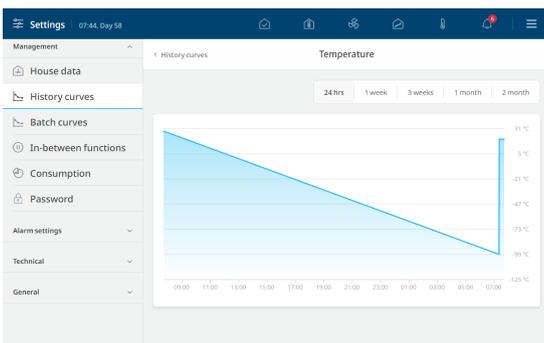
Start at day	Setting of the day on which the batch shall start.
House name	Setting of house name. When the climate and production controller is integrated in a LAN network, it is important that each livestock house has a unique name. The house name is transferred through the network and the livestock house should therefore be identifiable based on the name. Set up a plan for the naming of all controllers connected to the network.
Service Access activated	Information that the climate and production controller is being remotely controlled via the farm management program FarmOnline Explorer.

5.1.2.1 Preheating by day number



5.2 History curves

 Management History curves	Only applies to
History curves	Climate Production Power monitoring
	Only Climate controllers and Climate and Production controllers Only Production controllers and Climate and Production controllers Only Climate controllers and Climate and Production controllers



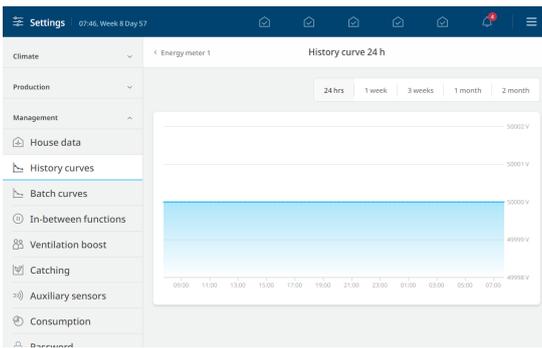
Climate history curves give a picture of how the climate has developed during the last 24 hours.

Depending on the type and setup of the house controller, the following curves are available:

- Temperature
- Tunnel temperature
- Humidity
- Outside humidity
- Outside temperature
- CO2
- NH3
- Pressure
- Experienced temperature measured
- Auxiliary sensors
- Ventilation
- Cooling
- Heating

- Stand-alone heater
- Heat recovery unit

The history curves' monitoring of power shows the level of power consumption for the most recent 24 hours and the last 50 days.



5.3 Batch curves

This section is relevant only to houses with batch production.

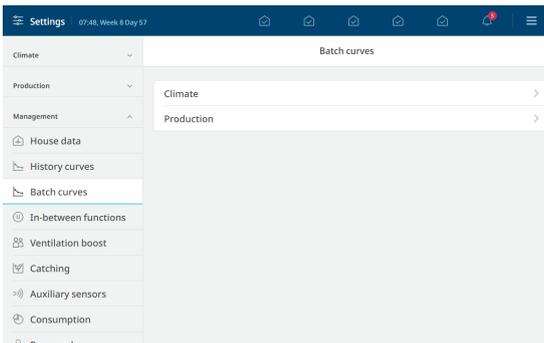


Management | Batch curves

Only applies to

Batch curves	Climate	Only Climate controllers and Climate and Production controllers
	Production	Only Production controllers and Climate and Production controllers

Together with other information, the curve settings form the basis of the controller's calculation of climate regulation.



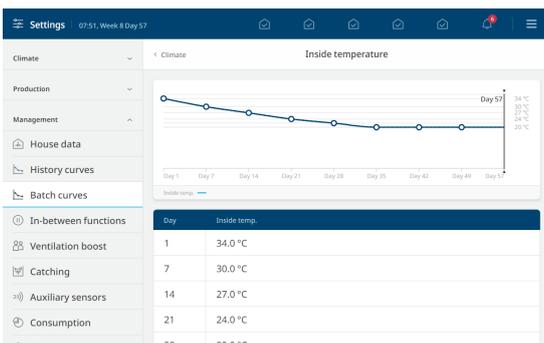
The controller can adjust automatically according to the animals' age.

When the house controller is connected to a network with the management program FarmOnline Explorer curves can also be changed via FarmOnline.

Depending on the type and setup of the house controller, the following flock curves are available:

- Inside temperature
- Heat offset temperature
- Comfort temperature
- Stand-alone heater temperature
- Floor heating
- Tunnel temperature
- Humidity
- Chill curve - factor
- Minimum ventilation
- Maximum ventilation
- Minimum air speed in tunnel
- Maximum air speed in tunnel
- Tunnel cooling start speed
- Day and night adjustment
- FreeRange cooling start temperature
- FreeRange fan start temperature

5.3.1 Setting curves



For each curve set:

- a day number for each of the eight curve points.
- the required value of the function of each of the eight curve points.

See also the section User offsets.

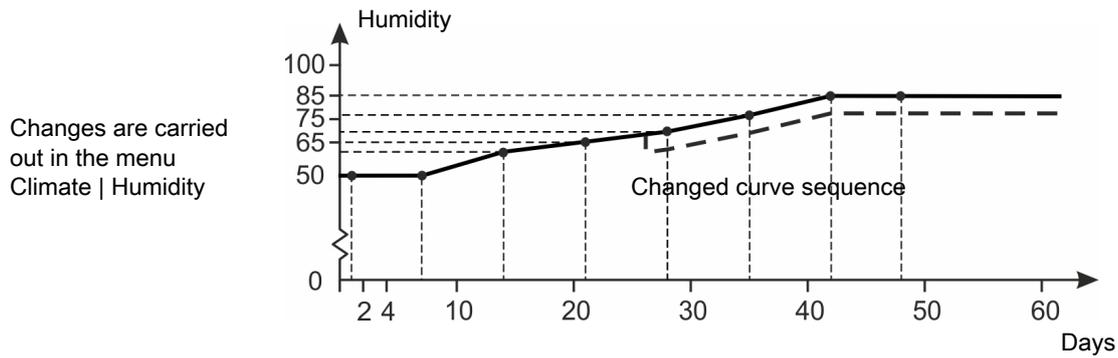


Figure 34: Curve for air humidity

It is generally the case for the curve functions that the house controller automatically displaces the rest of a curve sequence in parallel when you change the associated setting in the course of a flock.

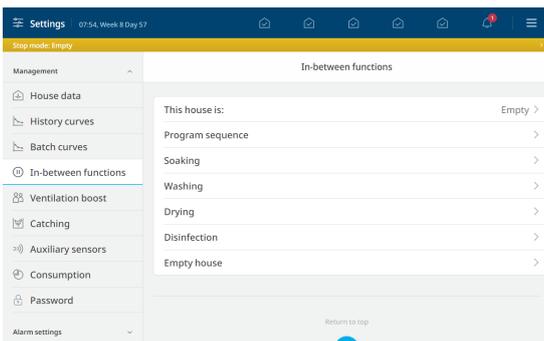
Changes in settings can be seen in the menu User offsets.

