307Pro • 310Pro China

Climate Controller

User Manual

99-94-0646 06/2025 GB • 2025-06-02

Big Dutchman

Software version 9.0

1 Declaration of Conformity

Manufacturer:	**SKOV A/S**
Address:	Hedelund 4, DK-7870 Roslev, Denmark
Telephone:	+45 72 17 55 55

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Product:	310Pro series
Type, model:	Controller

EU directives:	2011/65/EU	RoHS Directive
	2014/30/EU	Electromagnetic Compatibility (EMC)
	2014/35/EU	Low Voltage Directive (LVD)

Standards:
EN 63000:2018
EN 61000-6-2:2019
EN 61000-6-4:2019
EN 62368-1:2024

We declare as manufacturer that the products meet the requirements of the listed directives and standards.

Location: Hedelund 4, DK-7870 Roslev

Date: 2024.11.01

Tommy Bak

CTO

CE

Product and Documentation Changes

Big Dutchman reserves the right to change this document and the product herein described without further notice. In case of doubt, please contact Big Dutchman.

The date of change appears from the front and back pages.

IMPORTANT

Notes concerning alarm systems

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. The power supply isolator is not included.

Note

- All rights belong to Big Dutchman. No part of this manual may be reproduced in any manner whatsoever without the expressed written permission of Big Dutchman in each case.
- All reasonable efforts have been made to ensure the accuracy of the information contained in this manual. Should any mistakes or imprecise information occur in spite of this, Big Dutchman would appreciate being notified thereof.
- Copyright by Big Dutchman.

1 Declaration of Conformity 3

2 Guidelines 8

3 Product description 9

4 Operating instructions 12

4.1 Operation 12
4.1.1 Two-house variant 13
4.1.2 Selection of language 13
4.1.3 Climate card with daily settings 13
4.1.4 Search in menus 14

4.2 Operation - pigs 15

4.3 Report 16

4.4 Auxiliary 17

4.5 Activity log 18

4.6 Menu button 19
4.6.1 Pause functions 20
4.6.2 Strategy 22
4.6.2.1 Setting curves 22
4.6.3 Settings 23
4.6.3.1 System 23
4.6.3.1.1 Password 23
4.6.3.2 Alarms 25
4.6.3.2.1 Stopping an alarm signal 26
4.6.3.2.2 Power failure alarm 26
4.6.3.2.3 Power reduction when power supply is insufficient 26
4.6.3.2.4 Alarm test 26
4.6.3.3 About 26

5 Climate 27

5.1 Automatic climate control 27

5.2 Temperature 28
5.2.1 Temperature control 28
5.2.1.1 Heat wave comfort 29
5.2.1.2 FreeRange 30
5.2.1.3 Comfort temperature 31

5.3 Humidity 33
5.3.1 Humidification 35
5.3.2 Humidity control mode 35
5.3.2.1 Humidity ventilation 36
5.3.2.2 Temperature reduction 36
5.3.2.3 Humidity heat 37
5.3.3 Intelligent humidity control - at high outside temperature and outside humidity 37
5.3.4 Humidity settings 38
5.3.4.1 Adaptive humidity ventilation 38
5.3.4.2 Adaptive humidity heat 38

5.4 Ventilation 40
5.4.1 Air quality 40
5.4.1.1 Cycle timer at minimum ventilation 42
5.4.1.2 NH3 42
5.4.2 Side ventilation 42
5.4.2.1 Ventilation settings 43
5.4.2.1.1 Inlet de-ice 43
5.4.3 Tunnel ventilation 45

5.4.3.1 Cycle timer at tunnel ventilation ... 45
5.4.3.2 Chill factor and chill effect ... 45
5.4.4 Combi-Tunnel ventilation ... 47
5.4.4.1 Combi-tunnel ventilation: change between side and tunnel ... 48
5.4.5 Pressure ... 48
5.4.5.1 Equal pressure ventilation ... 49
5.4.6 Ventilation status ... 49
5.4.7 Parking of fans ... 50

5.5 Delivery ... 51

5.6 Cooling ... 52
5.6.1 Cooling potential ... 52
5.6.2 Spraying and behavior control ... 52
5.6.2.1 Spray sequence ... 52
5.6.2.2 Limitation of spraying ... 53
5.6.3 Behavior control ... 54
5.6.4 Tunnel cooling ... 55
5.6.4.1 Tunnel cooling settings ... 55
5.6.4.2 Start cooling ... 55
5.6.4.2.1 Tunnel cooling start based on a fixed air speed ... 56
5.6.4.2.2 Tunnel cooling start based on an adapted air speed ... 56
5.6.4.2.3 Tunnel cooling start based on inside temperature ... 57

5.7 Heating ... 58
5.7.1 House heaters ... 58
5.7.1.1 Minimum heating ... 59
5.7.2 Stand-alone heating ... 60
5.7.3 Floor heating ... 60

5.8 House mode Active house - Empty house ... 63
5.8.1 Empty house safety ... 64

5.9 Pause functions ... 65
5.9.1 Disinfection ... 65
5.9.2 Empty house ... 66
5.9.2.1 Preheating ... 66
5.9.2.2 Temperature surveillance ... 67

6 Production ... 68

6.1 Animals ... 68

6.2 Pig weighing ... 68

6.3 Water ... 69

6.4 24-hour clock ... 70

7 Management ... 71

7.1 Equipment status ... 71

7.2 Power reduction ... 71

8 Alarm settings ... 72

8.1 Climate ... 72
8.1.1 Temperature alarms ... 72
8.1.2 Humidity alarm ... 73
8.1.3 Inlet and outlet alarm ... 73
8.1.4 Sensor alarm ... 74
8.1.5 Tunnel cooling sensor alarm ... 74
8.1.6 Pressure sensor ... 75
8.1.7 Auxiliary sensor, CO2 and NH3 alarm ... 75
8.1.8 Emergency control ... 75
8.1.8.1 Emergency opening ... 75
8.1.8.2 Temperature-controlled emergency opening ... 75
8.1.8.3 Emergency inlet ... 76

8.2 Production 76
8.3 Auxiliary 76
8.3.1 Auxiliary alarms 76
8.4 Master/Client alarms 77
8.5 Equipment status 77
9 Maintenance instructions 79
9.1 Cleaning 79
9.2 Recycling/Disposal 79

2 Guidelines

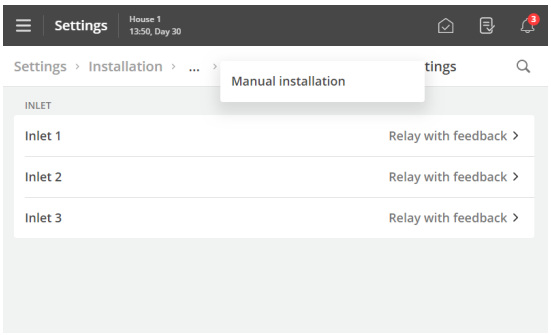
This user manual deals with the daily operation of the controller. The manual provides fundamental knowledge about the functions of the controller that is required to ensure optimum use of it.

The user manual describes the general operation of the controller and all climate functions. A description of production functions can be found in the appurtenant user manual for production.

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 *Technical Manual* or contact service or your dealer, if required.

10" and 7" controller display

The displays shown in this manual are from a 10" controller display where the menu overview is shown to the left in the display. If you use a controller with a 7” display, the menus are shown in the middle of the display.



Using a 7” display you can press the menu headlines at the top of the display to go back step-by-step in the menus.

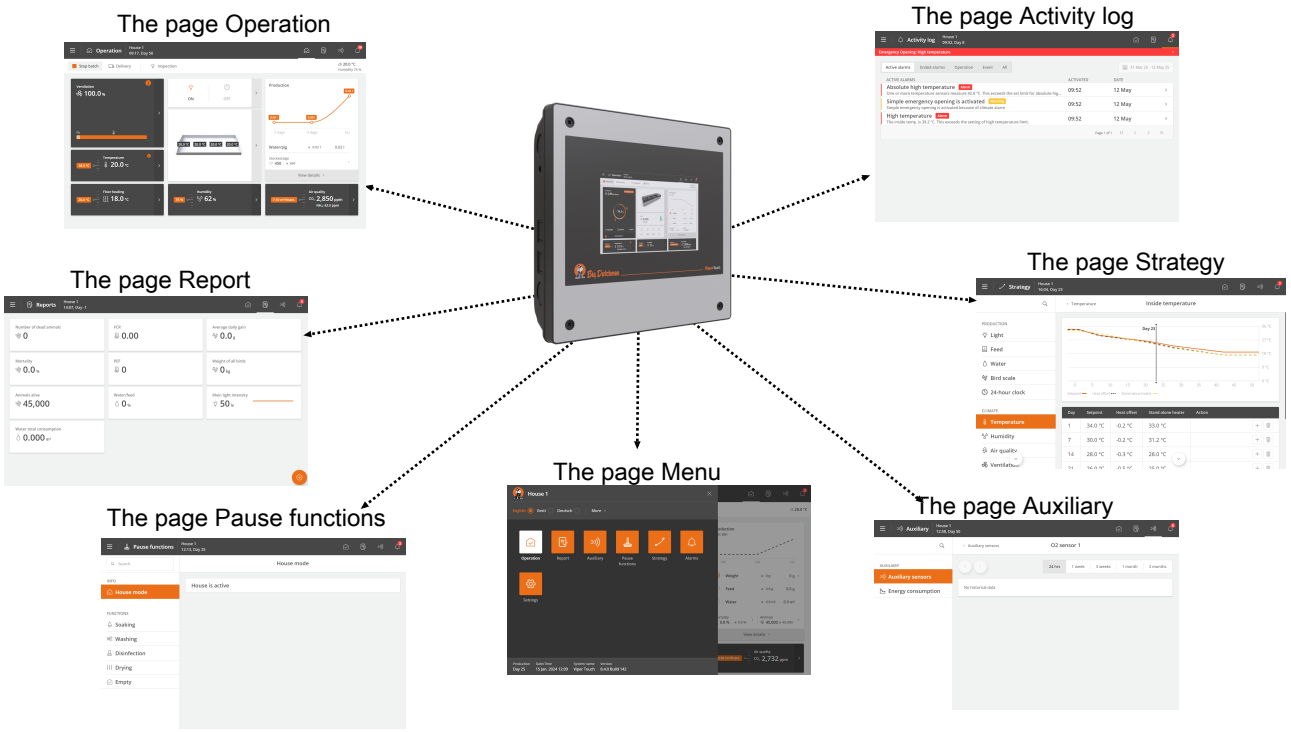
If more steps are available that what can be shown, you can press the 3 dots and select a menu from the appearing list.

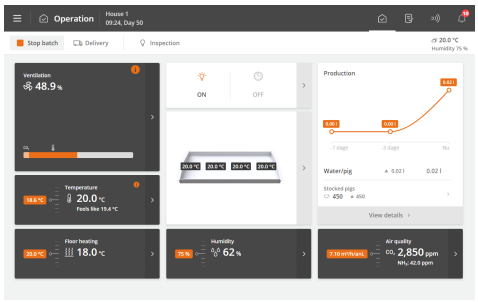
3 Product description

310Pro China is a two-house climate controller for pig houses, which can regulate and monitor the climate in the house.

A page setup adapted to the needs of pig producers

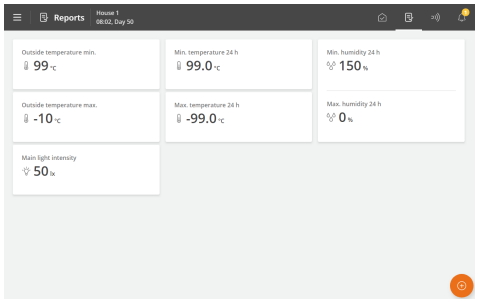
The controller has 6 main pages, which are adapted to pig production and a menu page. The pages contain selected functions and views relevant to the daily work.





The page **Operation**

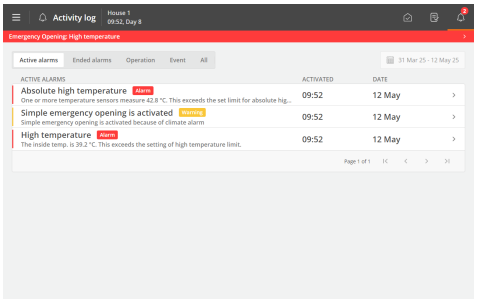
The page is the main page view where the functions used for daily operation are gathered.



The page **Report**

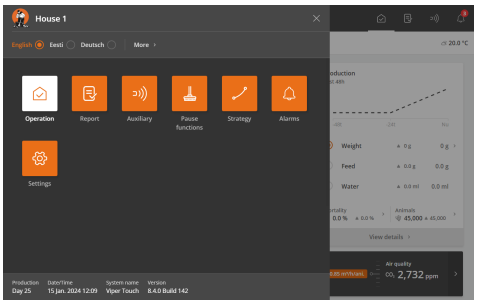
The page can be set up according the user's wishes to contain cards with key values showing current data.

It can thus be used to collect values that must be read daily and collect data to be reported.



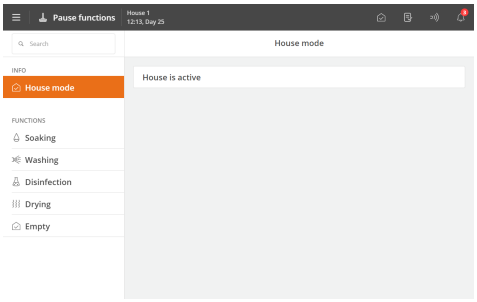
The page **Activity log**

The page displays a log of all recorded alarms, operations of the controller and events.



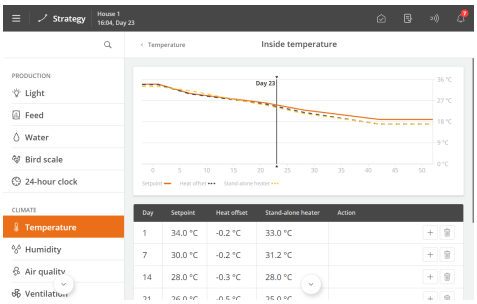
Menu button

The button gives access to language selection and to a collection of shortcuts to the various pages.



The page **Pause functions**

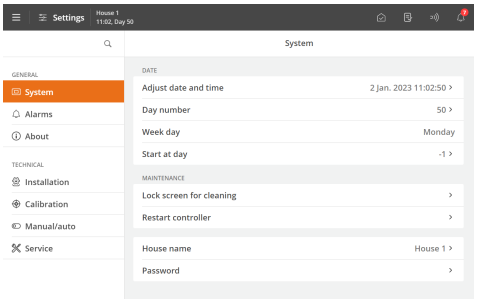
The page gives access to functions designed partly to facilitate the activities you must carry out in the house to clean it and prepare it for the next batch and partly to ensure the air change and temperature in the house while it is empty.



The page **Strategy**

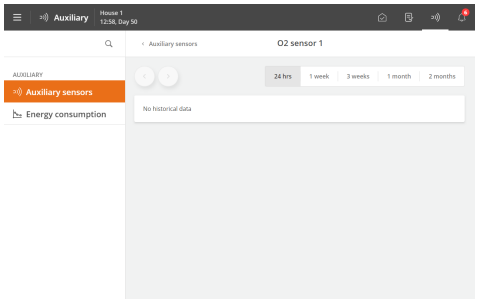
The page gives access to determination of the desired production strategy, which must be repeated from batch to batch.

These are, for example, program settings, references, and batch curves.



The page **Settings**

The page provides access to general settings and alarm limits.



The page **Auxiliary**

The page gives access to graphical displays of historical data from various types of additional equipment (auxiliary sensors and energy meters).

The page is only displayed if additional equipment is installed.

4 Operating instructions

4.1 Operation

Each page is composed by different types of cards that provide information about the operation and quick access to operation.

From the top bar of the page, there are shortcut buttons that allow you to switch between the main pages **Operation** (**C**), **Report** (**D**)**, Auxiliary** (**E**) and **Activity log** (**F**).

A The icon and name of the page.

B The house name, time, and possibly week and day number.

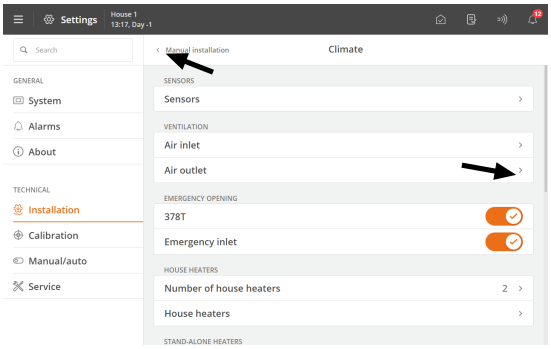
C The **Operation** page provides an overview and the ability to operate the functions most needed for your daily work.

D The **Reports** page shows the key values the user wants on the page.

E The **Auxiliary** page displays the consumption figures and auxiliary equipment status (if installed).

F The **Activity log** page displays active alarms and a complete log of operations, events, and alarms.

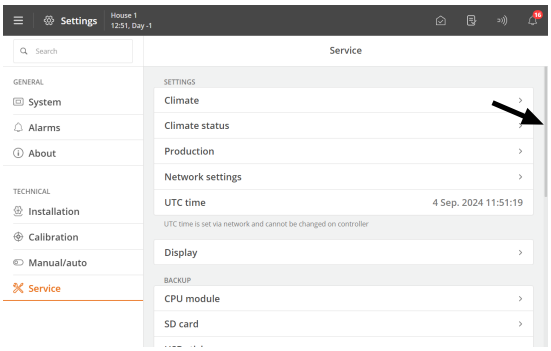
G The menu button gives access to language selection (see section Selection of language [▶ 13]) and other pages: **Pause functions**, **Strategy** and **Setting**.



Navigation menus provide access to sub-menus.

› The right arrow displays a sub-menu.

‹ The left arrow in the upper left corner allows you to take one step back in the menu.



Scroll

If the page is higher or wider than the display, you can scroll.

This is shown in the display as scroll bar.

Scroll by sliding your finger over the display.

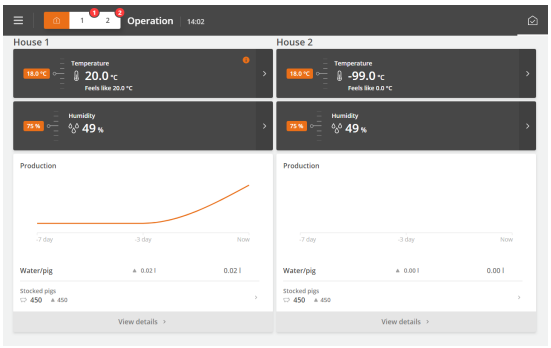
7” Display

This is shown in the display as arrows or scroll bar.