5.4 In-between functions

 | Management | In-between functions

In-between functions	This house is:	Soaking/ Washing/ Drying/ Empty
	Program sequence	Outside the programmed intervals the status is Empty house Start washing Start drying Start disinfection
	Soaking/ Washing/ Drying	Roof inlet flap Roof inlet fan Re-circulation inlet Side inlet Tunnel inlet Ventilation Air outlet flap Air outlet fan speed Soaking time Cycle time ON-time Washing time Heating Floor heating setpoint Drying time
	Disinfection	Disinfection time Temperature Floor heating setpoint
	Empty house	Roof inlet flap Roof inlet fan Re-circulation inlet Side inlet Tunnel inlet Ventilation Air outlet flap Air outlet fan speed Heating Preheating Preheating setpoint Preheating at stop Floor heating setpoint Temperature surveillance active Temperature surveillance limit Temperature surveillance time

The in-between functions are designed partly to facilitate the activities which you must carry out in the house to clean it, and partly to ensure the air change and temperature in the house while it is empty.



Status

The house controller can activate the in-between functions only when the status is **Empty house** (in the menu **Management/ House data/ Status**).

The menu is only visible when status is **Empty house**.

When the time for an in-between function is up, the controller will again regulate according to the settings for **Empty house**.

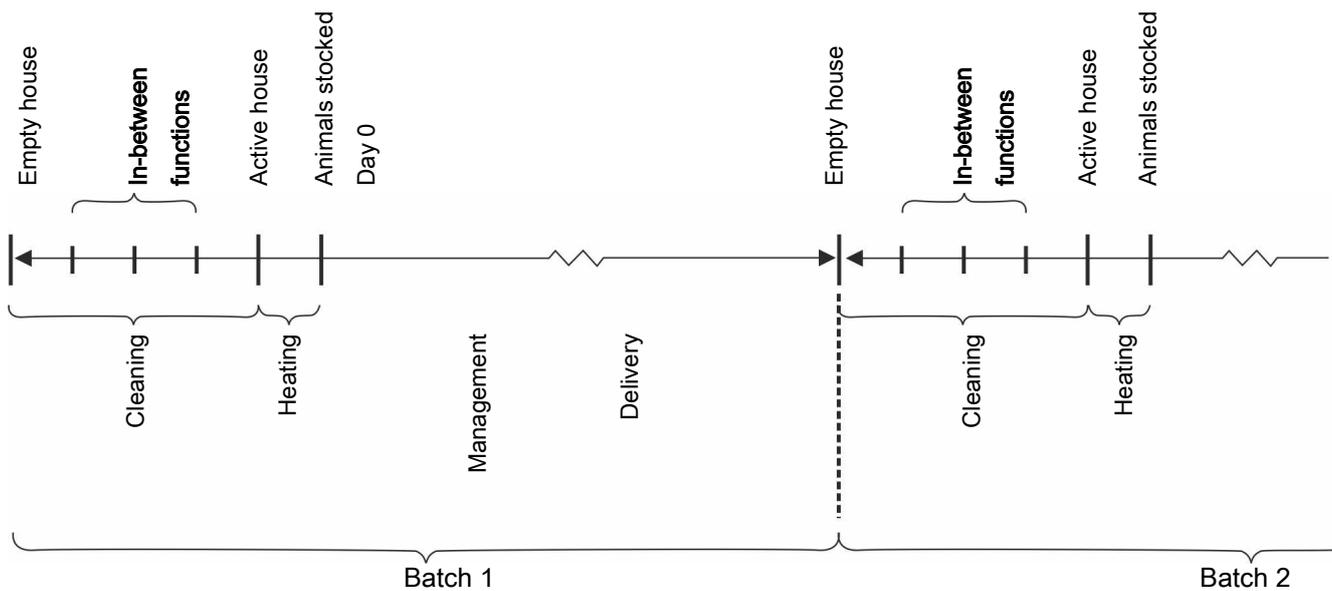


Figure 35: In-between function at batch production

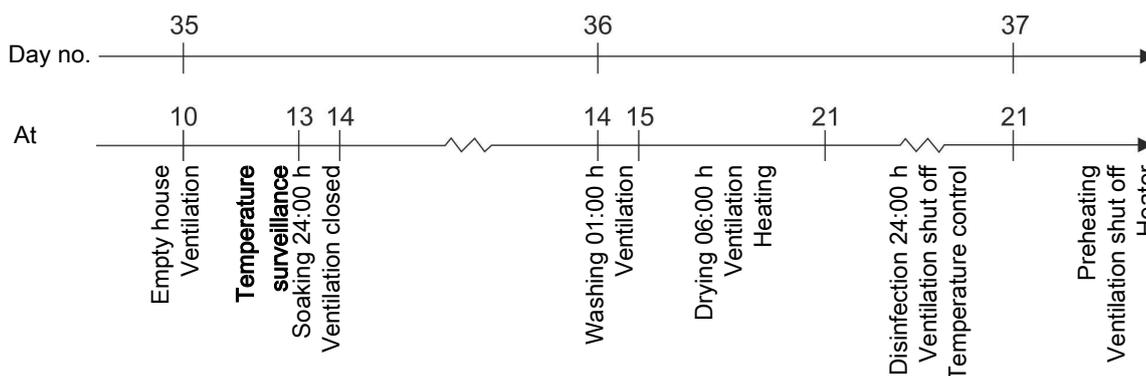
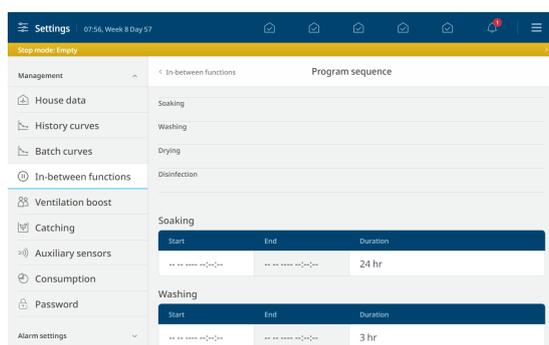


Figure 36: Sequence of in-between functions



Program sequence

With time control, each in-between function can be set to start at a specified time. It is thus possible to set a total sequence for the in-between functions.

Soaking

Soaking will soak the house with water to loosen dust and dirt. This will not only reduce the amount of dust during the subsequent cleaning but also make cleaning easier.

In soaking mode, stop ventilation to maintain the humidity in the house. Set the soaking system to run at intervals (**Cycle time**) for a number of minutes (**ON-time**) during the total period (soaking time) which the soaking process is to last.

Washing

While washing the house manually, ventilation must run again to start changing the air in the house.

Drying

Drying is a combination of ventilation and heat supply. The more heat is supplied to the the house, the faster it dries.

Heating can be supplied as room heating or floor heating.

A desired temperature is set when room heating is used.

When floor heating is used, the percentage the floor heating system will operate at must be set. The floor heating stops when the inside temperature exceeds the temperature that has been set.

Disinfection

Disinfection is carried out manually by adding disinfectant to the water.

A certain temperature must be maintained in the house during disinfection in order for the disinfectant to have optimal effect (often over 20 °C).

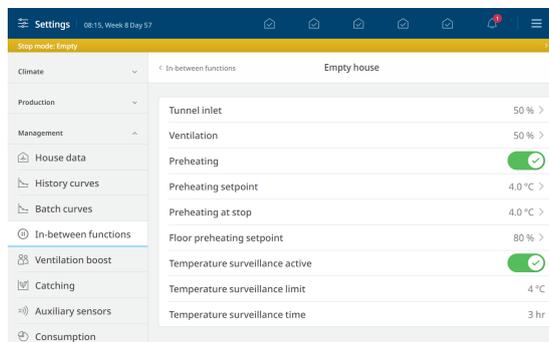
The house controller shuts off the ventilation system and supplies heat as needed to maintain the correct temperature for disinfection.

Heating can be supplied as room heating or floor heating.

A desired temperature is set when room heating is used.

When floor heating is used, the percentage the floor heating system will operate at must be set. The floor heating stops when the inside temperature exceeds the temperature that has been set.

5.4.1 Empty house



Category	Setting	Value
In-between functions	Tunnel inlet	50 %
	Ventilation	50 %
	Preheating	<input checked="" type="checkbox"/>
	Preheating setpoint	4.0 °C
	Preheating at stop	4.0 °C
	Floor preheating setpoint	80 %
	Temperature surveillance active	<input checked="" type="checkbox"/>
	Temperature surveillance limit	4 °C
	Temperature surveillance time	3 hr

Empty house

When batch status is **Empty house** (in the **Management | House data** menu), the house controller will regulate according to the settings for **Empty house** (set in the **In-between functions** menu).

This function will maintain the air change in the house by allowing ventilation to run at a fixed percentage (50 %) of the system capacity. This is to protect the animals in case a house is set to **Empty house** by mistake.



When status is **Empty house**, all alarm functions - except temperature surveillance at empty house - are disconnected. See also the section Temperature surveillance [► 82].

When batch status is **Empty house**, the house controller disables all automatic regulations and operates according to the settings in the **Empty house** in-between function.

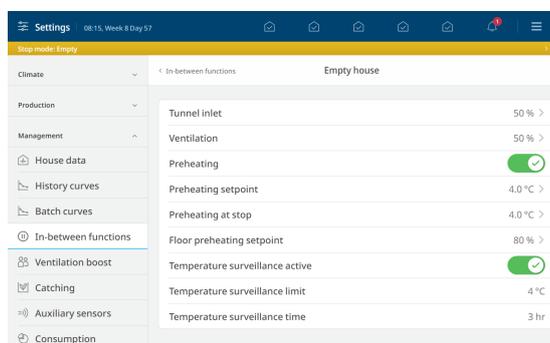
5.4.2 Settings

Management | In-between functions

The house is	Menu for selection of in-between function
Roof inlet flap	Setting of flap position for the roof inlets (roof).
Roof inlet fan	Setting of speed control for the roof inlets (roof).

Re-circulation inlet	Setting of recirculation fan for the roof inlets (roof).
Side inlet	Setting the flap opening for side air inlet.
Tunnel inlet	Setting of the tunnel opening (tunnel).
Ventilation	Setting the percentage of nominal ventilation. When the house is in Empty house, this function is typically used to open a number of ON/OFF air outlets.
Air outlet 1 flap	Setting the flap opening for air outlet. When the house is in Empty house, this function is typically used to open the stepless flap.
Air outlet fan speed	Setting of speed control for air outlet. When the the house is in Empty house, this function is typically used to turn off the stepless fan.
Soaking time	Setting the active period for soaking.
Cycle time	Setting the intervals in which the soaking system is active.
ON time	Setting the active period for soaking.
Washing time	Setting the active period for washing.
Heating	Setting the heating in connection with the Drying function.
Drying time	Setting the active period for drying.
Disinfection time	Setting the active period for disinfection.
Temperature	Setting of the temperature it needs to be in the house during disinfection.

5.4.3 Preheating



Mode	Function	Value
Empty house	Tunnel inlet	50 %
	Ventilation	50 %
	Preheating	<input checked="" type="checkbox"/>
	Preheating setpoint	4.0 °C
	Preheating at stop	4.0 °C
	Floor preheating setpoint	80 %
	Temperature surveillance active	<input checked="" type="checkbox"/>
	Temperature surveillance limit	4 °C
	Temperature surveillance time	3 hr

Preheating ensures that the inside temperature does not fall below the set temperature when batch status is empty house for a longer period of time.

Thus, the function can also be used to protect the house against frost.

Heating can be supplied as room heating or floor heating.

A desired temperature is set when room heating is used.

When floor heating is used, the percentage the floor heating system will operate at must be set. The floor heating stops when the inside temperature exceeds the temperature that has been set.

At batch production the **Preheating at stop** function maintains an inside temperature of 4°C, for example, between two batches. Note that ventilation must be shut off and the heating system must be connected.

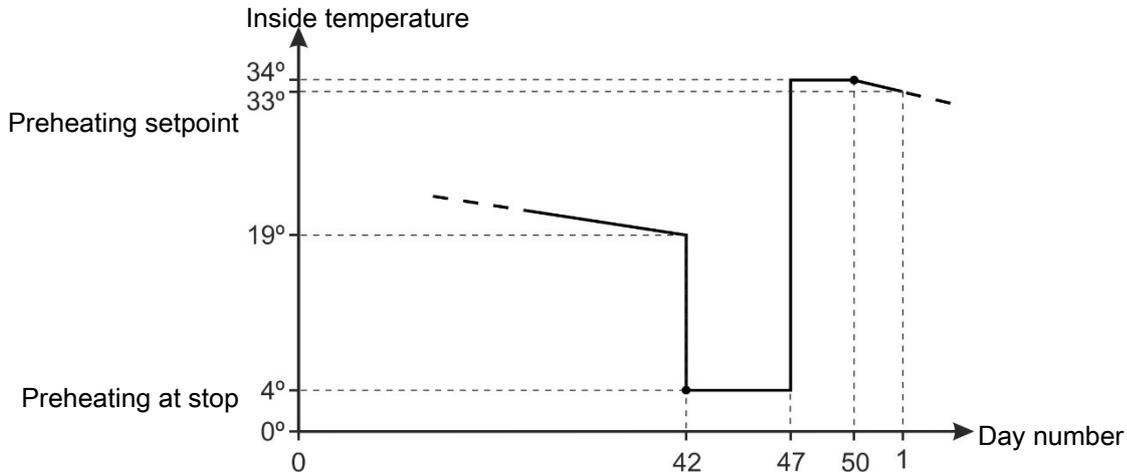


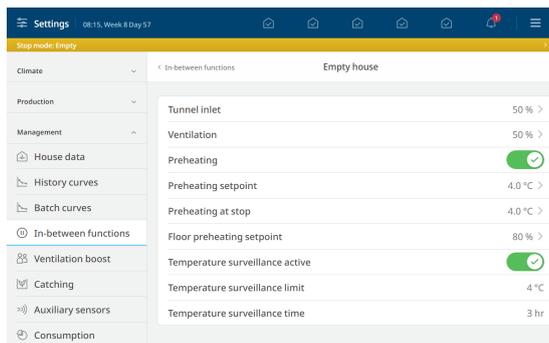
Figure 37: Example of setting of preheating.