Scroll by pressing the arrows or letting your finger slide across the display.

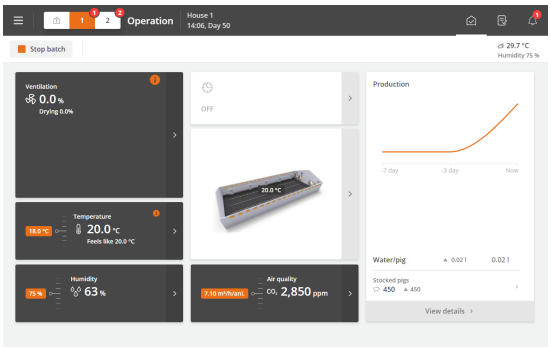
4.1.1 Two-house variant

The two-house controller have house keys for each house and a shared page view for **Operation**.



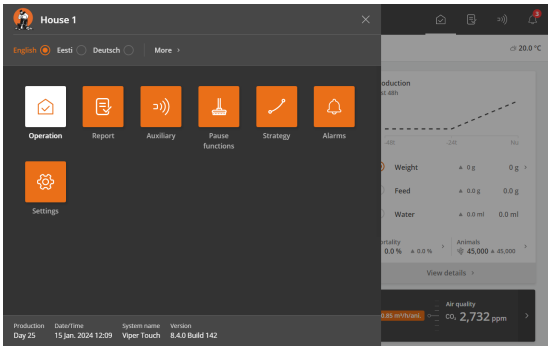
Press the house key to display a shared front view for both houses.

Press to access the overview.
When you press the house key, only the shared settings for the controller are shown, if the **Settings** menu is opened.



Press house key 1 or 2 to display pages for the individual house or to access the house menus.

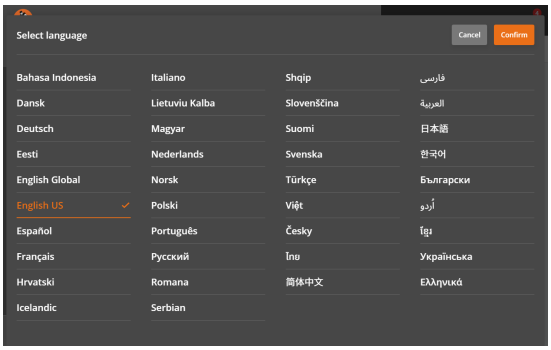
4.1.2 Selection of language



Press the Menu button.

A dot indicates the selected language.

Press **More** if the requested language is not displayed.



Select the language from the list. Press **Confirm**.

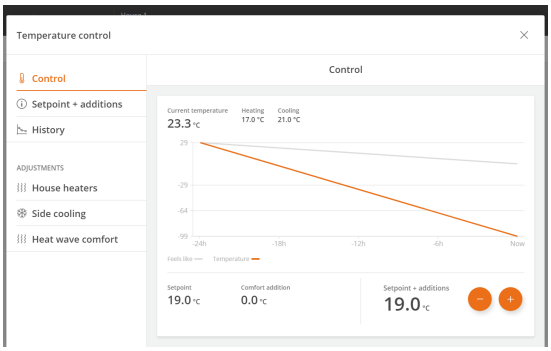
Note that function names (such as 24-hour clocks, water meters, and programs the user can name) are not translated into the selected language.

The factory setting for the names is English.

4.1.3 Climate card with daily settings

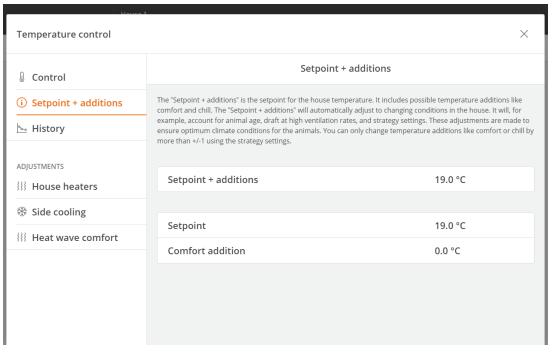
Press **Operation**.

The climate cards at the bottom of the page **Operation** provide an overview of the current climate in the house for daily users.



The climate cards provide easy adjustment of temperature, humidity and CO_2, for a graphical display of climate data over the last 24 hours, and for a number of settings and data in the settings menu.

When adjusting the temperature setting, the controller shows how the adjustment will affect the climate control, such as whether the ventilation will increase or decrease, for example.



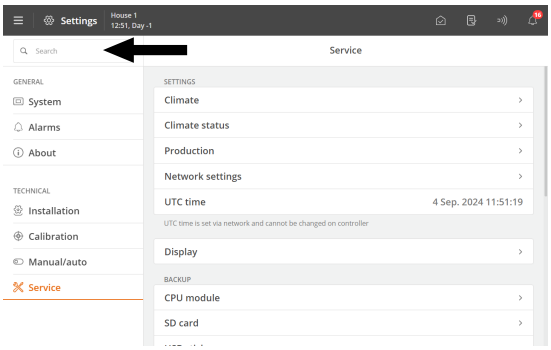
Temperature card. Setpoint + additions

Displays the parameters that determine the current temperature control.

4.1.4 Search in menus

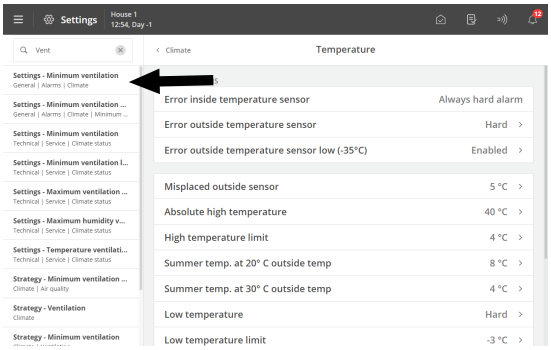
It is easy to search for the individual functions of the controller. There are search fields on the pages: **Auxiliary, Pause functions, Strategy,** and **Settings**.

A search across the pages is performed.



Use the search field to the left to search in menus.

Enter at least 3 characters to search.



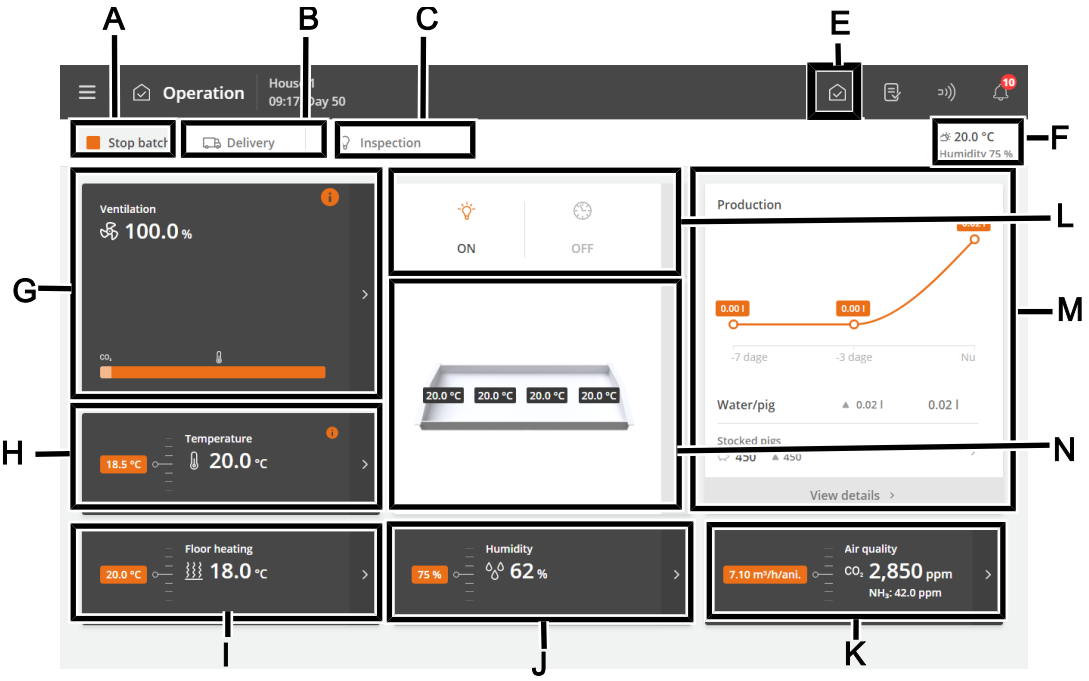
The result is shown below the search field. The path for the individual menus is also shown, for example, under Settings: **General | Alarms | Climate**.

Press a search result to go directly to that menu.

Press the X in the search field to remove the search results again.

4.2 Operation - pigs

The page has been adapted for pig production. It contains selected views and settings relevant to the daily work of a pig house.



A The function button **Stop batch/Start batch**. See the section House mode Active house - Empty house [▶ 63].

B The function button **Delivery**. The function is designed to alter the air change in the house in connection with all or some animals leaving the house.

C The function button **Inspection** for manually activating the inspection light.

E **Shortcut to the main page Operation**.

F View of outside temperature and outside humidity.

G Status view for climate control and access to the climate equipment menus and house card setup.

The house card displays values for climate sensors and climate equipment. The values are displayed as whole numbers. In case of an error, a line appears instead and the value changes color to red.

The status view also provides a shortcut for manual control of the climate equipment. This is intended for situations where equipment must be stopped.

H Temperature settings. See the section Temperature.

I Floor heating settings. See the section Floor heating [▶ 60].

J Humidity settings. See the section Humidity [▶ 33]

K The ventilation functions CO_2 and NH_3. See the section Air quality [▶ 40].

L Status view for climate and production functions controlled by time programs. The views also provide an overview of all applications and their associated settings.

M View of the development of key figures for animal weight, feed, and water consumption during the past 2 days. In addition, the view of calculated mortality and the current number of animals and shortcuts for recording the number of dead and moved animals.

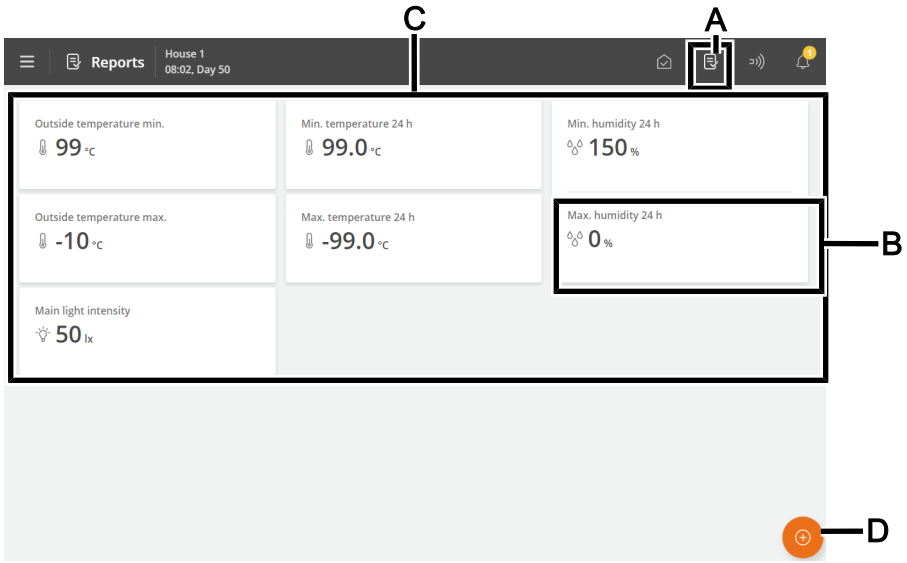
The view also provides a shortcut to details with information and settings options.

N The house card displays values for climate sensors and climate equipment. The values are displayed as whole numbers. In case of an error, a line appears instead and the value changes color to red.

The house card provides access to status displays for climate control, menus for climate equipment, and house card configuration.

4.3 Report

The user can set up the page to include the key values that give the desired overview of climate and production values.

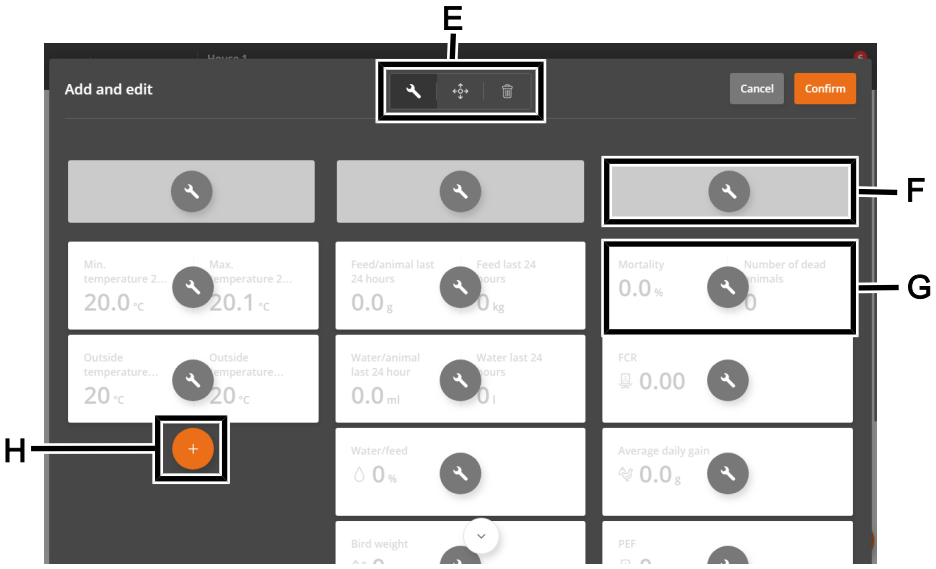


A Shortcut to the **Reports** page.

B Card with the key value. Each card can be set up to include up to 3 key values.

C The page displays a series of cards with selected key values for, for example, history and current values.

D Edit button. Gives access to choose between the desired key values.



E Tools for editing headlines or content on cards and moving or deleting cards.

First, press a tool and then make the desired change.

F Column header.

Press to name.

G Card with the key value.

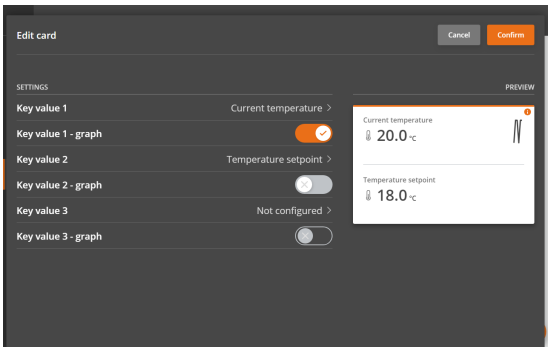
Press to change the key value and set up its view.

H Tool for adding a new card in the column.

Press to add a card and select the desired key value.

Cards with several key values

You can merge several cards to view up to 3 key values in one card.



Press the editing tool.

Press on the key value to be changed.

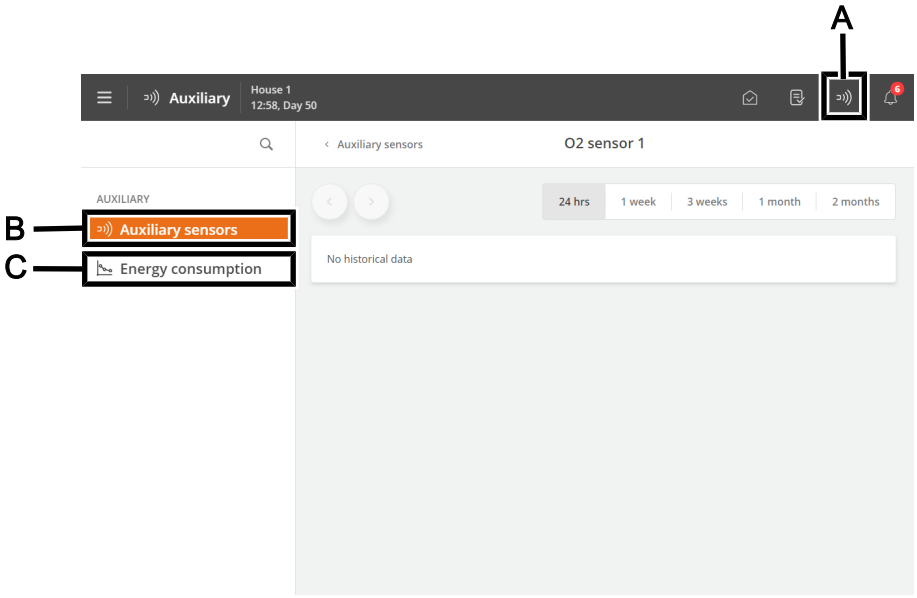
Select Key value 2 and select the key value to be displayed.

Select Key value 3, if required and select the key value to be displayed.

To the right a preview of the card is shown.

4.4 Auxiliary

The page provides access to recordings from different types of equipment (auxiliary sensors and energy meters), which can be used for monitoring, as an example.



A Shortcut to the page **Auxiliary**.

B The **Auxiliary sensors** menu provides an overview of the controller recordings supplied by the auxiliary sensors in a graphical view.

The auxiliary sensors do not influence the regulation.

The controller records the content of CO_2, NH_3, O2 in the air as well as humidity, pressure, and temperature. You can also connect air velocity and wind direction sensors that can measure the wind direction and wind velocity outside the house.

The values measured by each sensor are viewed in intervals of 24 hours to 2 months.

C The menu **Energy consumption** shows the current consumption in W and total consumption in kWh. The menu content depends on the type and the setup of the controller.

4.5 Activity log

The Activity log page displays a log of alarms, operational changes, and events.