When the batch state is **Empty house (Management/ House data)** and **Preheating** is connected, the house controller regulates according to the temperature for **Preheating at stop**.

Management | In-between functions

Preheating	Connection and disconnection of the Preheating function.
Preheating setpoint	Temperature setpoint for preheating at batch start.
Preheating at stop	Temperature setpoint for preheating at stop.
Floor preheating setpoint	Setting the percentage the floor heating will operate at when used for preheating.

5.4.4 Temperature surveillance



The house controller prevents incorrect setting of **Empty house**. The climate controller monitors the temperature in the house for three hours after changing the batch status to **Empty house**. If the temperature increases in this period by more than 4 °C (indicate there are animals in the house), the house controller triggers an alarm and activates the ventilation.

This temperature surveillance is interrupted if an in-between function is activated.

Management | In-between functions

Temperature surveillance limit	Display of the number of degrees the temperature must rise after batch stop.
Temperature surveillance time	Display of the time period when the temperature is monitored after batch stop.

5.5 Ventilation boost

  This section is only relevant to houses where ventilation boost is activated in the menu  |  |  |  |  |  |  |  |  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Adjustment by staff comfort Display of the number of degrees with which the temperature is lowered to adapt the ventilation to ventilation boost.

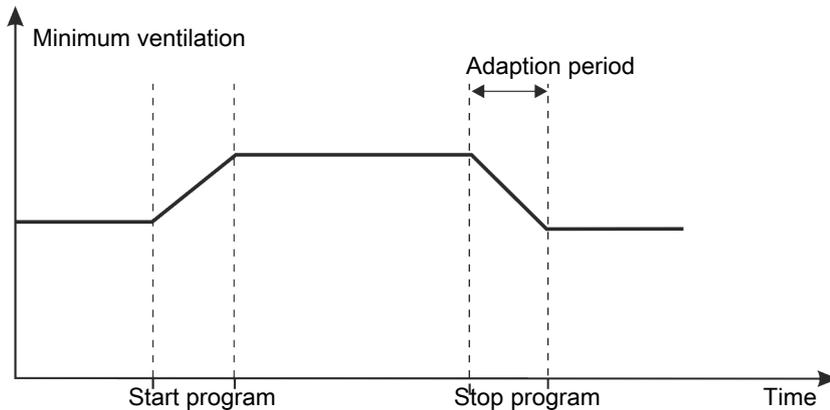
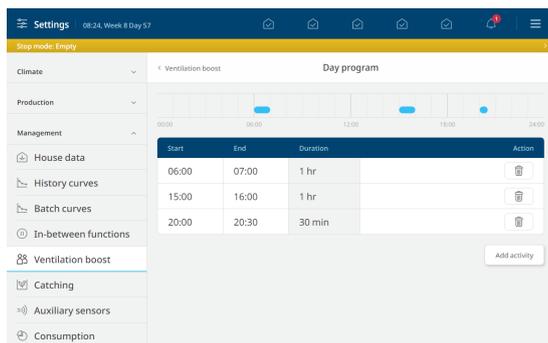


Figure 38: Gradual adaption to minimum ventilation.

You must set the day program's periods for when the function must be active. Furthermore, you must adjust **Temperature adjustment** with the degrees by which the inside temperature must fall and **Ventilation addition** with the percentile by which **Minimum ventilation** must rise.

When the function starts and stops, the temperature will be adjusted within the specified period. To achieve the full effect, the start time may be set to approx. 30 minutes before you wish to enter the livestock house.



Set:

- Number of periods per day (1-8)
- Time for start
- Time for stop

Press the field in the column **Start** to change the start time.

Press the field in the column **End** to change the stop time.

Press **Add activity** for a new period and then set the start and stop time.

The blocks on the time line shows when and how long ventilation boost is active.

Press  to delete a period.

The function operates in the same way every day. When **Batch status** is **Empty house**, the function is disconnected.

5.6 Catching

 | Management | Catching

Catching	Inactive/ Active
Catching climate info	(displayed after catching)
Countdown for restoration time	(displayed after catching)
Feed weigher stopped	
Feeding stopped	
Feed mix stop	
Feed weigher stop	
Feeding end	

	Resume feeding	
	Catching ready	Date/ Time
	Setup	Timing Climate Light control Production

The catching function is designed to alter the air change in the house in connection with all or some of the animals leaving the house. The ventilation status will change to **Catching** and adapt its settings. When it changes back, the ventilation returns to half the ventilation requirement that was just before the function started and display restoring information. The function also modifies the feeding program, light control and alarms.

Catching can be set up to activate in three ways:

- External key
- Push button
- Display operation

Management | Catching

Catching	Connection and disconnection of the function. (with display operation)
Catching ready	Setting the date and time that the user can activate the function.
Catching start	Displaying the time when catching was activated. Only visible when the function is active.
Catching stop	Display of the time when the function is to stop (using the Auto stop catching after). If the catching lasts for longer than expected, the stop time can however be changed. Only visible when the function is active.
Allow catching start period	Setting the time period when the user can activate the function. (only push button and key)
Auto stop catching after	Setting the maximum period that Catching can be active.
Air inlet	Setting how much the air inlets must be open in percent during catching.
Roof inlet	Setting roof inlet, flap, fan and stir fan in percent during catching.
Stepless	Setting how much the air outlets must be open in percent during catching.
MultiSteps	Selecting which MultiStep should be active during Catching . For example, you can control the desired direction of the airflow, by only activating the MultiSteps at one end of the house.
Light control	Select if activating catching should change the light control.
Stop feed system	Select if activating catching should stop the feed system.
Stop feed weigher before feed system is stopped	Setting the time period. The time period should correspond to the time it takes for the animals to eat the feed which is distributed in the system.
Stop feed mixing before feed weigher is stopped	Setting the time period. The time period should correspond to the time that the animals should only have one type of feed.
Type of feed when feed mixing is stopped	Selection of the last type of feed to be used before the feeding system is stopped.

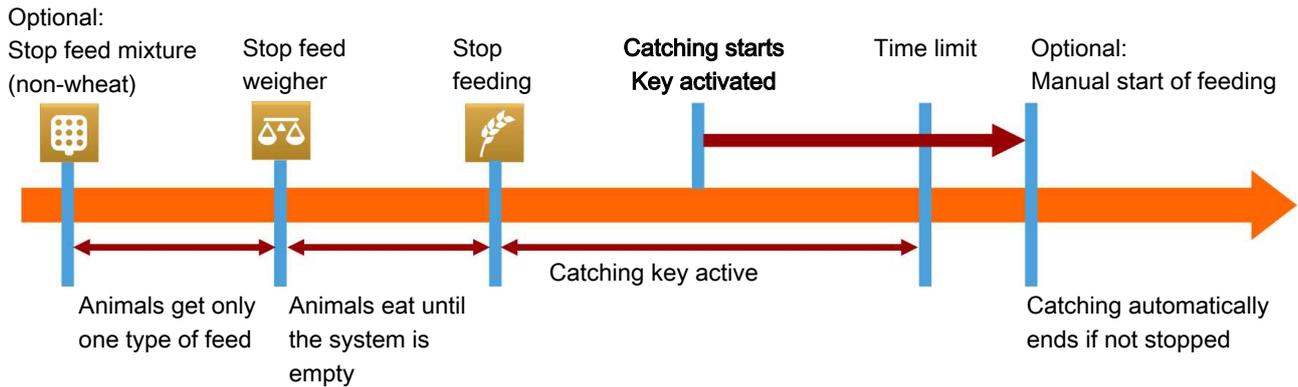


Figure 39: The sequence when stopping the feed system during catching

5.7 Auxiliary sensors

This section is relevant only to houses with auxiliary sensors.

5.7.1 Auxiliary sensor menu

| Management | Auxiliary sensors

- Auxiliary sensors
- CO2 sensor
- Pressure sensor
- NH3 sensor
- O2 sensor
- Temperature sensor
- Humidity sensor
- Air speed sensor
- Wind direction sensor
- Chill sensor
- pH sensor
- Water level sensor
- Conductivity sensor

The **Auxiliary sensors** menu gives you a quick overview of the registrations of the house controller from the auxiliary sensors. Extra sensors have no influence on the regulation.

The climate controller registers the content of CO2, NH3, O2 and humidity in the house air, as well as pressure and temperature. You can also connect air speed and wind direction sensors that can measure the wind direction and air speed outside the house as well as a chill sensor which registers the air speed in the house. For use with, for example, air cleaning, a pH sensor, a water level sensor and a conductivity sensor can be installed.

The display of the aux. sensors menu depends on which types of auxiliary sensors you install.

Climate | Auxiliary sensors

Auxiliary sensor (x) Current value registered by the sensor.

5.8 Consumption

| Management | Consumption

Consumption	Ventilation consumption
	Heat consumption
	Stand-alone heat consumption
	Power consumption

Management | Consumption

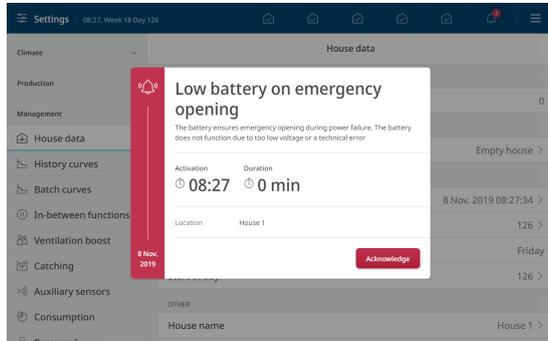
The menu shows the energy consumption in the house. The contents of the menu depend on the type and the setup of the house controller.

6 Alarms



Alarms only work when the status is **Active house**.

The only exceptions are alarm test and alarms for CAN communication and temperature surveillance for **Empty house**.



When an alarm occurs, the house controller will register the alarm type and the time it occurred.

The information on the type of alarm will appear in a separate alarm window together with a short description of the alarm situation.

The alarm relay is only triggered by hard alarms.

Soft alarms generate a pop-up in the display.

Red: active alarm

Yellow: active warning

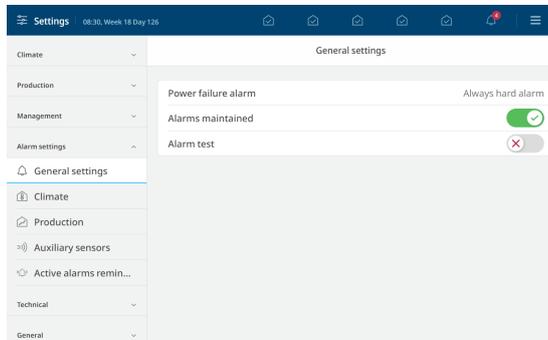
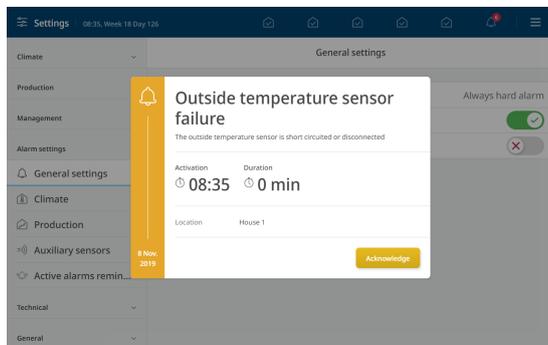
Gray: deactivated alarm (alarm state ceased)

There are two types of alarm:

Hard alarm: Red pop-up alarm on the controller and alarm generation with the connected alarm units, e.g. a horn

Soft alarm: Yellow pop-up alert on the controller.

In the alarm menu, it is possible to select whether some climate and production alarms are to be hard or soft.



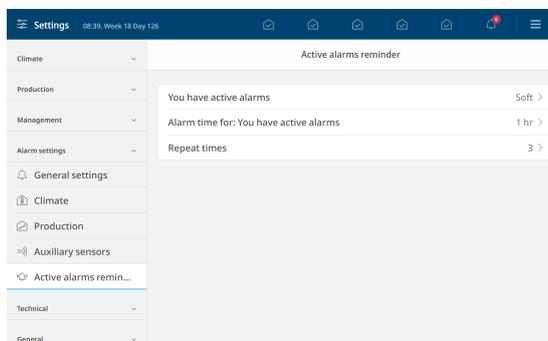
The controller will also activate an alarm signal, which you can choose to maintain.

The alarm signal will thus continue to sound until you acknowledge the alarm. This also applies even if the situation that triggered the alarm has stopped

Alarms maintained:

YES: The signal continues after the alarm situation has ceased.

NO: The signal stops after the alarm situation has ceased.



The controller can remind you of an on-going alarm situation once you have acknowledged a hard alarm. This to ensure that the cause of the alarm is handled.

Settings for reminders:

Alarm time: Setting how long after the alarm, the reminder is to appear.

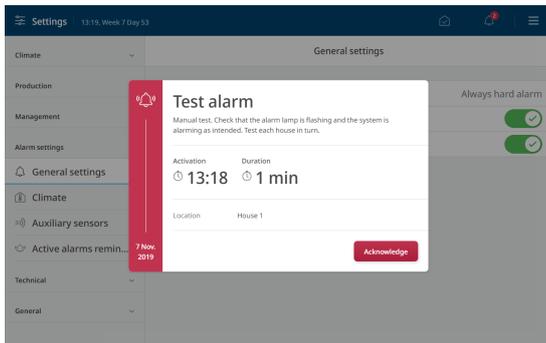
Repeat times: Setting how many times the reminder is to appear.

6.1 Stopping an alarm signal

The alarm window disappears, and the alarm signal stops when you acknowledge the alarm by pressing **Acknowledge**.