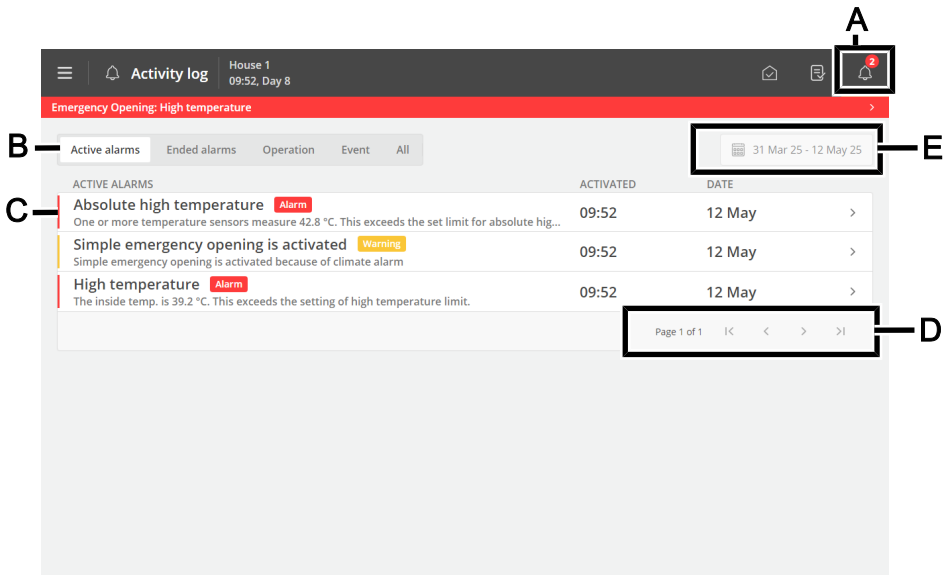
The most recent activity appears at the top. Previous activities can be viewed on the underlying log pages.

The activity log tabs show the different activity categories.

Alarms are divided into active and terminated alarms.

Alarm status colors:

- Red – hard active alarm
- Yellow – soft active alarm (warning)
- Gray – deactivated alarm



A Shortcut to the page **Activity log**.

The icon for the Activity log indicates the number of active alarms as long as an alarm situation has not ceased.

B Filtering options for the various types of activities:

Active alarms: displays alarms where the alarm situation is still present.

Ended alarms: displays alarms where the alarm situation has ceased.

Operation: shows the operation of the controller

Event: shows, for example, reset of the controller

All: shows all types

C Each line shows an activity.

Press the activity line to see details, such as when an alarm was activated and acknowledged. Also, when a value/setting was changed.

Press **Close** to close the details screen again.

D Page view in the activity log.

Switch one page at a time or switch to the first or last page.

E Filtering option for dates and periods.

Several alarms often 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 allow you to follow an alarming course back in time to detect the error that caused the alarm.

See the description of alarms in the section Alarms [▶ 25].

4.6 Menu button

The menu button gives access to language selection and general settings pages.

A Menu button

B Displaying house name, day number, time, week number, if required, variant name, and software version.

C Select language. Access other languages under **More**.

Note that function names (such as 24-hour clocks, water meters), and programs the user can name are not translated into the selected language. The factory setting for the names is English.

D Shortcut to the page **Pause functions**.

The page is designed partly to facilitate the activities 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.

E Shortcut to the page **Strategy**.

The page provides access to the batch curves, which form the basis for controlling climate and production functions. See also the section Setting curves [▷ 22].

F Shortcut to the page **Settings**.

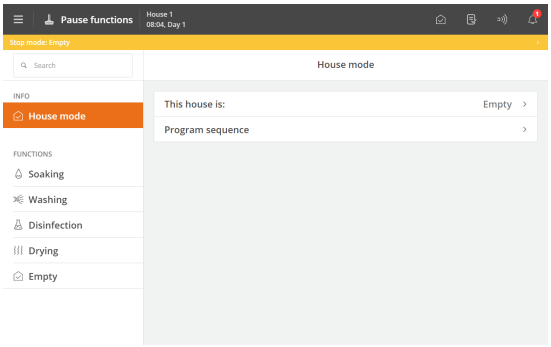
The page provides access to the user settings for **House info**, **Alarm settings,** and **Password**. See the sections System [▷ 23], Alarms [▷ 25], and Password [▷ 23].

In addition, you have access to the technical menus used for setup and service. See the Technical Manual.

4.6.1 Pause functions

The page gives access to functions designed partly to facilitate the activities 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.

- Soaking
- Washing
- Disinfection
- Drying
- Empty



State

The controller can only activate the functions when the house status is **Empty**.

Empty house status is indicated at the top of the page by a colored bar.

When the time of a function is up, the controller will again regulate according to the settings for **Empty**.

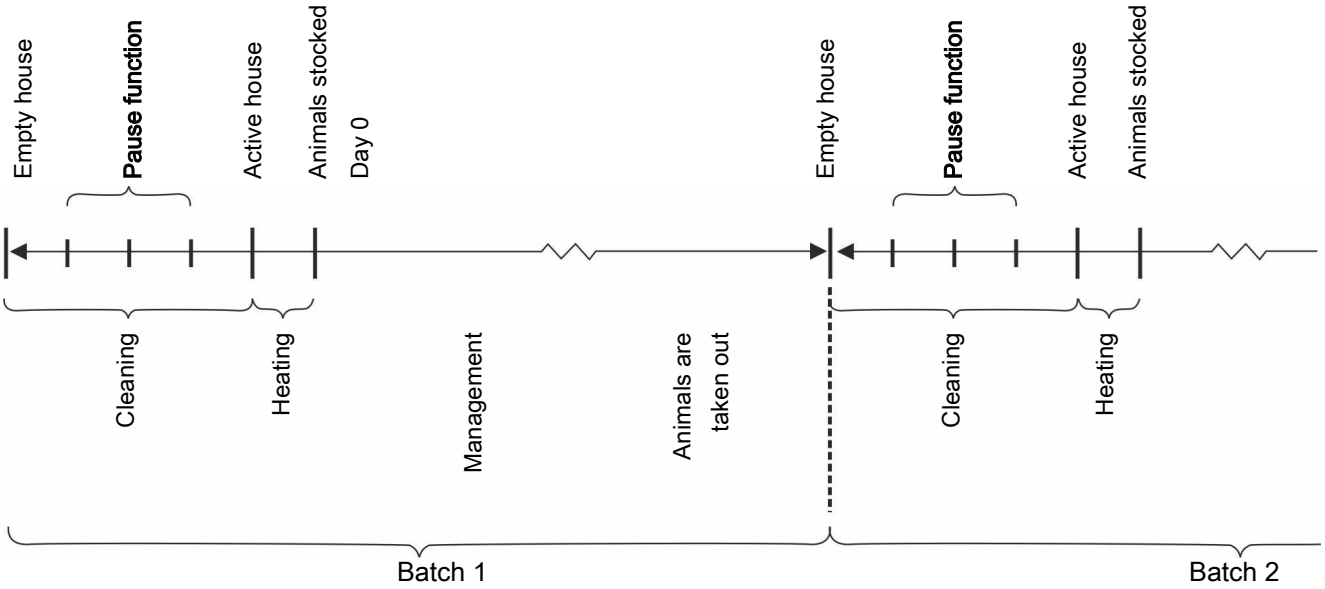


Figure 1: Setup example of Pause functions for batch production

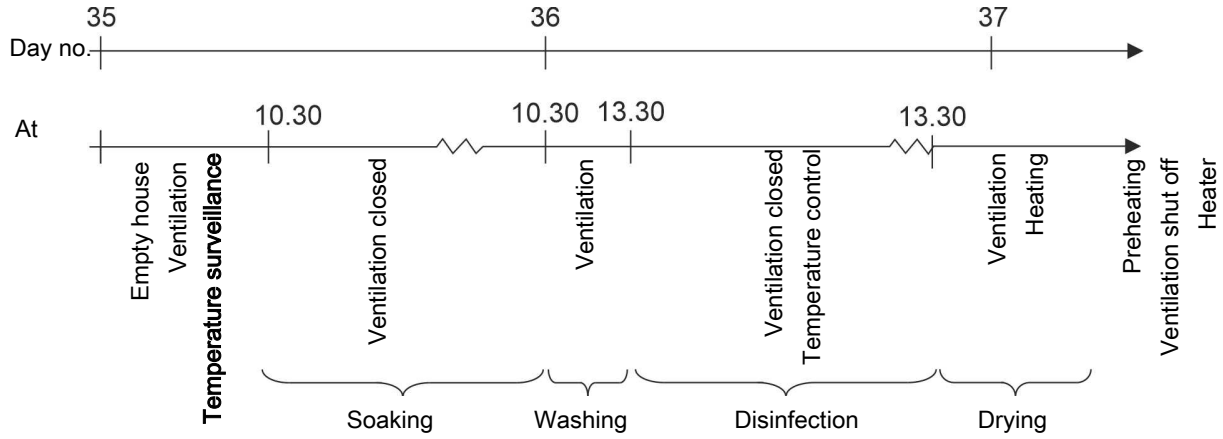
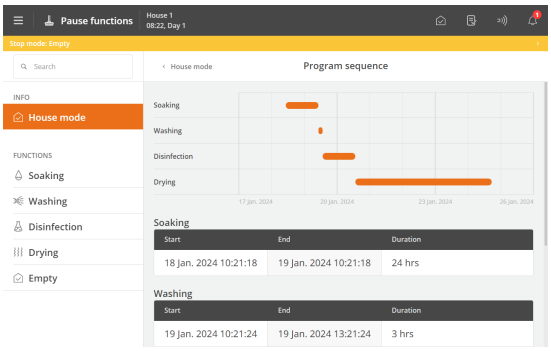


Figure 2: Sequence of functions



Program sequence

You can set up each function to start at a specified time. It is thus possible to set an entire program sequence for the functions.

Menu button | **Pause functions** | **Info** | **House mode** | **Program sequence**

This house is:	Function selection menu (only displayed when the house status is **Empty**).
Function remaining time	When a function is activated, the set time counts down (only displayed when the house status is **Empty**).
Program sequence	Menu for setting the start time and function duration (only displayed when the house status is **Empty**).

Also see the section Pause functions [▶ 65] for a description of the various functions.

4.6.2 Strategy

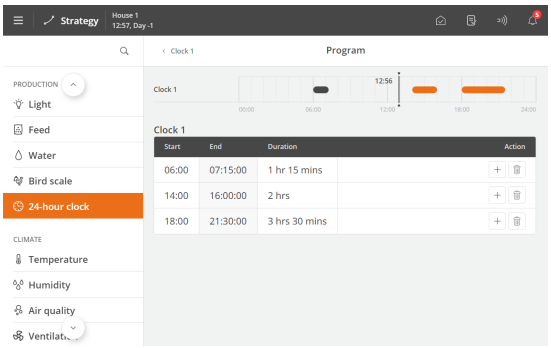
The page provides access to the more constituent function settings that you typically do not need to change during a batch. The strategies are thus determined in light of the overall requirements for the production.

It is where batch curves for temperature and light are set up, sub-functions such as nozzle cleaning for cooling are selected, and limit value settings are made.

Changes to the strategy curves are grouped here and displayed as **User offset**.

See the relevant section below for a description of the various functions.

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.

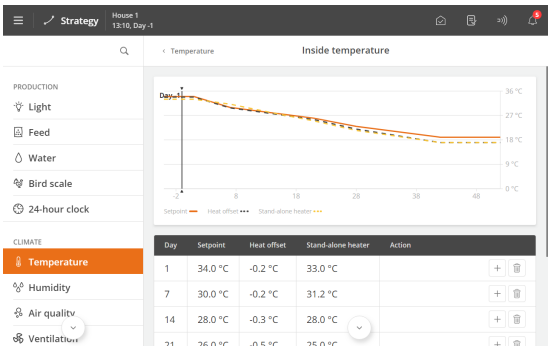


Depending on the type and setup of the controller, the following batch curves may be available:

- Inside temperature
- Heat offset temperature
- Stand-alone heater temperature
- Humidity
- Minimum ventilation
- Maximum ventilation
- …

When the controller is connected to a network with the management program BigFarmNet Manager, curves can also be changed via BigFarmNet.

4.6.2.1 Setting curves



Menu button | **Strategy**

Set up for each curve:

- A day number for each of the required curve points.
- The desired value of the function for each curve point.

Press + to add the required number of curve points.

Typically, the last day number of the batch curve is set to match the expected production time.

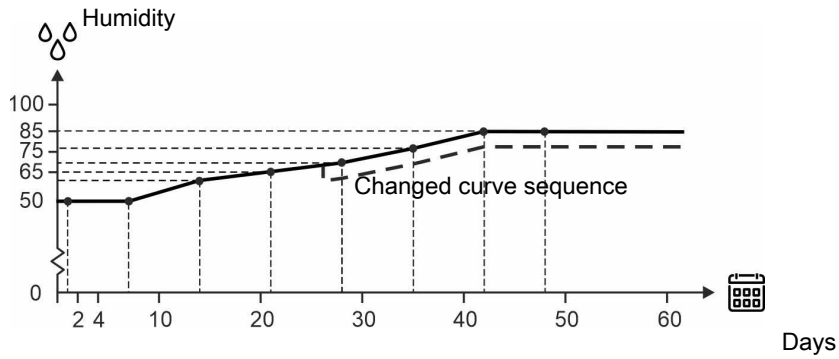


Figure 3: Curve for air humidity

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

4.6.3 Settings

The page provides access to general settings and alarm limits.

4.6.3.1 System

Menu button | **Settings | General | System**

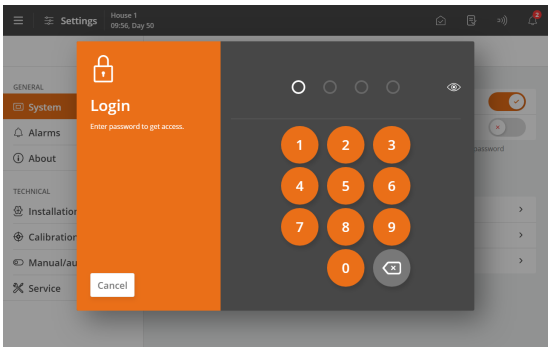
Adjust date and time	Setting current date and time. Correct clock setting is important for several control functions and alarm recording. Thus, all controller programs use date, time, and day number. The clock will not stop in the event of a power failure. **Summer and wintertime** There is no automatic adaptation in summer and winter, as some animal types are very sensitive to changes in their circadian rhythm. If you want the controller to follow the local time for summer and winter, you must manually change the time setting by +/- 1 hour.
Day number	Select whether the day number should show the time since start (house status is active) or the actual age of the animals. When the actual age of the animals is required, the day number must be adjusted until it matches the life expectancy. At midnight, day number 1 counts for every day that passes. Please note that if the day number is changed during a batch, it will shift/destroy the historical data of the batch (feed consumption, etc.). The function **Day number** can also be used to preheat the house by setting a number of minus days.
Week day	Viewing week day.
Start on day	Setting the day on which the batch shall start. Day number can be set as low as -3 so the controller can control the preheating of the house before the animals are stocked.
House name	Setting house name. Each livestock house must have a unique name when the controller is integrated with a LAN network. The house name is transferred through the network, and the livestock house should be identifiable based on the name. Set up a plan for naming all controllers connected to the network.
Password	Decide whether the controller must be protected against unauthorized operation using passwords. See section Password [▶ 23].

4.6.3.1.1 Password

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

The controller can be protected against unauthorized operation using passwords.

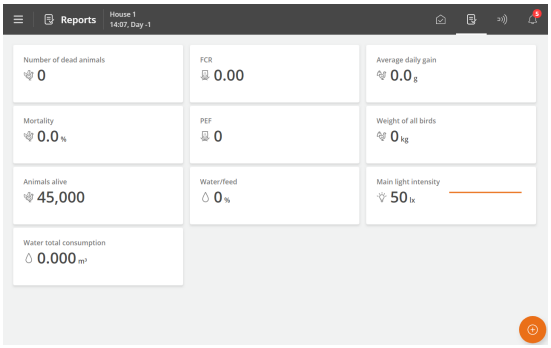
In order to have access to changing a setting, a password must be entered that corresponds to the user level which the relevant function is found at (**Daily**, **Advanced** and **Service**).



Menu button | **Settings** | **General** | **System** | **Password** to access the activation of the function.

Enter a service password.

After entering the password, the controller can be operated at the corresponding user level. After 10 minutes without operation, the user is automatically logged out.



Select a page after an operation. After 1 minute, the controller will request the password again.

Activate the function **Use password for the Technical menu only** to make the controller require the **Service** password only when the user wants to change settings in the menus **Installation**, **Calibration**, and **Service**.

Change password for each of the 3 user levels.

To gain access to changing a password a valid password must first be entered.

Menu button | **Settings** | **General** | **System** | **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 Manual climate control	
Daily	Daily: Changing set values	1111
Advanced	Daily + advanced: Changing curves and alarm settings Manual production control	2222
Service	Daily + advanced + service: Changing settings under Technical menu	3333

Access limitation to operate the controller

We recommend that you change the default passwords and subsequently change the password regularly.

Forgotten Password

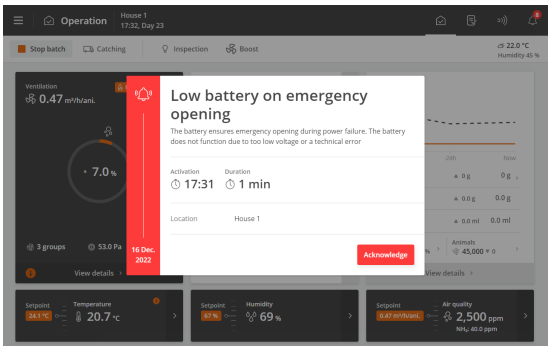
If an incorrect password is entered 3 times, the controller will display its MAC address and UTC date.

These must be provided by contacting a Service Partner who can assist with a new temporary Service Password. The password is specific to the individual controller and only valid on the day it is generated.

4.6.3.2 Alarms

Alarms only work when the status is Active house.

The only exceptions are alarm tests and alarms for CAN communication and temperature surveillance at **Empty**.



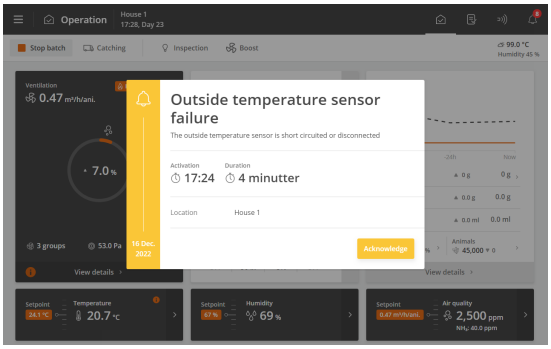
The controller will record the alarm type and time when an alarm occurs.

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

Red: hard alarm

Yellow: soft alarm

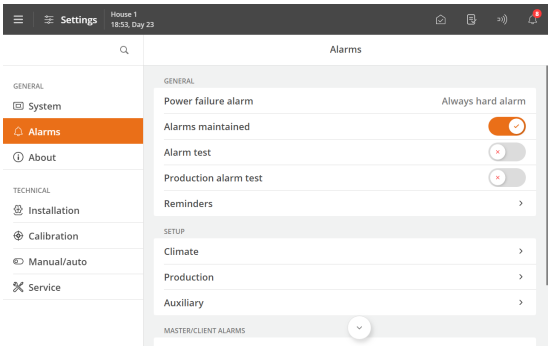
Gray: deactivated alarm (alarm state ceased)



You can choose whether the alarm should be hard or soft for selected climate and production alarms.