6.2 Alarm test

Regular alarm tests help to ensure that the alarms actually work when needed. Therefore you should test the alarms every week.



Activate **Alarm test** to start testing.

Check that the alarm lamp is flashing.

Check that the alarm system alarms as intended.

Press **Acknowledge** to finish testing.

6.3 Alarm menu

 Alarm settings		Only applies to
General settings	Power failure alarm [▶ 92]	Always hard alarm
	Alarms maintained	
	Alarm test [▶ 89]	
	Production alarm test	Production controller, Climate and production controller
Climate		Climate controller, Climate and production controller
Production		Production controller, Climate and production controller
Auxiliary sensors		
Active alarms reminder [▶ 88]	You have active alarms Alarm time for: You have active alarms Repeat times	

6.4 Alarm menu - Climate

 Alarm settings Climate		Only applies to
Temperature [▶ 92]	High temperature limit	4 °C
	Current alarm limit	
	Low temperature alarm	- 3 °C
	Low temperature limit	- 10 °C
	Low temp. limit with FreeRange	8 °C
	Summer temp. at 20°C/68°F outside	4 °C
	Summer temp. at 30°C/86°F outside	32 °C
	Actual Abs. high temperature	0.0 °C
	Temperature difference in tunnel Front/Rear	
	Humidity [▶ 94]	Abs. high humidity alarm
Abs. high humidity limit		100 %
Inlet and outlet [▶ 94]	Error roof inlet 1-6	
	Error side inlet 1-6	
	Error tunnel inlet 1-2	
	Error tunnel outlet 1-2	

Sensors [▶ 95]	Error inside temperature sensor: Always hard alarm	
	Error outside temperature sensor	5 °C
	Misplaced outside sensor	
	Tunnel opening failure 1 alarm	2 °C
	Tunnel cooling sensor alarm limit. Tunnel opening failure	
	Cooling pump 1 failure alarm	- 1 °C
	Tunnel cooling sensor alarm limit. Cooling pump limit	
	Tunnel cooling sensor 1 alarm	
	Error humidity sensor 5%	
	Error outside humidity sensor (5%)	
	Auxiliary sensors	
Error floor heating temperature sensor: Always hard alarm		
Pressure [▶ 95]	Pressure sensor alarm delay	1:00 AM m:s
	Pressure high alarm	ON/OFF
	Pressure high limit	100 Pa
	Pressure low alarm side	ON/OFF
	Pressure low alarm tunnel	ON/OFF
	Low pressure limit	5 Pa
CO2 [▶ 96]	Low CO2	
	Low CO2 limit	300 ppm
	High CO2	
	High CO2 limit	8500 ppm
NH3 [▶ 96]	Low NH3	
	Low NH3 limit	5 ppm
	High NH3	
	High NH3 limit	20 ppm
Heat recovery unit [▶ 96]	Error Heat recovery unit inlet flap	
	Error Heat recovery unit outlet flap	
	Error Heat recovery unit inlet temp. sensor	
	Heat recovery unit inlet low temperature	-3 °C
	Heat recovery unit low temperature limit	
Dynamic Air [▶ 96]	Alarm cannot be disabled in Control mode	
	Dynamic Air Alarm	
	Pressure deviation limit	10%

Emergency opening [▶ 97]	High temperature	
	Absolute high temperature	
	Abs. high humidity alarm	
	Pressure high alarm: ON	
	Low pressure alarm: ON	
Temperature-Controlled Emergency Opening [▶ 97]	Emergency opening setpoint	40.0 °C
	Temperature setpoint	19.0 °C
	Warning at emergency temp.	ON/OFF
	Warning emergency temp. limit	6 °C
	Battery alarm: Always ON	
	Battery voltage limit	16 V
	Power failure	
	Current battery voltage	
	Lowest measured battery voltage	
Emergency inlet [▶ 98]	Emergency inlet	
	Absolute high temperature	4 °C
	Error temperature sensor	
	Power failure: ON	
Pop holes [▶ 96]	Pop holes are not closed	LPV, CT
	Pop holes are not open	
Winter garden [▶ 96]	Winter garden is not closed	LPV, CT
	Winter garden is not open	

6.5 Power failure alarm

The controller will always generate an alarm and activate emergency opening in the event of power failure.

6.6 Alarm settings

The house controller has a number of alarms, which it will activate if a technical error occurs or alarm limits are exceeded. A few of the alarms are always connected, e.g. Power failure. The other alarms can be activated / deactivated, and for some of them, you can even set the alarm limits.



The user is always responsible for ensuring that all alarm settings are correct.

6.6.1 Temperature alarms

Alarm settings | Climate | Temperature

High temperature limit

The temperature alarm for high temperature is only activate when the batch state is **Active house**. The alarm is set as an excess temperature to **Temperature setpoint**.

FreeRange

The alarm limit in FreeRange houses increases when the pop-holes are open, with an addition on the **Fan temperature offset**.

Low temperature limit Alarm for excessively low temperature in relation to the **Temperature setpoint**.

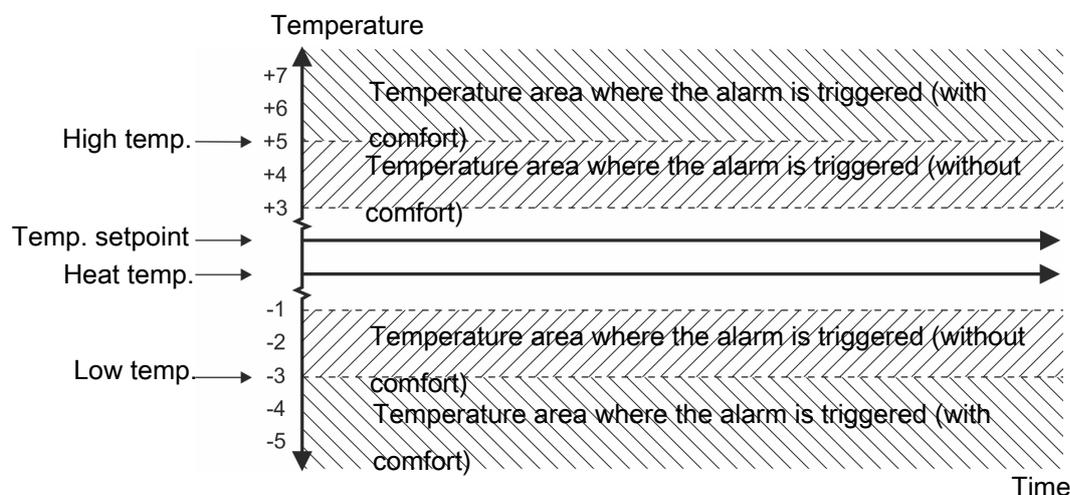


Figure 40: Alarm high and low temperature

If the house controller is set with the functions comfort temperature or humidity control with temperature reduction, the controller will add the number of degrees that the comfort temperature is set to, to Temperature or take the number of degrees that humidity control with temperature reduction is set to, from Temperature. The high temperature alarm will therefore be calculated in relation to Temperature plus an addition for Comfort temperature or minus Reduction for humidity control.