Hard alarm: Red alarm pop-ups on the controller and generation through the connected alarm units, e.g., a horn. Only hard alarms trigger the alarm relay.

Soft alarm: Yellow pop-up alert on the house controller. Soft alarms generate a pop-up in the display.

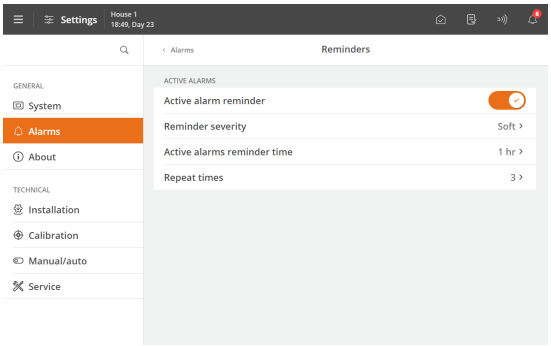


The controller will also trigger an alarm signal, which you can choose to maintain.

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

Menu button | **Settings** | **Alarms**

Alarms maintained: Selecting whether the alarm signal should continue after the alarm condition has ceased.



Reminder

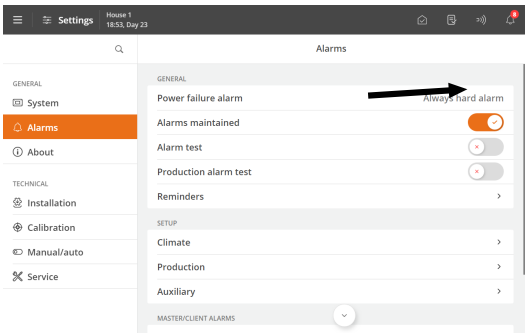
The controller can remind you of an ongoing alarm once you have acknowledged a hard alarm. It should ensure that the cause of the alarm is handled.

Reminder settings:

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

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

See section Climate [▶ 72] for setting the alarm and alarm limits.



Switch change

When the controller is connected to an override switch module, an alarm is available for changing the module's switch position.

Changes in the switch position are logged in the Aktivitet-sloggen.

4.6.3.2.1 Stopping an alarm signal

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

4.6.3.2.2 Power failure alarm

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

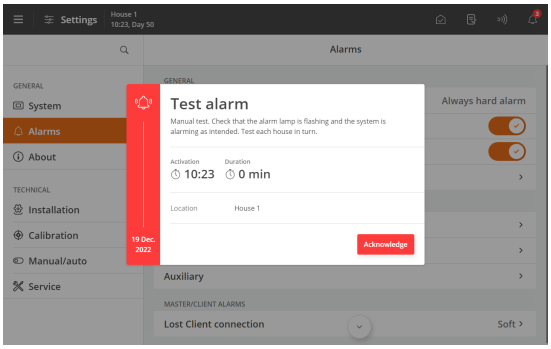
4.6.3.2.3 Power reduction when power supply is insufficient

If the power supply is insufficient for periods of time, the controller can turn off or limit the current consumption of the following functions: ventilation, main light, slave light, extra light, feeding system (pan feeding and layer feeding), and 24-hour clock.

The controller will also generate an alarm when the alarm condition has been present for 10 seconds.

4.6.3.2.4 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.

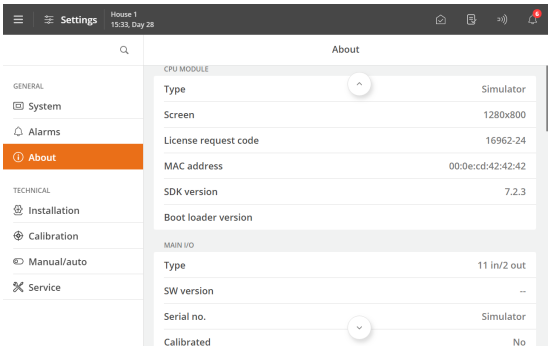
Check that the alarm lamp is flashing.

Check that the alarm system alarms as intended.

Press **Acknowledge** to finish testing.

4.6.3.3 About

The menu item contains information about types and versions of software and hardware.

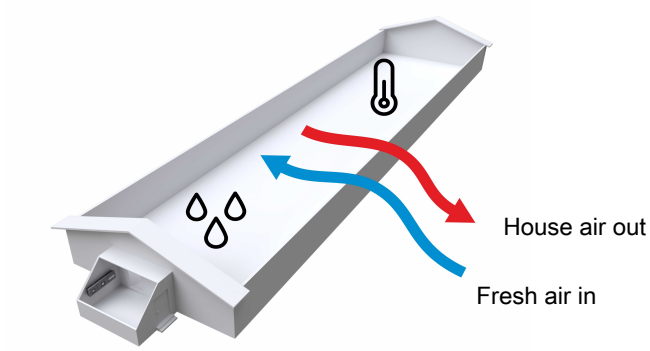


Furthermore, under **CPU module** you can see the license order code, which must be used when ordering additional software, e.g.,production add-ons.

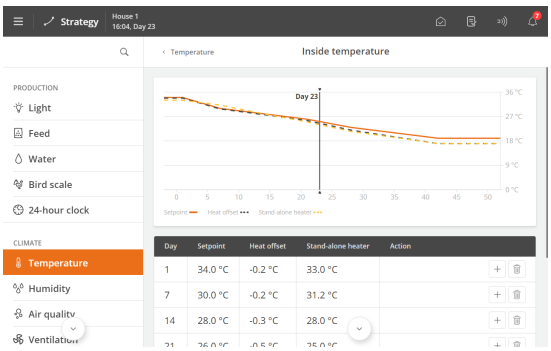
5 Climate

5.1 Automatic climate control

The controller automatically regulates and monitors a large number of factors that are important for the climate in the house - e.g.,air change and temperature. It can regulate very precisely and maintain the required temperature and humidity level in the house.



With correct setup of the controller, the daily user of the house should only exceptionally need to make manual changes to the settings.



The controller will continuously adapt the climate to the animals' age and needs on the basis of the strategy laid out.

In addition, it can via its adaptive functions adapt the regulation to the very current conditions such as e.g., changing outside temperature.

.

Manual mode

Normally the controller must be set to automatic control. During start up, or in a service situation, it may however be convenient to control the individual functions manually.

After the manual operation, you must set the function back to automatic control, so that the controller continues to operate as before.

Operation | Climate equipment card **| See details**

Provide access to manual control of the climate equipment.

Menu button | **Settings | Technical | Manual/auto | Manuel mode overview**

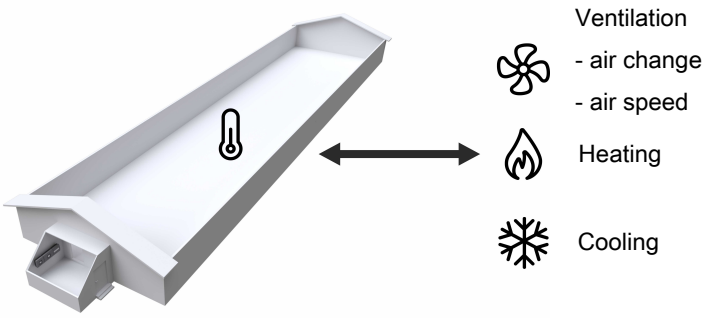
Lists all components currently set to manual mode.

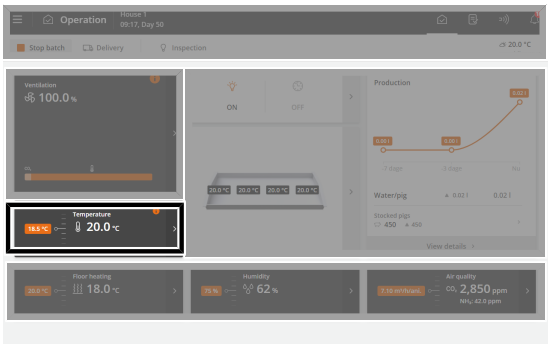
The manual control can also be deactivated here.

5.2 Temperature

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

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





Operation. The most important temperature values can be viewed and adjusted via the card **Temperature**.

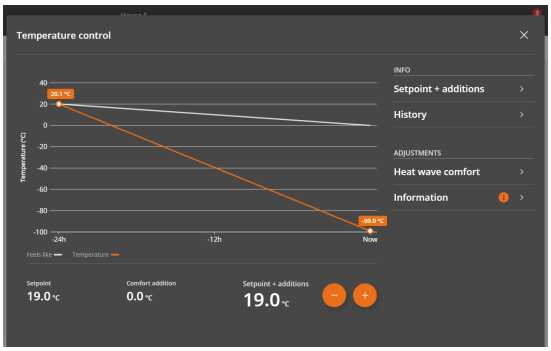
The front of the card shows the current inside temperature and the temperature setpoint.

The following sections describe the functions and setting options available for temperature.

5.2.1 Temperature control

The function **Dynamic setpoint** provides access to easy adjustment of the inside temperature during a batch.

Dynamic setpoint continuously takes into account both the current ventilation and the settings you make. It will thus adapt so that there is always the optimum temperature at the given level of ventilation.



Operation | **Temperature** card

When a higher or lower inside temperature is needed, adjust the **Dynamic setpoint** up or down by 0.5°C. The text below the setting explains the adjustment's impactustment on climate control.

Wait approximately 2 hours and evaluate the status.

The Temperature card shows a curve of the temperature development for the last 24 hours, marking the minimum and maximum temperature. Both the measured and the sensed temperature (calculated) are shown here. It illustrates that with the dynamic adjustment of the control, the animals will experience a stable temperature even if the measured temperature fluctuates.

The temperature card also shows the calculated inside temperature at which heating and cooling start.

The **Temperature** card provides access to the following temperature-related functions:

- Settings for heat wave comfort. See section Heat wave comfort.
- Settings for stand-alone heating. See section Stand-alone heating [▶ 60].

- Settings for floor heating. See section Floor heating [▷ 60].
- Graphic history curve. See section History curves.

When determining the desired temperature strategy, the following parameters are taken into account:

Menu button | **Strategy | Climate |** **Temperature**.

Inside temperature	Setting of batch curves for **Inside temperature**, **Heat offset** and **Stand-alone heating**. See also the sections House heaters [▷ 58] and Stand-alone heating [▷ 60].
Comfort temperature	See section Comfort temperature [▷ 31].
Floor heating	See section Floor heating [▷ 60].

5.2.1.1 Heat wave comfort

A heat wave is a period of high outside temperatures both day and night. After a heat wave, it is important to ensure that the animals do not get too low a temperature too quickly, as this can increase the risk of them becoming ill.

The heat wave comfort function adds an addition to the set temperature to postpone the time when ventilation starts again due to a high inside temperature. See also the section Comfort temperature [▷ 31].

Menu button **| Temperature** card **|** **Heat wave comfort**.

Heat wave:	Showing whether the conditions for a heat wave are present or not.
Heat wave comfort active	Connection and disconnection of the function.
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 a factor that determines how quickly the comfort temperature is to be cleared (°C/hour). The higher the factor, the faster the comfort temperature is cleared.
Heat wave ending time	Display of how many hours a heat wave comfort addition is still added to the temperature setpoint. The ending time is changed by changing the Comfort reduction factor.

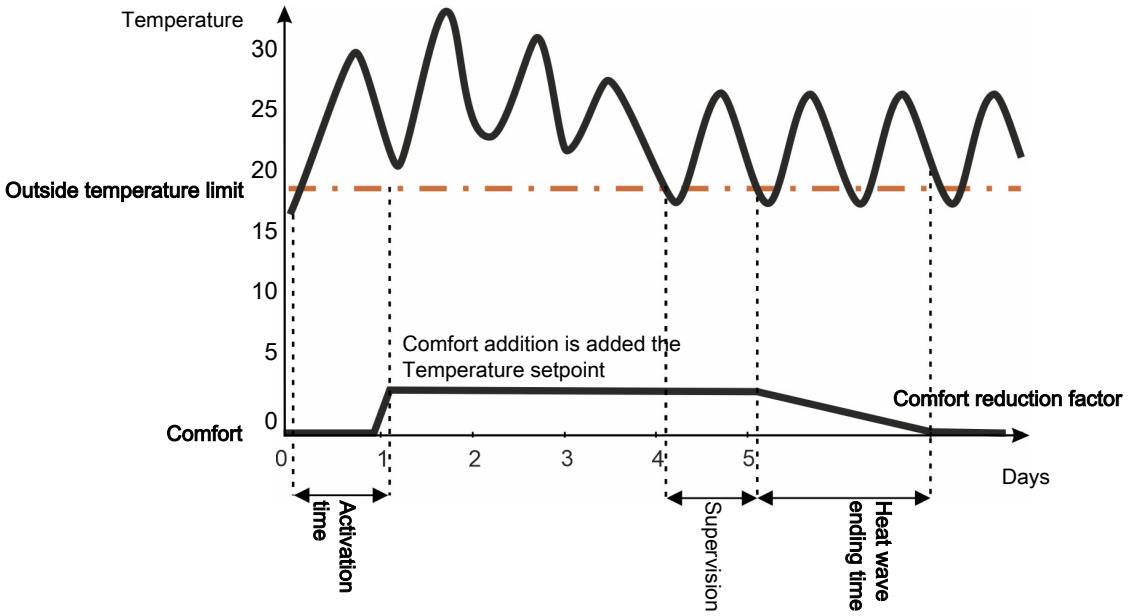


Figure 4: Heat wave comfort

During the heat wave, the comfort temperature is maintained.

When the heat wave stops, the controller monitors the outside temperature for 24 hours and the comfort addition is gradually reduced over a few days.

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

5.2.1.2 FreeRange

In FreeRange houses, animals have access to outdoor areas through pop-holes.

When the FreeRange air inlets are opened, the ventilation does not stop. The air velocity is changed to prevent drafts through the air inlets. The animals dislike going out in headwinds.

The ventilation requirement continues to be calculated based on air quality, temperature, and humidity, but ventilation is performed according to a specific FreeRange curve.

The opening of the FreeRange air inlets can be limited to the following factors:

- Outside temperature
- Time of day
- Ventilation level
- Weather limitations (only with weather station and/or rain detector)

Menu button | Temperature card | FreeRange

Outside temperature entry setpoint	Setting the temperature setpoint at which the outside temperature must be higher than for FreeRange to start.
Start time	Setting the time of day the function should be active.
Stop time	
Ventilation entry setpoint	Setting the ventilation rate at which FreeRange should start.

Menu button | **Strategy** | **FreeRange | Motor weather protection | Protection selection**

Wind protection	Selection of which air inlet to adjust concerning wind.
Rain protection	Selection of which air inlets to adjust concerning rain.

Menu button | **Strategy** | **FreeRange** | **Motor weather protection** | **Protection setup**

Rain	Limit. Setting a wind speed where rain protection is activated when the wind direction is within a set area (To/From). When the wind speed exceeds the limit for more than 30 seconds (factory setting), the air inlets close towards the required setting.
Draft	Limit. Setting the wind speed corresponding to draft. When the wind speed has been above the limit for more than 1 minute (factory setting), and the wind direction is within a set range (To/From), the air inlets close towards the required setting. When the wind speed has been 1.5 m/s below the setting for more than 1 minute (factory setting), the air inlets close towards the required setting.
Rain or draft	From/To. Setting the wind direction range where the weather protection is active.
Storm	Limit. Setting the wind speed corresponding to storm. When the wind speed has been above the storm limit for more than 1 minute (factory setting), the air inlets close towards the required setting.
Maximum opening	If rain and wind are present simultaneously, the maximum opening that limits the opening most will apply. By rain or draft. Setting the maximum opening of the system when weather protection is active by wind and rain. By storm. Setting the maximum opening of the system when weather protection is active by storm.

5.2.1.3 Comfort temperature

Not relevant for Tunnel and Natural.

If the controller increases the ventilation on hot days to keep the inside temperature down, the higher air velocity in the house will make the air feel cooler for the animals. Thus, for example, 20°C feels warmer on a calm day than 20°C in windy weather conditions.

The controller lets the inside temperature increase by the set comfort temperature before it increases the ventilation. The temperature increase counteracts the fact that the animals perceive the powerful ventilation as a draft.

Menu button | **Strategy** | **Temperature**

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.

Batch production

The comfort temperature can, at batch production, be set as a curve over 2 days. Thus, the controller will gradually reduce the temperature addition and raise the ventilation degree that activates comfort as the animals grow bigger.

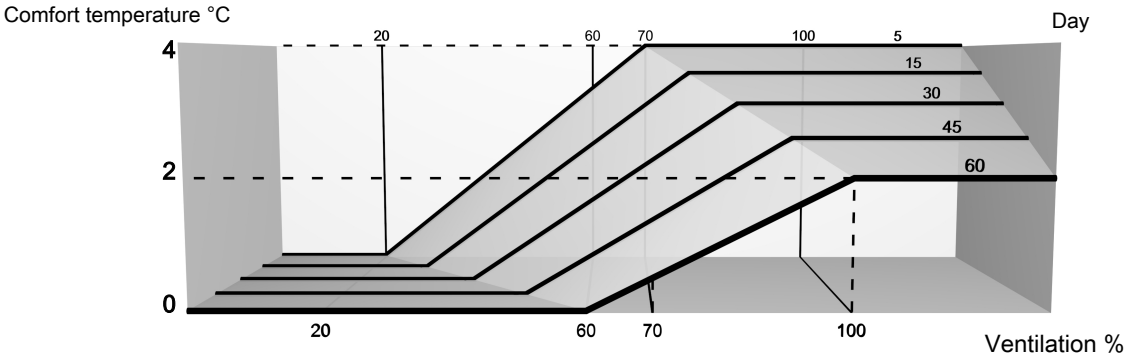


Figure 5: Comfort temperature at batch production

At batch production, the comfort temperature is, by default, set to start as an addition of 4°C at a ventilation rate of 30%. Toward day 60, it gradually changes to 2°C at a ventilation rate of 50%.

Continuous production

At continuous production, the comfort temperature is, by default, set as an addition of 2°C, which is gradually added to the **Temperature setpoint**, when ventilating more than 50%.

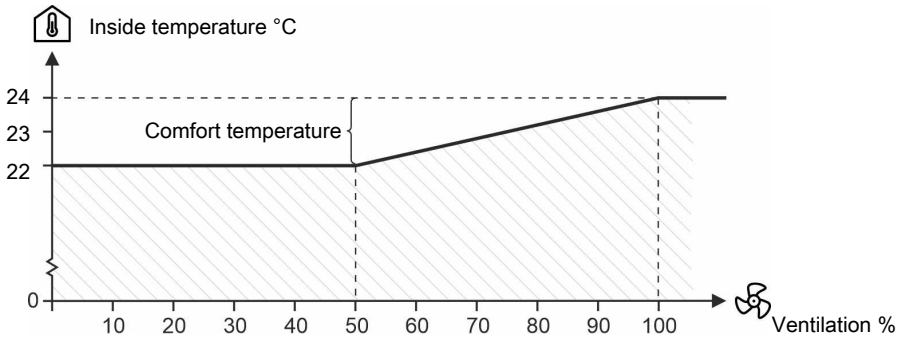


Figure 6: Comfort temperature at continuous production

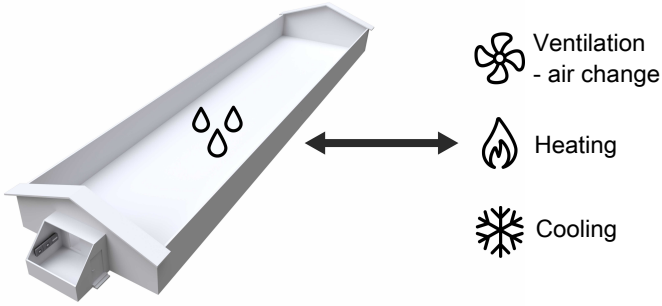
5.3 Humidity

The air humidity in the house is important for the indoor climate and the animals' well-being. Concerning air humidity, the regulation must ensure a suitable level - neither too high nor too low.

When the animals are young, it is especially important to avoid a very high humidity level (> 80%) to reduce the pathogens in their immediate environment. A very low humidity level (<40%) can dry out the house, and the animals.

Concerning animal welfare, it is generally more important to keep the correct inside temperature than to keep the humidity within a precise level. Therefore, the controller regulates humidity only when the temperature control allows it.

Note that a high inside temperature and high air humidity (>85%) can be life-threatening to the animals.



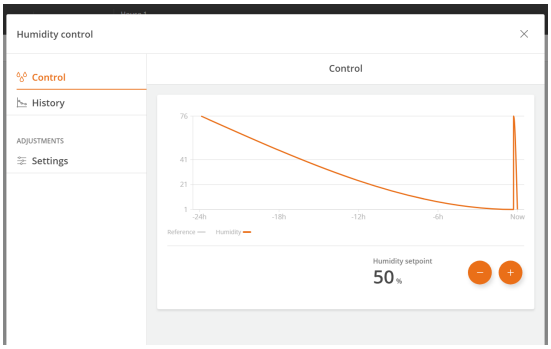
Humidity is supplied to the housing air partly from the animals, feed, drinking water, and animal waste and partly from the cooling and humidification functions.

Basically, the humidity in the house can be regulated by increasing or decreasing the ventilation level or increasing or decreasing the heat supply. The controller has several humidity control principles, which you can choose from, depending on what suits the house in question. See the section Humidity control mode [▷ 35].

Operation. The most important humidity values can be viewed and adjusted via the card **Humidity**.

The front of the card shows the current inside humidity and the desired air humidity.

The following sections describe the functions and setting options available for humidity.



Operation | **Humidity** card

The humidity card provides easy adjustment of the upper inside humidity limit during a batch.

If you need to adjust the humidity, changing it 3% and waiting 3-4 days is recommended. Then assess whether a further adjustment is necessary.

The Humidity card shows a curve of the humidity development during the last 2 days and a key value for water consumption calculated as water/animal. It may indicate problems such as water pressure or leakage on piping strings if water consumption is so high that it exceeds the reference.

The humidity card also provides access to the following humidity-related settings.

Operation | Humidity card | **Control settings**

Humidity control enabled	Connection and disconnection of humidity control. When the humidity control is disconnected, the controller regulates the ventilation exclusively in relation to the inside temperature. Switching off the humidity control during certain outdoor climate conditions may be relevant. It applies to areas with high outside humidity and temperature for a long time. Here, however, the humidity control will have no effect. See also the section Intelligent humidity control - at high outside temperature and outside humidity [▶ 37].
Humidity control mode	Selecting type of humidity control. See also the section Humidity control mode [▶ 35].
Maximum humidity ventilation	At Humidity heat. Setting of the degree of ventilation where the heat is reduced. In the case of humidity ventilation. Setting of the degree of ventilation where the humidity ventilation stops. See also the section Humidity ventilation [▶ 36]. If you, e.g., in periods of high outside humidity and temperature, want to limit the humidity ventilation, this setting can be reduced.
Humidification setpoint	Setting of lower air humidity limit. Can be set to a maximum of 5% below **Humidity.** See also the section Humidification [▶ 35].
Humidification last day	Setting of the day number when the controller deactivates humidification.
Switch humidity control on batch day	Changing the humidity control mode during the batch can be advantageous as the animals' needs change with age. Changing the humidity control mode automatically on a specific batch day is possible. Select the humidity control mode to start with and the mode to switch to and select the day for the switch to take place.
Switch humidity control setup	Selection of the humidity control principle the batch should switch to and selection of the day number where the change takes place.
Adaptive reaction	Setting how quickly the adjustment should react at adaptive humidity control (at **Humidity ventilation** and **Humidity heat** only). From the factory, the control is set to adaptive control. It means that the controller continuously adapts the regulation to the current conditions. Thus, there is less need for the user to make manual changes to settings. Also, see the Technical Manual.
Humidity control status	Display of the current humidity control. (at intelligent humidity control only) See the section Intelligent humidity control - at high outside temperature and outside humidity [▶ 37].

When determining the desired temperature strategy, the following parameters are taken into account:

See also the section Strategy [▶ 22].

Menu button | **Strategy | Climate |** **humidity**

Humidity **Humidification** **Maximum humidity ventilation**	The curve values must be set to suit the production method, type of animal, and the area's climate - especially outside humidity.

5.3.1 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 controller increases humidification as long as the air humidity is below the humidification setpoint.

During batch production, the controller can automatically regulate the humidification in relation to the age of the animals by adjusting the batch curve. See also the section Strategy [▶ 22].

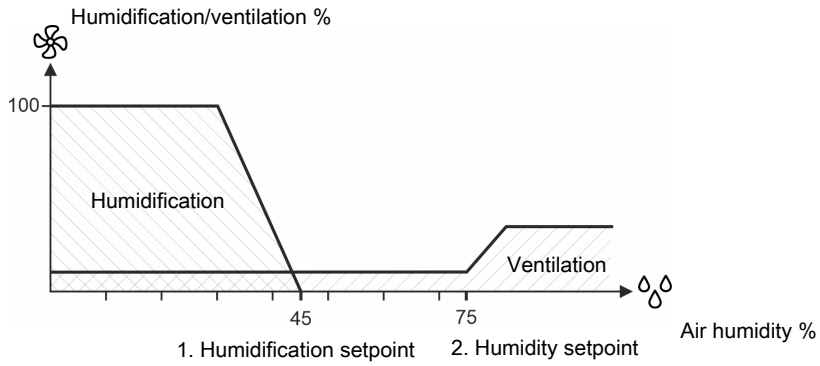


Figure 7: 1. Decreasing air humidity. The air humidity is below Humidification setpoint. The controller starts the humidification. 2. Increasing air humidity The air humidity is above humidity setpoint. The controller increases the ventilation.

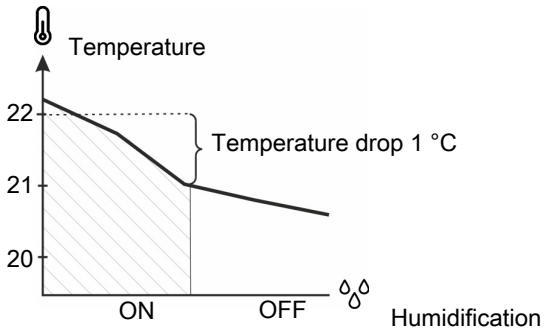


Figure 8: Decreasing temperature: Humidification will be disconnected if the inside temperature is 1° C below Temperature setpoint. Humidification could otherwise make the inside temperature drop further.

5.3.2 Humidity control mode

The air humidity can be regulated based on the correlation between the air temperature and its ability to contain moisture. The warmer the air is, the more water vapor it can contain.

It is generally estimated that for every 1 °C temperature change, the humidity will change 5%.

- As the temperature rises, the relative humidity decreases.
- As the temperature falls, the relative humidity increases.

If the temperature falls so much that the relative air humidity reaches 100%, the water vapor will start to condense (dew point).

These general principles can be exploited by choosing the humidity control mode that best suits the requirements of the animals and the individual house (geographical location).

The controller has 3 primary humidity control modes, each of which takes its own area into account.

Temperature reduction	Humidity ventilation	Humidity heating
Animals	Litter quality	Air quality (CO_2)

5.3.2.1 Humidity ventilation

This function is not active at tunnel ventilation.

Consequences	Method of operation
Higher heat consumption 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 controller has been set to control humidity according to the humidity ventilation principle, it will reduce a too high humidity level by gradually increasing the ventilation. 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.

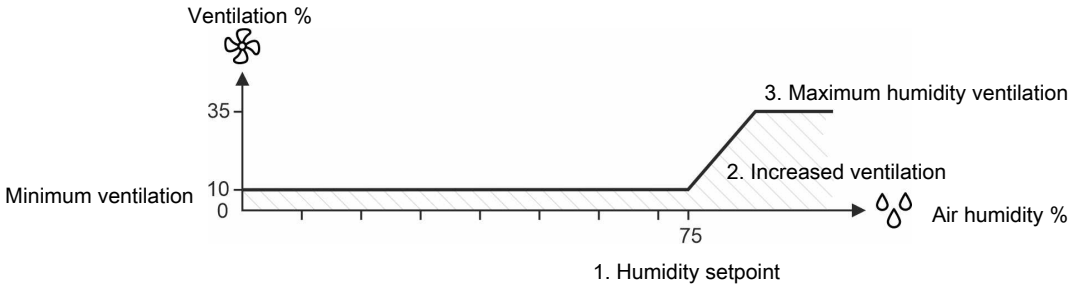


Figure 9: Humidity ventilation: 1. The air humidity exceeds humidity setpoint. 2. The controller increases ventilation. 3. Increase up to maximum humidity ventilation (35%).

Maximum humidity ventilation can be set with a batch curve. This especially relevant to livestock houses with limited heating capacity where you would prefer a lower degree of humidity ventilation at the start of a batch when the animals are small.

5.3.2.2 Temperature reduction

The 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.

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 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 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 **Heater setpoint**.

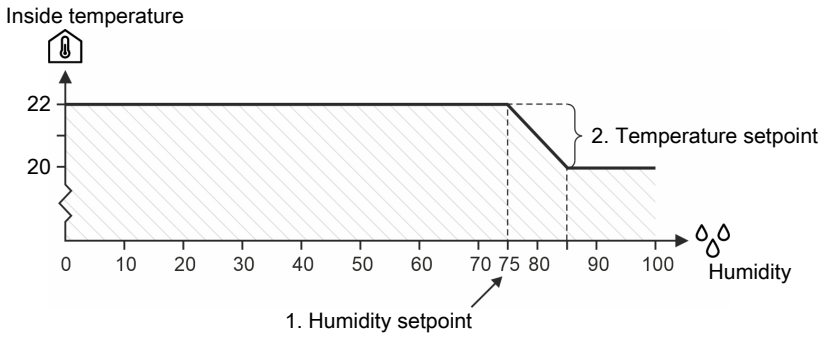


Figure 10: Humidity control with temperature reduction

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

5.3.2.3 Humidity heat

When the 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	Increases heat supply.
Maintains the set humidity	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.

At high outside temperature and high outside air humidity

Heat management according to humidity will not provide better litter or air quality. Increased ventilation will basically draw as much humidity into the house as is ventilated out.

5.3.3 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 high air humidity in the livestock house is reduced by raising the inside temperature.

The intelligent humidity control regulates both the inside and outside temperature and the inside and outside humidity, optimizing the humidity control according to the current climate conditions.

It is intended for areas with high outside temperatures and humidity where humidity control at high humidity through increased ventilation is less suitable.

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).

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	Conditions	
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°C > (19°C - 6°C)
Outside temperature 17°C		
Temperature setpoint 19°C		

Operation | Temperature card **| Dynamic setpoint**

Increase by humidity	View of how much the temperature setpoint is 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.

Operation | Humidity card **| Control settings | Status for humidity control**

Inside humidity above setpoint	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	

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

5.3.4 Humidity settings

5.3.4.1 Adaptive humidity ventilation

Big Dutchman recommends that humidity control is set up to adaptive control.

When using adaptive control, it is possible to fine-tune how quickly it reacts when the conditions change.

Operation | **Humidity** card | **Control settings**

Adaptive reaction for ventilation	Setting how quickly the adjustment should react (**Fast/Medium/Slow**). It is not necessary to change the factory setting **Medium** unless the adjustment reacts too slowly (select **Fast**) or too fast (select **Slow**). It will depend on the system in question. Also, see the Adaptive control section of the Technical Manual.

5.3.4.2 Adaptive humidity heat

Big Dutchman recommends that humidity control is set up to adaptive control.

When using adaptive control, it is possible to fine-tune how quickly it reacts when the conditions change.

Operation | **Humidity** card | **Control settings**

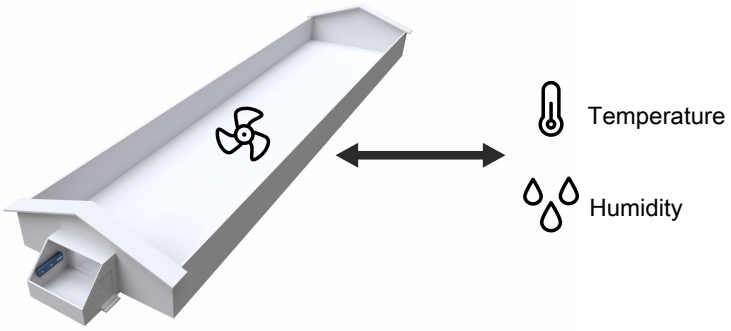
Adaptive reaction for heat	Setting how quickly the adjustment should react (**Fast/Medium/Slow**).

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

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

5.4 Ventilation

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



The degree of ventilation is determined based on 3 parameters:

1. Air quality (minimum ventilation). The amount of ventilation needed to ensure good air quality (CO_2).
2. Variable ventilation. The amount of ventilation needed to remove humidity and excess heat.
3. Maximum ventilation. The maximum degree of ventilation that must be used to remove humidity and excess heat - it typically depends on the age of the animals.

The controller continuously adjusts the ventilation according to a calculation of the ventilation requirement. Depending on the type of ventilation system, the controller calculates the ventilation requirement based on temperature and air humidity. Thus, the controller will increase or limit ventilation according to whether the inside temperature and air humidity are too high or too low.

Operation. The most important ventilation values can be viewed and adjusted via the card **Climate equipment**.

The front of the card shows how the ventilation system is running right now. It applies to the active equipment and the active functions.

The **Climate equipment** card allows you to adjust the values that are valid on the current day. The adjustment applies to the rest of the batch but is reset at the batch end. A new batch starts with the values from the batch curves under **Strategy**.

The number of animals in the house must be correct to achieve correct ventilation.

Please also note that at two-zone ventilation, the animals are assumed to be distributed equally in the 2 zones.

The following sections describe the general functions and setting options available for ventilation. Next, each type of ventilation system is described separately.

- Side (LPV). See the section Side ventilation [▷ 42].
- Tunnel. See the section Tunnel ventilation [▷ 45].
- Combi-Tunnel. See the section Combi-Tunnel ventilation [▷ 47].
- Natural. See the section Natural ventilation.

5.4.1 Air quality

The **Air quality** function provides just the amount of air to the house, which ensures 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 controller can regulate the air quality as minimum ventilation (m^3/h/animal) or as CO_2 ventilation (ppm) (using a CO_2 sensor).

Operation | Air quality card

The air quality card provides access to easy adjustment of the air quality during a batch.

The front of the card displays the desired ventilation and the current CO_2 level, if needed. When a NH_3 sensor is connected, the current NH_3 level is also displayed.

If the air quality is poor or if the temperature is too low

Adjust the setting up or down and wait and reevaluate the status the next morning.

The Air quality card shows a development curve for the last 24 hours.

The Air quality card provides access to the following functions:

- Settings.
- Graphic history curve (with CO_2 sensor CO_2 level is displayed. Without sensor, minimum ventilation is displayed).
- Information. See the section Informationskort [▶ 13].

When determining the desired air quality strategy, the following parameters are taken into account:

Menu button | **Strategy | Climate | CO_2 Air quality**

Air quality control	Select whether the air quality is to be regulated based on minimum ventilation (m^3/h per animal) or based on CO_2 ventilation (CO_2 level of the air).
Use NH3 ventilation	Select whether to use an NH_3 sensor to monitor the NH_3 level (ammonia) in the house as an indicator of the air quality. See also the section NH3.
CO2 ventilation	Using a CO_2 sensor, the CO_2 level in the livestock house can be monitored and used as an indicator of the air quality. The function either increases or decreases the ventilation depending on the atmospheric CO_2 content. i.e., whether it is higher or lower than the CO_2 setpoint. If the inside temperature drops below the heating temperature setpoint, the climate controller reduces the CO_2 ventilation by up to 25%. *Before Day 10* the controller can limit the CO_2 ventilation to 0 %. *After Day 10* the controller cannot limit the CO_2 ventilation to less than 25 % of the minimum ventilation.
Minimum ventilation	Setting a lower limit for how little is ventilated in relation to the animals' air requirement (m^3/h/animal). The animals' fresh air requirement varies according to breed and weight. Enter the requirement as m^3/h/animal. The correct number can be found in the technical literature or by asking an advisor. Minimum ventilation must only be adjusted in relation to the desired air quality - not to regulate the inside temperature.

From the factory, the limit for CO_2 is set based on the goal that the CO_2 level in the house must not exceed 3,000-3,500 ppm.

It is important that the batch curve is adapted according to the animal type, local regulatory requirements (in the EU max. 3000 ppm), outside climate conditions and type of heat supply.

When setting batch curves:

- Note that the number of animals must be correct.
- Note that in the case of heat supply with direct combustion, where combustion gas is led out into the house itself (e.g.,gas and oil burners without a chimney), a higher minimum ventilation will be required.
- Note that a high minimum ventilation results in increased heat consumption.