Low temperature limit with FreeRange

In FreeRange houses, the alarm limit is lowered with this setting when the pop-holes are open.

Example Heating installed but not active in FreeRange

Temperature setpoint 19 °C
Heat offset: -2 °C
Low temp. limit with FreeRange: -5 °C

When not in FreeRange mode, the heating is set to 17°C
Alarm is triggered at 12°C

Example Heating active in FreeRange

Temperature setpoint 19 °C
Heat offset: -2 °C
FreeRange reduction: -5 °C
Low temp. limit with FreeRange: -5 °C

When not in FreeRange mode the heating is set to 17°C

In FreeRange mode heating is set to 12 °C
Alarm is triggered at 7 °C

When the pop-holes close, the alarm limits will return to the general temperature alarm limits within 30 minutes

Summer Alarm at 20 °C and 30 °C Outside

The function has a varying alarm limit that monitors changes in the high outside temperature. When the temperature rises, the alarm limit will also rise. When the temperature rises, the alarm limit will also rise. It will thus postpone the time when the high temperature alarm is triggered.

The house controller only triggers the alarm if the inside temperature also exceeds the high temperature alarm.

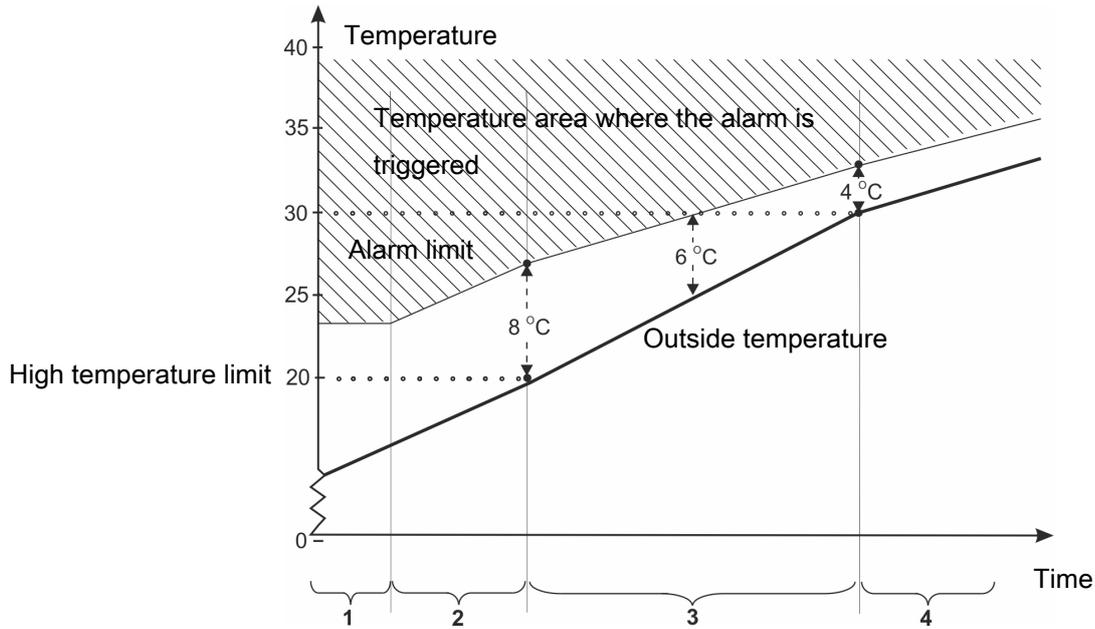


Figure 41: Summer temperature at 20° C and 30° C outside

1. The alarm limit does not fall below the High temperature limit.
2. Below 20° C outside, the alarm limit is 8° C, staggered in relation to the outside temperature.
3. Between 20° C and 30° C, there is a gradual transition from 8° C to 4° C. At an outside temperature of e.g. 25° C, the inside temperature must be 6° C higher (above 30° C) for the alarm to be triggered.
4. Above 30° C outside, the alarm limit is 4° C, staggered in relation to the outside temperature.

Absolute high temperature	The alarm for absolute high temperature is triggered by an actual temperature, such as 32° C. The house controller triggers the absolute high temperature alarm when the inside temperature exceeds this setpoint. The absolute high temperature alarm is set as a temperature curve.
Temperature difference in tunnel Front/Rear (Two zones)	The alarm is active at tunnel ventilation where ventilation is regulated according to an average value of the front and rear temperatures. The house controller generates an alarm when the temperature difference between the front and the rear zones exceeds the set number of degrees.

6.6.2 Humidity alarm

Alarm settings | Climate | Humidity alarm

Absolute high humidity	The house controller triggers the alarm for absolute high humidity when the humidity exceeds the setpoint. This may be due for example to lack of ventilation or a technical sensor error.
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6.6.3 Inlet and outlet alarm

Alarm settings | Climate | Inlet and outlet alarm

Inlet and outlet alarm	The inlet and outlet alarms are technical alarms. The house controller triggers an alarm if the actual flap position on the air inlet or air outlet deviates from the setpoint that the controller has calculated as correct.
Missing fan setting	This alarm indicates that the fan voltage has not been set in the Installation menu. When a 0-10 V output fan has been selected, a voltage value must be set which corresponds to the fan running at low and full speed.

Tunnel cooling temperature	Alarm for when the inside temperature exceeds the outside temperature. This indicates an error in tunnel opening.
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6.6.4 Sensor alarm

Alarm settings | Climate | Sensor errors

Error inside temperature sensor	<p>The house controller triggers an alarm if the sensor is short-circuited or disconnected.</p> <p>Without this sensor, the house controller cannot control the inside temperature, and apart from the alarm, the error will also trigger an emergency control of the ventilation system, which will open 50 %.</p> <p>The alarm is always a hard alarm.</p>
Error outside temperature sensor	The house controller triggers an alarm if the outside temperature sensor is short-circuited or disconnected.
Misplaced outside sensor	The alarm indicates whether the sensor is exposed to solar heating and therefore displays an incorrect outside temperature. The house controller triggers an alarm when the inside temperature measured by the controller is the number of degrees below the outside temperature that the function is set to (e.g. 5 °C).
Error humidity sensor Outside humidity sensor failure	The controller triggers an alarm when the humidity sensor is disconnected or the air humidity is lower than humidity setpoint.
Auxiliary sensors	The house controller triggers an alarm if the value for the sensor exceeds the setpoint.
Error floor heating temperature sensor	<p>The house controller triggers an alarm if the sensor is short-circuited or disconnected.</p> <p>The alarm is always a hard alarm.</p>

6.6.5 Tunnel cooling sensor alarm

Alarm settings | Climate | Sensor errors

Alarm for tunnel opening failure	<p>The climate controller triggers an alarm when the tunnel temperature exceeds the outside temperature by the number of degrees you set for Tunnel cooling sensor limit. Tunnel opening failure</p> <p>The alarm is only active at tunnel ventilation.</p>
Cooling pump failure	The climate controller triggers an alarm when the tunnel temperature exceeds the outside temperature by the number of degrees you set for Tunnel cooling sensor limit. Cooling pump limit
Tunnel cooling sensor 1 alarm	<p>The house controller triggers an alarm if the sensor is short-circuited or disconnected.</p> <p>In case of sensor failure, the climate controller will adjust tunnel cooling according to the outside temperature + 2 °C.</p>