Lack of ventilation in the case of CO2 alarm

In the case of CO_2 sensor errors or high CO_2 alarm, the controller deactivates the CO_2 function and enables Minimum ventilation. It is to prevent a faulty CO_2 sensor from 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 CO_2 minimum ventilation.

5.4.1.1 Cycle timer at minimum ventilation

If there is a very limited need for ventilation, you can control the air flows in the house with the cycle timer function.

When the controller regulates minimum ventilation with cycle timer, the air inlets are alternately opened and closed briefly. This sends a stronger jet of air through the house, which ensures a thorough replacement of the housing air.

When the cycle timer function is active, the graphical status is displayed on the **Climate equipment** card.

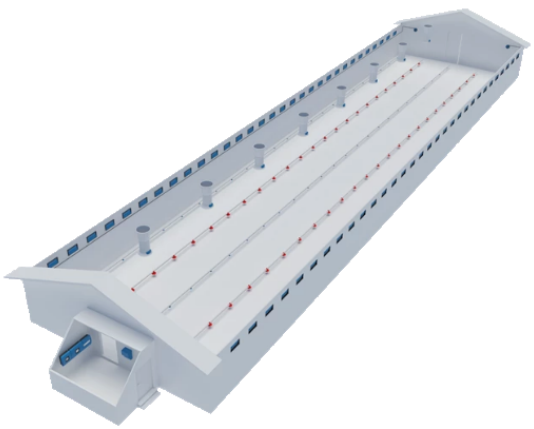
See also the technical manual regarding **Minimum air intake**.

5.4.1.2 NH3

By using a NH_3 sensor, the current NH_3 level (ammonia) in the house can be monitored and used as an indicator of the air quality.

Operation. The ventilation card shows the current NH_3 content in the air.

5.4.2 Side ventilation



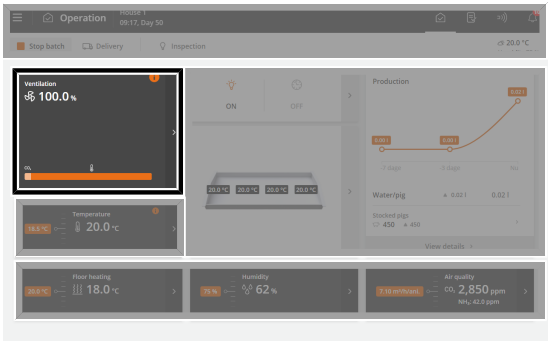
(LPV - Low Power Ventilation)

An LPC system is a classic negative pressure system. The system is intended for temperate regions of the world and can be adapted to most house types.

In an LPV system, the wall, ceiling or roof inlets supply the fresh air. The system adapts automatically the ventilation to the temperature outside, production type and the age of the animals.

When it is cold outside, the fresh air mixes with the housing air before it reaches the area occupied by the animals.

In hot periods, the air is taken in the same way, but the air is drawn into the house at a higher speed. This results in air circulation around the animals, and they are cooled without perceiving the increased air circulation as a draft.



Operation | Climate equipment card

The current status values for side ventilation can be viewed via the **Climate equipment** card.

The card displays the current ventilation requirement (%) and how much of the ventilation is due to temperature and humidity.

The climate equipment card provides furthermore access to following views:

- View of air inlet requirement.
- Graphic history curve.

5.4.2.1 Ventilation settings

Maximum ventilation

Maximum ventilation sets a limit to how much of the capacity of the ventilation system (in percentage) the controller can activate.

The function can be relevant to use at very high outside temperatures, i.e. in periods when the outside temperature daily exceeds 30-35 °C. Ventilation with the entire capacity of the system will here cause the inside temperature to exceed the desired temperature, as large amounts of hot air are supplied. The function can also prevent young animals from being exposed to a level of ventilation which they do not tolerate.

Maximum ventilation is typically only used in houses with high-pressure cooling and side ventilation and only in the summer months, where the cooling potential is great.

It is important that the **Maximum ventilation** is removed when the outside climate changes. The controller does not take the cooling potential into account over the year.

	Summer	Winter
Limitation	Yes (> 30-35 °C)	No
Setting	Batch curve	500 %

Menu button | **Strategy | Climate | Ventilation**

Maximum ventilation	Setting of upper limit for how much of the system's capacity 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).

5.4.2.1.1 Inlet de-ice

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 controller activates de-icing when the outside temperature falls below the setting for **Inlet de-ice below outside temperature**.

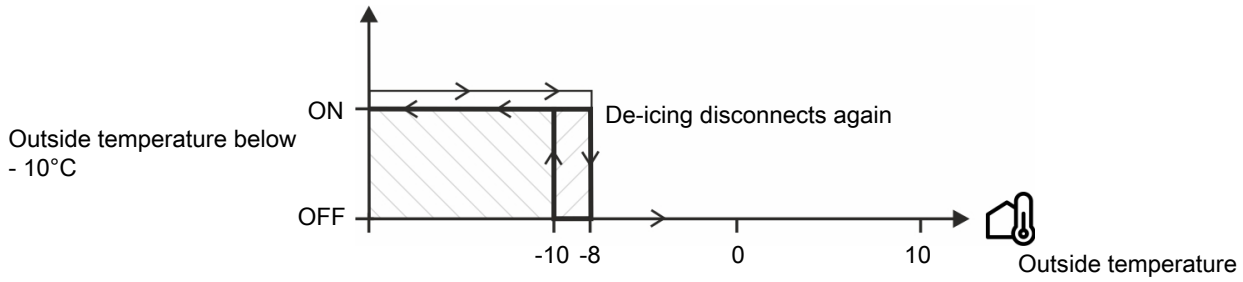
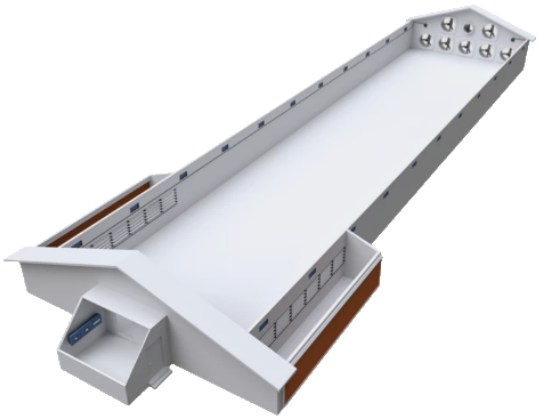


Figure 11: Activation of de-icing

Operation | Climate equipment card | **Air inlet**

Inlet de-ice below outside temperature	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.

5.4.3 Tunnel ventilation



Tunnel houses are intended for tropical regions of the world, where it is constantly hot, and it is therefore important to lower the temperature in the house.

Heat and very humid conditions are best solved with high air speed.

When using tunnel ventilation, large air volume and air movement can remove heat from the animals.

The air intake is located in the sides or in one gable and is often equipped with cooling pads or high-pressure cooling, in order to cool the incoming air.

At the end of the house, which is opposite the air intake, large gable fans are placed for air outlet. This creates a cooling airflow in the longitudinal direction of the house - a so-called chill effect.

The chill effect is a reduction in the perceived temperature as a result of air movement.

Depending on air humidity, it is possible to lower the temperature significantly.

5.4.3.1 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.

When the cycle timer function is active, the graphical status display is shown on the **Climate equipment** card.

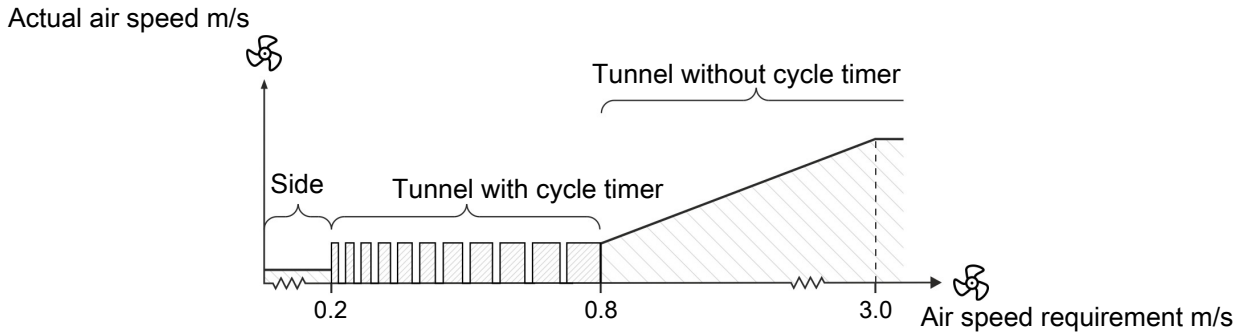


Figure 12: The ventilation sequence with cycle timer at tunnel ventilation

When a cycle timer is used at tunnel ventilation, the air velocity will cycle between 0.0 and 0.8 m/s.

The setting for **Minimum air velocity** works as a start condition for tunnel, but now with the possibility to start at a lower setting, e.g., 0.2 m/s.

5.4.3.2 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

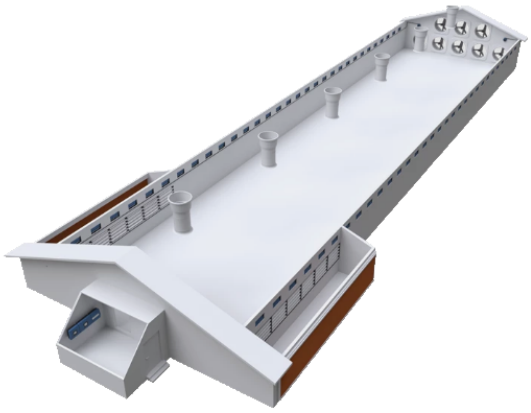
Chill factor	3	8
Chill effect	4.5 °C	12 °C
30 °C feels like	**25.5 °C**	**18 °C**

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.

5.4.4 Combi-Tunnel ventilation



A combi-tunnel house provides the best possible productivity conditions in changing weather conditions, when the outside temperature changes from very cold to very hot.

The system adapts automatically the ventilation to the temperature outside, production type, and the age of the animals.

When the outside temperature is low, ventilation is conducted with side ventilation. The ventilation system keeps the temperature and humidity at an ideal level by removing the excess humidity and heat generated inside the house.

When the outside temperature is high, ventilation is done with tunnel ventilation. The ventilation system replaces the air in the house so that the animals are cooled using air velocity and cooling systems.

Operation | Climate equipment card

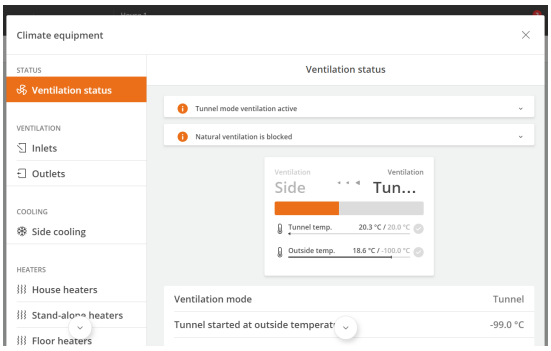
The current status values for combi-tunnel ventilation can be viewed via the Climate equipment card.

The graph on the card displays the current ventilation requirement (%) and how much of the ventilation is due to temperature and humidity and possibly CO_2, and what the air velocity (m/s) is at tunnel ventilation and what (m^3/h/animals) is at side ventilation.

The climate equipment card provides furthermore access to following views:

- View of air inlet requirement.
- Graphic history curve.

The following sections describe the specific functions and setting options available for combi-tunnel. Furthermore, see the section Side ventilation and Tunnel ventilation for a description of regulation of side and tunnel ventilation.



Operation | Climate equipment card | **Ventilation status**

The card shows the current values, which tell how the ventilation is running and when the regulation changes.

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.

Operation | Climate equipment card | **Air outlet | Tunnel**

Minimum air speed	Setting the lowest acceptable air velocity for tunnel ventilation. At low air velocity, there is too much temperature difference from one end of the house to the other. Therefore, it is possible to set a lower limit for the air velocity.
Maximum air velocity	Setting the lowest air velocity acceptable in tunnel ventilation. At high air velocity, there is a risk of excessive ventilation, for example in the case of small animals. Therefore, it is possible to set an upper limit for the air velocity.
Tunnel outside temperature limit	Setting a lower outside temperature limit for activation of tunnel ventilation.

Possible max. air velocity	Reading the systems maximum air velocity.

Menu button | **Strategy | Climate | Ventilation | Tunnel**

Tunnel outside temperature limit	Setting a batch curve for a lower outside temperature limit enables tunnel ventilation activation.
Minimum air velocity in tunnel	Setting of batch curve for the lowest air velocity acceptable in tunnel ventilation. At low air velocity, there is too much temperature difference from one end of the house to the other. This can be counteracted by setting a lower air velocity limit.
Chill factor	The cooling, which an animal of a given age and breed would experience at 1.0 m/s. See also the section Chill factor and chill effect [▶ 45].
Maximum air velocity in tunnel	Setting the highest air velocity 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 velocity in the house, **Maximum air velocity**.
Accepted experienced temperature drop	Setting how many degrees the perceived temperature must be below the temperature setpoint before changing from tunnel to side ventilation. See also the section Combi-tunnel ventilation: change between side and tunnel [▶ 48].
Last day that tunnel is blocked	Setting 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 only after a specific day number.

5.4.4.1 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 at maximum.
- Side cooling is at maximum.
- The inside temperature (tunnel temperature) is high enough to allow tunnel ventilation at minimum air speed.
- The limit for the outside temperature has been exceeded.

Change from tunnel to side

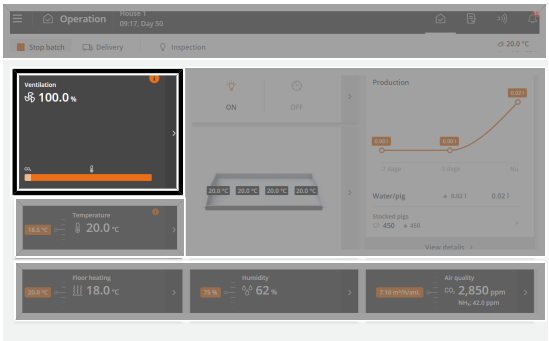
The controller changes to side ventilation automatically when the following conditions have been fulfilled:

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

5.4.5 Pressure

Based on measurements from a pressure sensor, the controller regulates the air intakes.

With negative pressure control the controller regulated the inlets so the required pressure is maintained in the house.

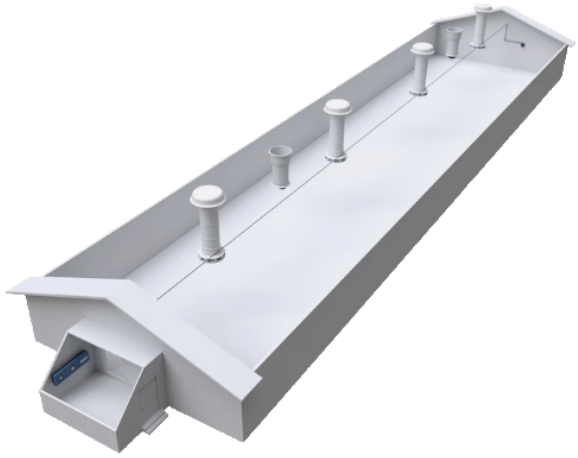


Operation. The current pressure level can be seen on the **Climate equipment** card.

Operation | Climate equipment card | **Pressure**

Pressure	Graphic display of the historical values in different time intervals from 24 hours to 2 months.
Pressure setpoint	Setting of the pressure level.
Pressure inlet requirement	Percentage indication of how much the flaps must be open to maintain **Pressure setpoint**.
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.

5.4.5.1 Equal pressure ventilation



An equal-pressure ventilated house provides full air intake and outlet control.

The system is intended for temperate regions of the world and can be adapted to most house types.

In an equal pressure system, the fresh air is supplied through the roof inlets, and the air outlet is conducted through the exhaust units. Both are equipped with active fans to ensure neutral pressure.

5.4.6 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 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.

5.4.7 Parking of fans

With this function, fans can be taken temporarily out of service. It can, for example, be used in cold periods when some fans are closed for insulation purposes or if a fan is defective and awaiting repair.

We recommend that you only use parking for fans that are not actually in use. Otherwise, the ventilation control cannot automatically adapt to the changed ventilation capacity.

Operation | Climate equipment card | **Outlets | Side outlets**

MultiStep	Connection and disconnection of fans in each ON/OFF MultiStep.

If there has been ventilation at maximum level for 5 minutes, the controller will give a soft alarm to make you aware that you should activate the fans again.

Parking of fans must not be used as safety breaker in case of servicing the fan.

Be aware that if you park all tunnel fans in a Combi-Tunnel system, the controller can still switch to tunnel regulation of the ventilation - but without actually being able to use the tunnel fans.

This can be catastrophic for the animals.

5.5 Delivery

Delivery is a function that is designed to adapt the ventilation in connection with the animals having to leave the house. The ventilation status will change to **Delivery** and adapt its settings. When it changes back, the ventilation returns to half the ventilation requirement requested before the function started.

The daily user sets a period during which the function can be activated.

When the external carrier comes to the livestock house, he activates **Delivery** manually or by pressing the controller's display or with an external key.

Operation | Delivery

Delivery	Connection and disconnection of the function. (with display operation)
Delivery ready	Setting the date and time that the user can activate the function.
Delivery start	Displaying the time when catching was activated. Only visible when the function is active.
Delivery stop	Displaying the time when the function is to stop (using the **Auto stop Delivery after**). If the catching lasts longer than expected, the stop time can however be changed. Only visible when the function is active.
Allow delivery start period	Setting the time period when the user can activate the function. (only push button and key)
Auto stop delivery after	Setting the maximum period that Delivery can be active.
Air inlet	Setting how much the air inlets must be open in percent during delivery.
Roof inlet	Setting roof inlet, flap, fan and stir fan in percent during delivery.
Stepless	Setting how much the air inlets must be open in percent during delivery.
MultiSteps	Selecting which MultiStep should be active during **Delivery**. For example, you can control the desired airflow direction, by only activating the MultiSteps at one end of the house.

5.6 Cooling

5.6.1 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.

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

5.6.2 Spraying and behavior control

Spraying can help prevent wallowing by ensuring that the animals can regulate the temperature through water evaporation from the body surface.

The spraying can be set run depending on the inside and outside temperature and/or time.

The spraying system can also be used for behavior control. The behavior control runs according to the same settings as the spraying that cannot start simultaneously.

Operation | Climate equipment card | **Spraying**

Activate spraying	Connection and disconnection of the spraying.
Spraying requirement	View of current spraying requirement.
Minimum spraying	Setting of a percentage of the spraying system's capacity that the system shall run at as a minimum. Most often, **Minimum spraying** will be set to 0%.

Menu button | **Strategy | Spraying**

Outside low stop temperature	Setting of a lower temperature limit for when spraying can run.
Start time	Setting of a time for the start of spraying.
Stop time	Setting of a time for spraying to stop.
Forced start at outside temperature above	Setting of an outside temperature that will start the spraying even in the stop period.
Spraying 1-100%	Matrix for setting up the spraying cycle (**Temp./ON/Cycle**).
Installation of behavior control	Activation of the function Behavior control. See the section Behavior control [▷ 54].

Spraying can ensure the animals' requirement for natural temperature regulation with water evaporation from the surface of the body.

5.6.2.1 Spray sequence

In accordance with inside temperature

Spraying starts when the inside temperature exceeds the temperature limit setpoint. The spraying is increased automatically the higher the temperature rises.

Temperature setpoint: 22 °C

Requirement 1%: 0.5 °C

Requirement 100 %: 3 °C

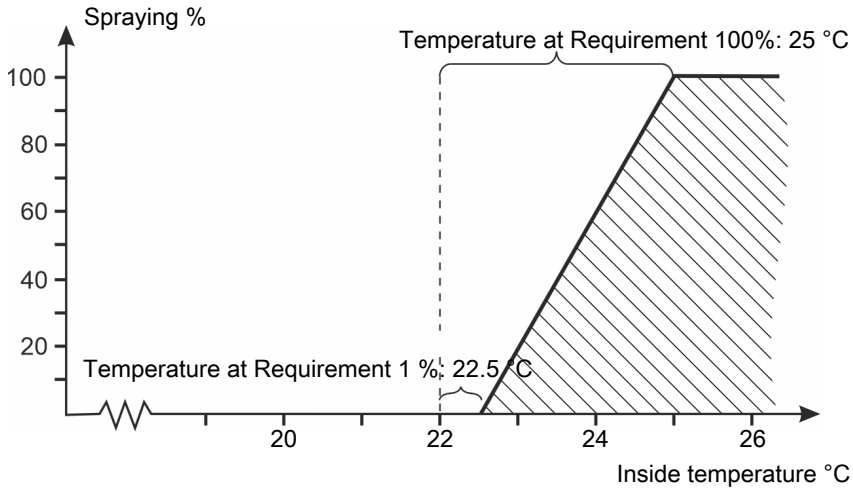


Figure 13: Spraying in accordance with inside temperature

You must set the Spraying 1-100% with the number of degrees that the temperature must rise above the Temperature setpoint for spraying to start.

If you want spraying to be independent of the inside temperature, you can disregard the function by making both setpoints for Temperature at x% to -1°C for example.

5.6.2.2 Limitation of spraying

The other settings in the spraying menu can act as start conditions that must be fulfilled for spraying to be able to start.

Spraying can only start when the outside temperature is above the temperature for **Stop at outside temperature below**, and only within the set period.

However, an upper outside temperature limit can be set which will also activate spraying outside the set period, if the inside temperature is sufficiently high.

Minimum spraying 20%

Stop at outside temperature below: 5 °C

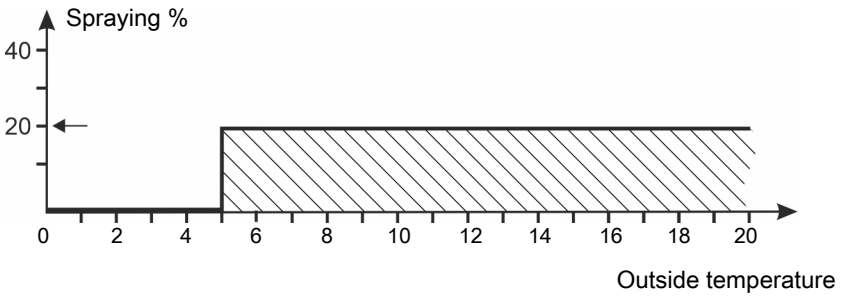


Figure 14: Spraying in accordance with outside temperature

If you want spraying to be independent of the outside temperature, you can disregard the function by setting Stop at outside temperature below down to -10°C for example.

Minimum spraying: 20%
Start time: 07:00 HH:MM
Stop time: 20:00 HH:MM

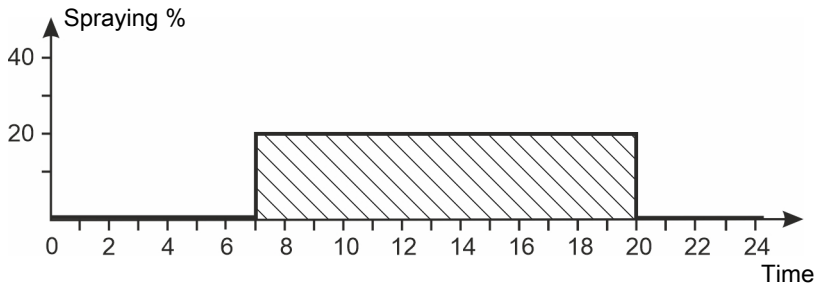


Figure 15: Spraying in accordance with time

If you want the spraying function to be active all the time, you can disregard the function by setting the Start time and Stop time to the same time.

Forced start at outside temperature above: 19 °C
Minimum spraying: 20%
Start time: 7:00 AM HH:MM
Stop time: 20:00 HH:MM

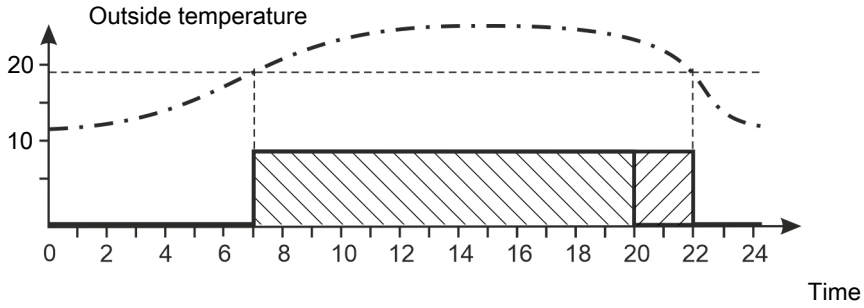


Figure 16: Spraying in accordance with time and outside temperature

Spraying continues after the stop time when the outside temperature is above the limit.

Spraying according to outside temperature does not start unless the inside temperature limits have been exceeded.

5.6.3 Behavior control

The spraying system can be used for behavior control by spraying an area of the pen to make the animals choose to lay in another area of the pen.

Spraying typically runs in a cycle with short sprays and long pauses.

Behavior control cannot be started if spraying is disabled.

Operation | Spraying button

Duration	Setting for how long the behavior control should run.
ON time	Setting of how long water shall be sprayed on the animals each time.
Cycle time	Setting of the time between water being sprayed on the animals.

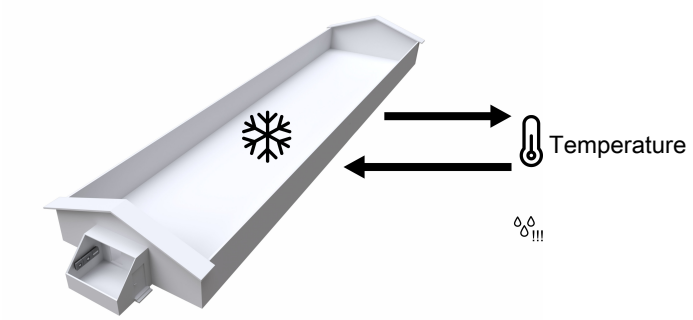
Operation | Strategy | Spraying

Behavior control installed	Connection and disconnection of behavior control.
Spraying deactivated	View of the current status for spraying.

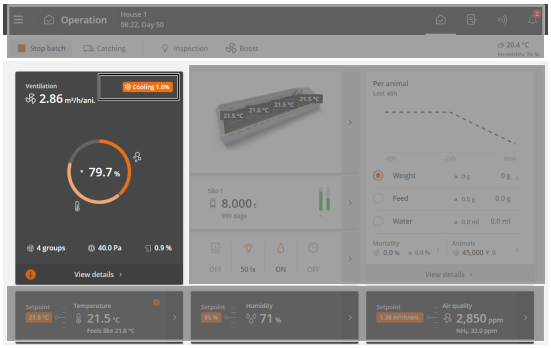
5.6.4 Tunnel cooling

Cooling is used in houses where ventilation alone cannot reduce the inside temperature sufficiently. Cooling has the advantage over ventilation 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 tunnel cooling** (normally 75-85%, factory setting: 85%).



Operation. The most important cooling values can be viewed and adjusted via the **Climate equipment** card.

When cooling is active, this is shown in the upper right corner of the card.

In order to ensure that the cooling system does not run under inappropriate conditions (not desirable due to the well-being of the animals), the controller will stop the cooling. Thus cooling can be blocked by air speed, temperature, tunnel cooling temperature, humidity and humidity sensor error.

The following sections describe the functions and setting options available for tunnel cooling.

5.6.4.1 Tunnel cooling settings

Tunnel cooling can be set to start based on 3 different factors:

- Fixed air speed
- Adjusted air speed
- Temperature

Menu button | **Strategy** | **Tunnel cooling**

Calculated cooling start	Reading of the temperature that the tunnel cooling is controlled by when a dedicated tunnel cooling sensor is used.
Start based on	Selecting which factor is to activate tunnel cooling (**Fixed air speed / Adaptive air speed / Temperature**). See the sections Tunnel cooling start based on a fixed air speed [▶ 56], Tunnel cooling start based on an adapted air speed [▶ 56], and Tunnel cooling start based on inside temperature [▶ 57].

5.6.4.2 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.

5.6.4.2.1 Tunnel cooling start based on a fixed air speed

Operation | Climate equipment card | **Tunnel cooling**

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 the side cooling.

Menu button | **Strategy | Tunnel cooling**

Calculated cooling start	Calculation of the inside temperature starting the tunnel cooling, when the launch is based on air speed.

5.6.4.2.2 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 outside 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.

The function is only available when an outside 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. See also the section Cooling potential [▶ 52].

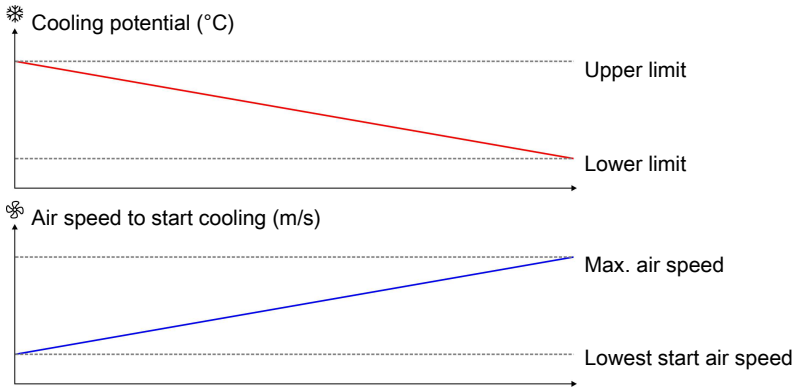


Figure 17: In areas with low outside humidity and a large cooling potential, cooling can start at a lower air speed. Whereas in areas with low cooling potential, cooling will start as late as possible, meaning that it starts at maximum air speed.

Operation | Climate equipment card | **Tunnel cooling**

Humidity to stop tunnel cooling	Setting 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 the side cooling.

Menu button | **Strategy | Tunnel cooling**

Lowest tunnel cooling start speed	Setting the batch curve for 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.

Calculated cooling start	Calculation of the inside temperature starting the tunnel cooling, when the launch is based on air speed.
Lowest cooling start speed	Adjustment of the air speed required (set as batch curve) before the tunnel cooling can start.
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.

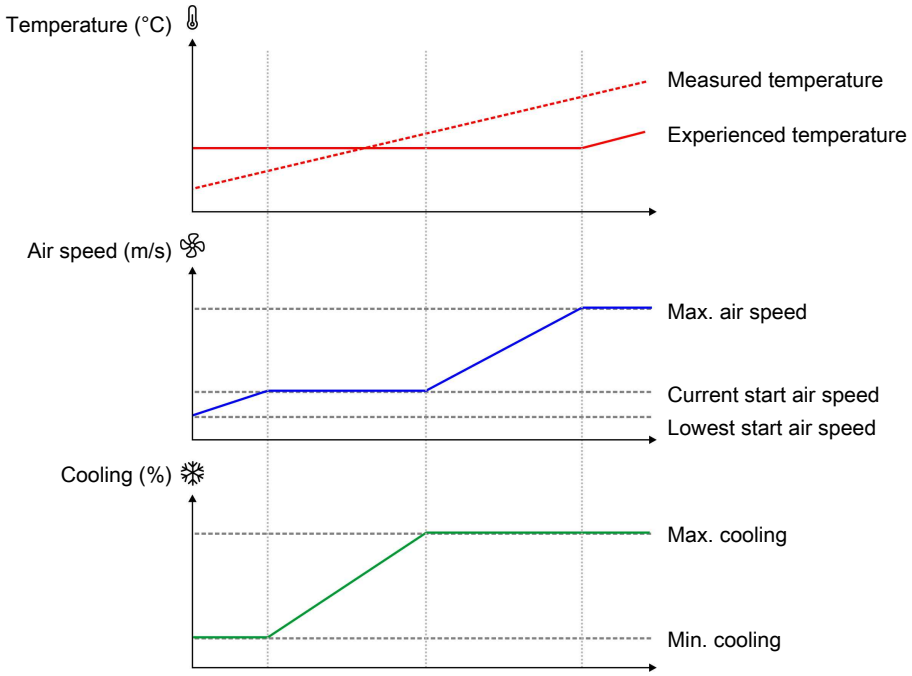


Figure 18: The cooling starts already at low air speed to maintain the required inside temperature. When the cooling cannot maintain the temperature, the air speed is increased again.

5.6.4.2.3 Tunnel cooling start based on inside temperature

Operation | Climate equipment card | **Tunnel cooling**

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.

5.7 Heating

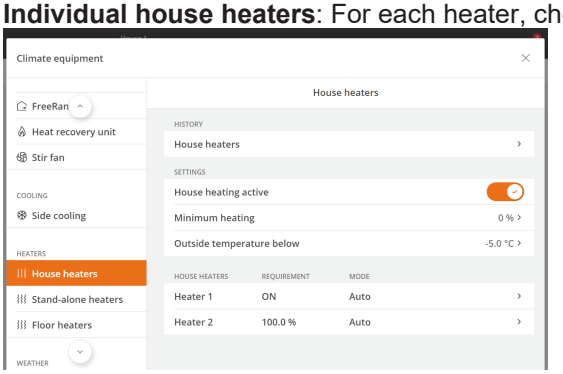
5.7.1 House heaters

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.

House heaters 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.



Operation | Climate equipment card | House heaters

House heaters	Connection and disconnection of house heaters. When you want to stop the heat supply in the house, disconnect heating. The controller will then automatically turn off the heat supply.

Inappropriate regulation

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

Heat offset

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

Operation | Temperature card | Heating

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

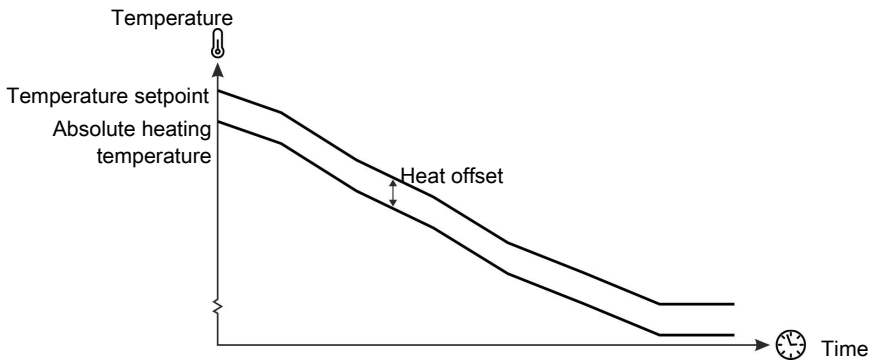


Figure 19: Set heat offset

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

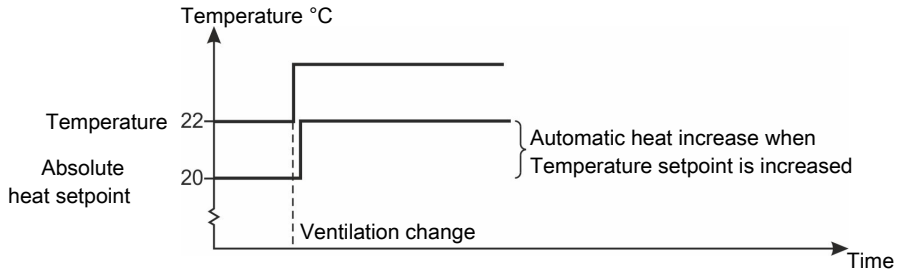
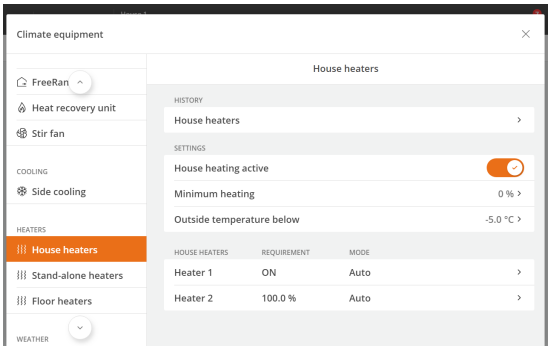


Figure 20: Heat supply

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

5.7.1.1 Minimum heating



Minimum heating is a function which the 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 controller constantly adds the minimum heat.

Operation | Climate equipment card | **House heaters**.

Minimum heating	Setting of the percentage of the heating system capacity at which the system opens at minimum heating.
Outside temperature below	Setting of the outside temperature that activates the **Minimum heating** function.