6.6.6 Pressure sensor

Alarm settings | Climate | Pressure sensor

Pressure sensor	<p>With the function Sensor alarm delay you can postpone the alarm signal so that the alarm is not triggered by transient changes of the pressure level in the house, e.g. when a door is opened.</p> <p>The controller activates an alarm when the pressure in the house drops below or exceeds the settings of Pressure high limit/ Pressure low limit.</p>
------------------------	--

6.6.7 Auxiliary sensor and CO2 alarm

Alarm settings | Climate | Sensor errors/CO2 alarm

Auxiliary sensor CO2 alarm	The house controller triggers an alarm if the values for the sensor fall below or exceed the setpoints.
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6.6.8 NH3 alarm

Alarm settings | Climate | NH3 alarm

NH3 alarm	<p>The house controller triggers the alarm when the NH3 content of the air in the house registers above or below the alarm limit.</p> <p>From the factory the low alarm is disconnected. The alarm limit is factory pre-set at such a low level (5 %) that the alarm is only usually triggered upon intrinsic sensor errors.</p> <p>In the case of a high alarm (30 ppm) the house controller ventilates 100%.</p>
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6.6.9 Heat recovery alarm

Alarm settings | Climate | Heat recovery

Heat recovery unit	<p>The flap alarm for the heat recovery unit works in the same way as the other flap alarms, see Inlet and outlet alarm [► 94].</p> <p>The controller can generate an alarm if the temperature sensor in the air inlet is short-circuited or disconnected.</p> <p>The controller generates an alarm when the temperature in the air inlet is below the set limit (-5 °C).</p>
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6.6.10 Dynamic Air Alarm

Alarm settings | Climate | Dynamic Air

Dynamic Air	<p>The Dynamic Air alarm may be due to a mechanical error in the fan, the pressure sensor or the flap position. The house controller triggers an alarm if the measurement of the ventilation output deviates from the calculated ventilation requirement.</p> <p>Check the fan while it is running. Further troubleshooting must be carried out by technically trained personnel.</p>
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6.6.11 Alarm for pop holes

Depending on the installation of the function, the controller will make an alarm for when the pop holes do not open and/or close as required.

As long as the alarm is active, the controller will not open and close the pop holes. The user must acknowledge the alarm, before adjustment is made again.

Alarm settings | Climate | Pop holes alarm

Max. time for closing pop holes	The alarm monitors if the pop holes are opened/closed within the set time period.
Max. time for opening pop holes	

6.6.12 Winter garden alarms

Depending on the installation of the function, the controller will make an alarm for when access to the winter garden does not open and/or close as required.

As long as the alarm is active, the controller will not open and close the access to the winter garden. The user must acknowledge the alarm, before adjustment is made again.

Alarm settings | Climate | Winter garden alarm

Max. time for closing winter garden The alarm monitors if access to winter garden is opened/closed within the set time period.

Max. time for opening winter garden

6.6.13 Catching

Catching

Catching key error Alarm that the catching is not completed within the set period.

6.7 Emergency control

6.7.1 Emergency opening

The house controller has emergency opening as a standard function regardless of whether an actual emergency opening is installed. As long as there is power, the controller will open the ventilation system 100 % in case of a relevant alarm - even if it is cold outside.

The emergency opening can be activated by five types of alarms.

Activated by	Side	Tunnel (CT, T)
High temperature	Yes	
Absolute high temperature	Yes	Yes
Absolute high humidity	Yes	Yes
Pressure high alarm	Yes	Yes
Pressure low alarm	Yes	Yes
Power failure	Yes	Yes

It may be an advantage to disconnect absolute high humidity in houses that are placed in areas with very high outside air humidity and in situations when a technical sensor error emerges.

6.7.2 Temperature-controlled emergency opening

 This section is relevant only to houses where temperature controlled emergency opening is installed.
 
 

Temperature controlled emergency opening is only triggered when the inside temperature exceeds the temperature setpoint for emergency opening (**Emergency opening setpoint**). You can read off the setpoint as an actual temperature figure on the house controller's display. The emergency opening is also triggered in the event of power failure.

Emergency opening temperature

You can set the temperature at which emergency opening shall occur directly on the emergency opening's adjustment knob. The setpoint can be read off in the display together with Temperature setpoint.

Warning at emergency temp.

The house controller can issue a warning that will flash in the display in the event of the **Emergency opening setpoint** being too high in relation to the **Temperature setpoint** (inside temperature). This is especially relevant at batch production and a falling temperature curve. This is where on an ongoing basis you must adjust the **Emergency opening setpoint** downwards. However, too high a setting can also be caused by an error.

The warning function can be connected and disconnected. The setting here should be the number of degrees by which the **Emergency opening setpoint** must exceed the **Temperature setpoint** for the controller to issue a warning.

Battery alarm and battery voltage

Temperature controlled emergency opening has a battery that ensures that the emergency opening will open, despite there being a power failure, if the inside temperature exceeds the **Emergency opening setpoint**.

You can read off the current and the lowest measured voltage on the battery. These readings indicate whether you need to replace the battery or whether there may be a technical fault causing the battery alarm.

The house controller can trigger an alarm if the battery that operates emergency opening is not working.



Be careful not to set the **Battery voltage limit** too low, as this will actually deactivate the alarm.

6.7.3 Emergency inlet

- This section is relevant only to houses where emergency inlets are installed.

The emergency air intake can be triggered by four types of alarms.

Activated by	
Emergency inlet (temperature)	Set
Absolute high temperature	Connect or disconnect
Error temperature sensor	Connect or disconnect
Power failure	Always activate

Whether an inside temperature sensor error should trigger the emergency inlet depends on the general climate conditions. If it is very hot, you could profit from using the function. However, if it is cold, you should consider the necessity of using it and whether the animals will suffer.

The emergency Inlet has its own temperature setting **Emergency Inlet**, where the number of degrees are entered for the **Temperature setpoint** and any **Comfort temperature**.

This setting makes it possible to open the air intake during a hot season where the air intake, under normal conditions, is not activated by the normal high temperature alarm limit.

7 Maintenance instructions

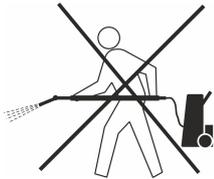
The house controller requires no maintenance to function correctly.

You should test the alarm system every week.

Use only original spare parts.

Note that the service life of the house controller will be extended if it stays connected all the time, as this will keep it dry and free from condensation.

7.1 Cleaning



Clean the product with a cloth that has been wrung out almost dry in water and avoid using:

- high-pressure cleaner
- solvents
- corrosive/caustic agents

7.2 Recycling/Disposal



Products suitable for recycling are marked with a pictogram.

It must be possible for customers to deliver the products to local collection sites/recycling stations in accordance with local instructions. The recycling station will then arrange for further transport to a certified plant for reuse, recovery and recycling.

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