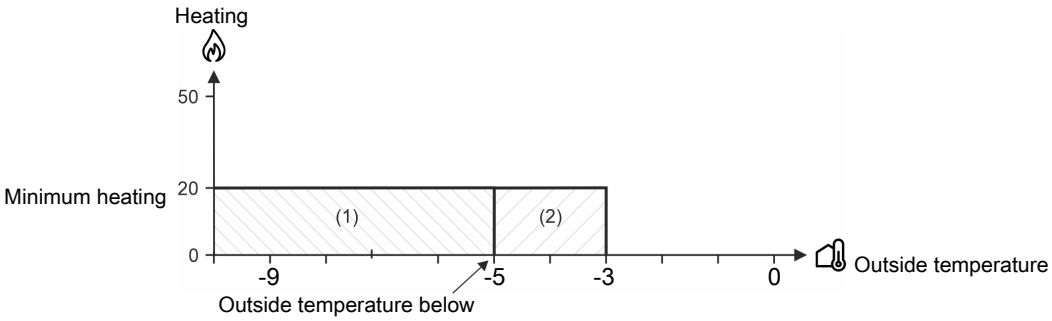


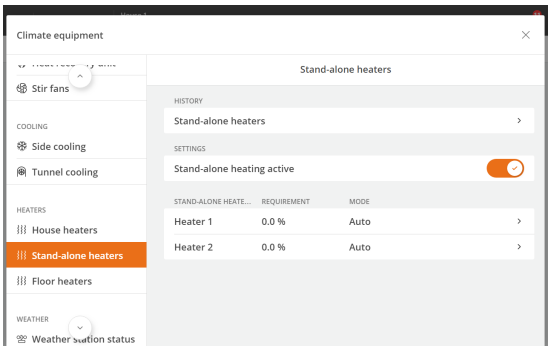
Figure 21: Minimum heat at decreasing or increasing outside temperature

(1) At decreasing outside temperature: The controller switches on the heat when the outside temperature is lower than **Outside temperature below** (-5°C).

(2) At increasing outside temperature: The controller only switches off the heat when the outside temperature is 2 °C above **Outside temperature below**. This prevents the heating system from connecting and disconnecting continuously when the outside temperature fluctuates around the set **Outside temperature below**.

5.7.2 Stand-alone heating

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



You can use up to 4 stand-alone heaters to which a local zone should be assigned at controller setup.

The controllers regulate the stand-alone heaters independently of the room heating.

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

Operation | Climate equipment card | **Stand-alone heaters**.

Stand-alone heater 1 active	Connecting or disconnecting all stand-alone heaters.

Operation | Climate equipment card | **Stand-alone heaters** and the desired stand-alone heater in the table.

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

Operation | Temperature card | **Stand-alone heaters.**

Stand-alone heater setpoint	Setting of the temperature which is the lowest temperature allowed in the local zone. When the temperature is lower than this setting, the heater supplies heat.

The page **Operation | Climate equipment** card | **Stand-alone heaters** provides furthermore access to:

- Graphic history curve.
- Current requirement
- Manual mode

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

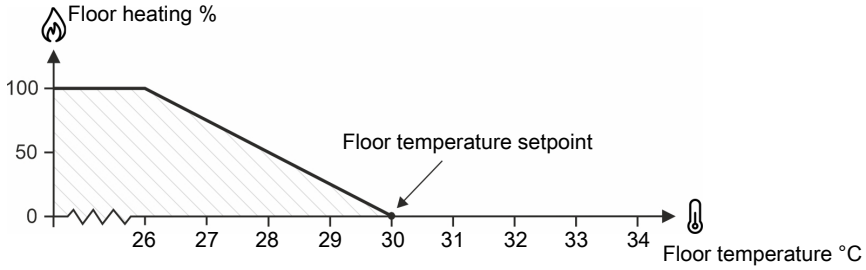


Figure 22: Floor heating with temperature sensor

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

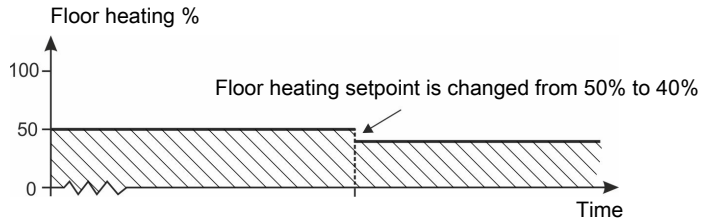


Figure 23: Floor heating without temperature sensor

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.

Menu button | Strategy | Temperature | Floor heating

Floor heating	Determination of strategy via batch curve for floor heating.
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 outside temperature above	Setting the outside temperature that causes the climate controller to deactivate floor heating.

Operation | Temperature card | **Floor heating**.

Setpoint	Setting of floor temperature (only with sensor). Setting of the percentage that the floor heating system shall operate with (only without sensor).
Minimum floor heating	Minimum floor heating is used in temperature-controlled floor heating. 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. 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.
Activate minimum heating at an outside temperature below	Setting an outside temperature that causes the controller activate minimum floor heating.

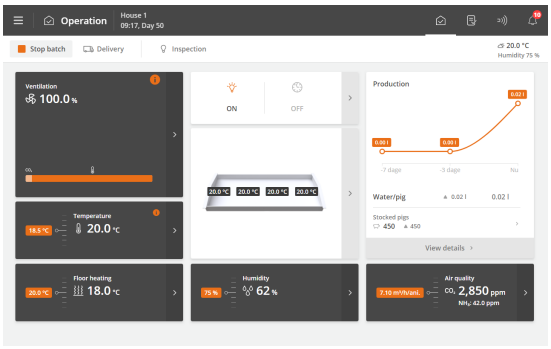
Outside temperature control	Connection and disconnection of outside temperature control. The function is intended for areas with a high daytime temperature, where it renders possible to turn off the floor heat during the day.
Stop heating at outside temperature above	Setting the outside temperature that causes the climate controller to deactivate floor heating.

5.8 House mode Active house - Empty house

The controller has 2 different modes of operation, one for when there are animals in the house and one for when the house is empty.

With animals in the house – active house. Control takes place according to the automatic settings and strategies and all alarms are active.

Without animals in the house – empty house. Control takes place according to the in-between batches setting **Empty**. Only active alarms are alarms for CAN communication and temperature surveillance for **Empty.**

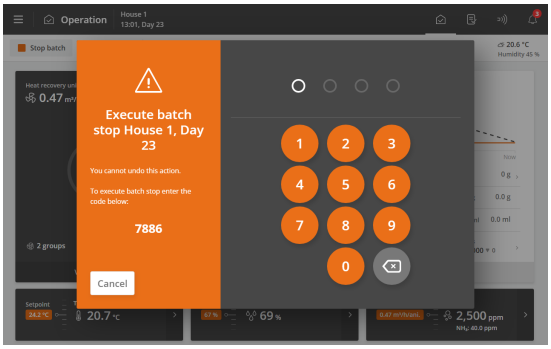


Press **Operation**.

Press **Stop batch** to change house status to **Empty**.

or

Press **Start batch** to change to house status active.



The change between active and empty house is done manually by the user. It is critical for the animals that the change does not happen by mistake. The function is therefore protected with a code entry.

Enter the displayed code to change the house status.

The change takes place immediately when the fourth digit is entered.

.

Active house

It may be an advantage to change the status to active house 1-3 days before stocking the animals. This way the controller has time to adapt the climate to the needs of the animals and to feed in the house.

When the house status changes to active, the day number changes to **Start at day**, and the controller controls according to the automatic settings.

(Be aware that it can cause problems with the history of production data if you change the **Day number** after the house status is set to active. This setting should only be used for service).

Empty house

The house status should not be changed to **Empty** until the house has been depopulated.

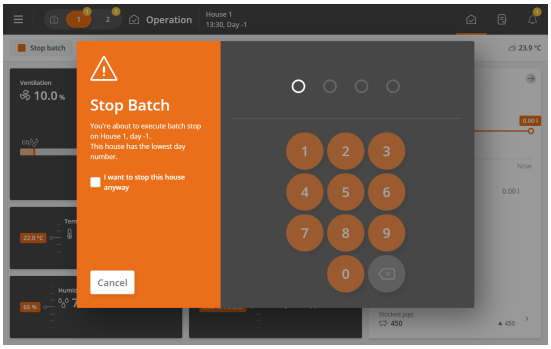
Then the controller disconnects the adjustment and controls according to the settings for **Empty**. It protects the animals in case a house is set to **Empty** by mistake.

If the house is to be completely closed, the settings of the function **Empty** must be reset. See the section Empty house [▷ 66].

When the house status changes to **Empty**, the controller resets all settings that deviate from the strategy and settings made during the previous batch.

5.8.1 Empty house safety

This section is relevant only to houses with 2-house controllers.



The house with the lowest day number cannot immediately be set to **Empty**.

Only when **I want to stop this house anyway** is marked can the status be changed to **Empty**.

This menu is only shown for the house with the lowest day number.

5.9 Pause functions

5.9.1 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 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.

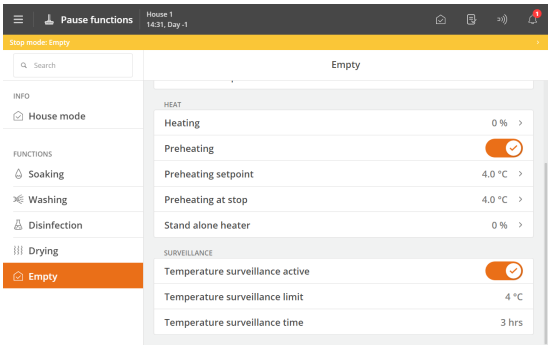
Menu button | **Pause functions | Functions |** **Disinfection**

Duration of Desinfection	Setting the number of hours during which the function is active.
Temperature	Setting of the temperature it needs to be in the house during disinfection.
Floor heating setpoint	Setting of floor heat supply. 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.

Inlets	
Roof inlet flap	Setting of flap position for the roof inlets (roof).
Roof inlet fan	Setting of speed control for the roof inlets (roof).
Recirculation inlet	Setting of recirculation fan for the roof inlets (roof).
Side inlet	Setting the flap opening for side air inlet (side).
Tunnel inlet	Setting of the tunnel opening (tunnel).
HRU inlet flap	Setting of flap opening for air inlet for heat recovery unit.
HRU HRU inlet fan	Setting of fan speed controller for heat recovery unit.

Outlets	
Air outlet 1 flap	Setting the flap opening for air outlet. When the house is in **Empty** mode, the function is typically used to open the stepless flap.
Air outlet fan speed	Setting of speed control for air outlet. When the house is in **Empty** mode, the function is typically used to turn off the stepless fan.
HRU outlet flap	Setting of flap opening for air inlet for heat recovery unit.
HRU outlet fan	Setting of fan speed controller for heat recovery unit.

5.9.2 Empty house



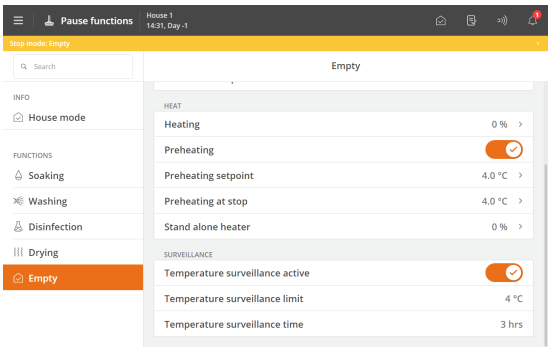
Empty house

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

When batch status is **Empty**, the controller disables all automatic regulations and operates according to the settings for **Empty**.

All alarm functions - with the exception of temperature monitoring when the house is empty - are switched off. See also the section Temperature surveillance [▶ 67].

5.9.2.1 Preheating



Preheating ensures that the inside temperature does not drop below the set temperature when house status is **Empty** for a longer period of time.

The function can therefore also be used for frost protection of the house.

Heating can be supplied as room heating or floor heating.

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.

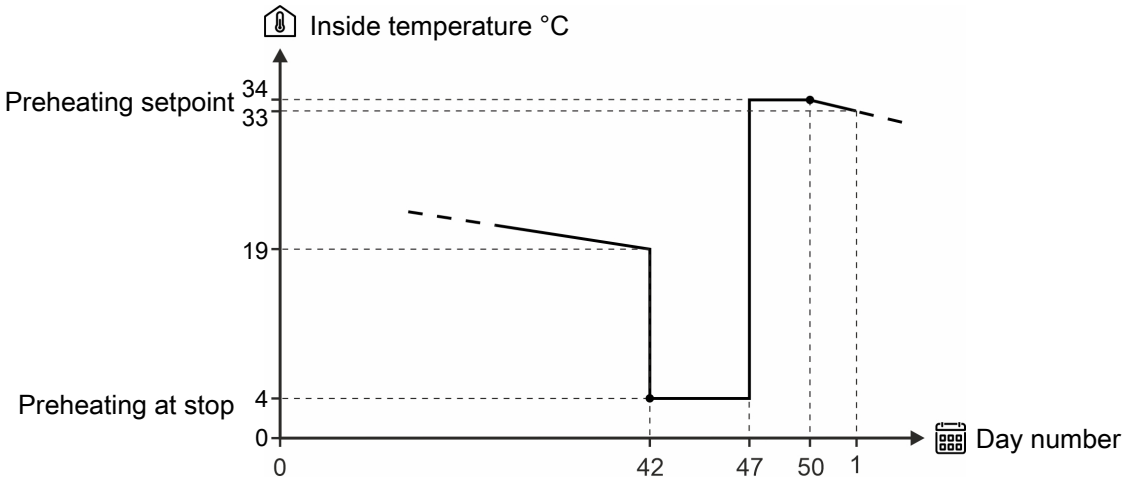


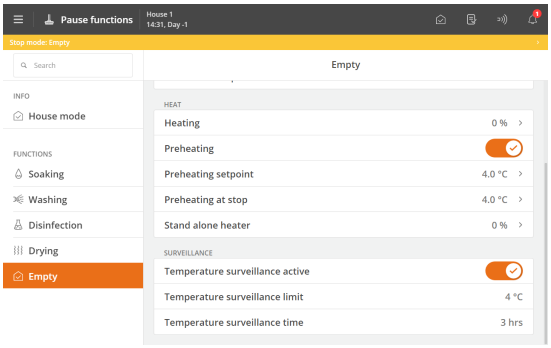
Figure 24: Example of setting of preheating.

Menu button | **Pause function** | **Functions** | **Empty**

Preheating	Connection and disconnection of the function.
Preheating setpoint	Setting of desired inside temperature at start.
Preheating at stop	Setting of desired minimum inside temperature between 2 batches.

Floor preheating set-point	Setting of the percent that the floor heating system shall operate with. The floor heating stops when the inside temperature exceeds the temperature that has been set.

5.9.2.2 Temperature surveillance



The controller can be secured against incorrect setting to the house status **Empty**.

The controller monitors the temperature in the house for 3 hours after changing the batch status to **Empty**. If the temperature increases in this period by more than 4 °C (indicate there are animals in the house), the controller triggers an alarm and activates the ventilation.

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

Menu button | **Between batches | Functions | Empty**

Temperature surveillance active	Connection and disconnection of the function.
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.

6 Production

The light, water, and 24-hour clock functions are part of the standard software for pigs.

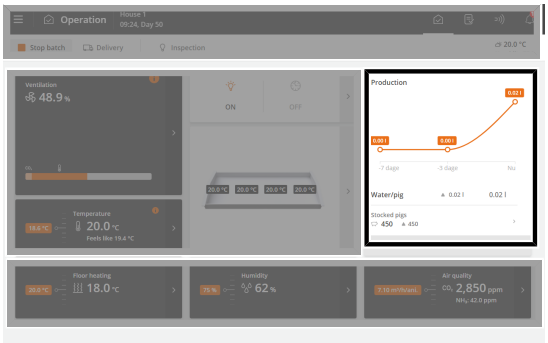
The feature software for pigs also has:

- Advanced dry feeding program with subcircuit and volume dispenser control.
- Production alarm relay.
- Recording key figures, such as water/animal and live and dead animals.

6.1 Animals

Information about the number of stocked animals helps to form the basis for the controller's calculations relating to climate control.

With feature software for production, these options are expanded with more options for registration of key figures for live and dead animals and calculating mortality.



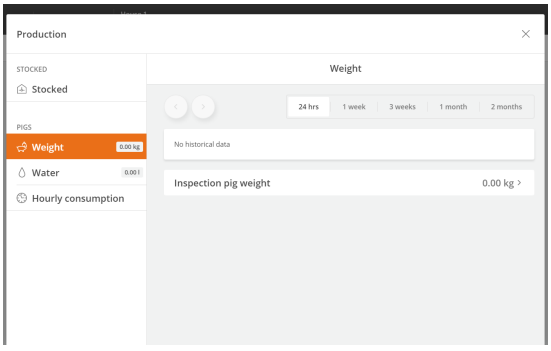
Operation. The most important values and settings for animals n the livestock house can be viewed and entered via the **Production results** card.

A graphic on the face of the card illustrates the current water values during the last 7 hours. Furthermore the number of animals in the house is displayed and access to registration of new data is available.

Operation | Production results card | **Animal**

Stocked	Entry of the total number of animals at batch start. If animals are stocked or removed from the livestock house in the course of a batch, it must be recorded in the menu **Add/remove animals** or **Number of dead animals**.

6.2 Pig weighing



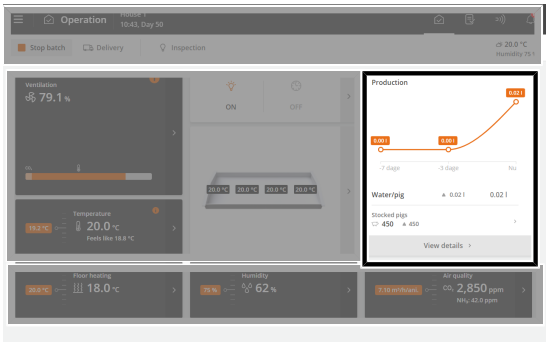
Operation | Productions results card | **Scale**

Manually weigh a number of animals.

Enter the average weight of the animals in the production controller as **Inspection weight**.

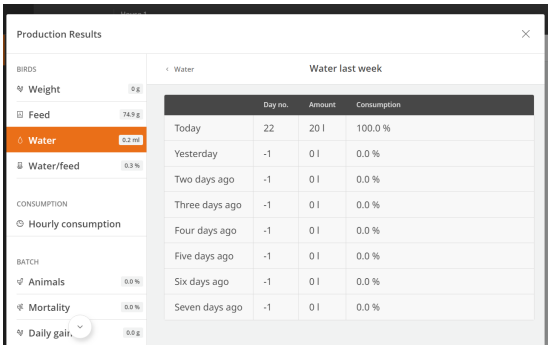
The manual weighings should be carried out on the same day and time of the week to ensure that the weighings are comparable.

6.3 Water



Operation | Production results card | **Water**

Water data is collected and presented in graphs and outlines, including important key figures.



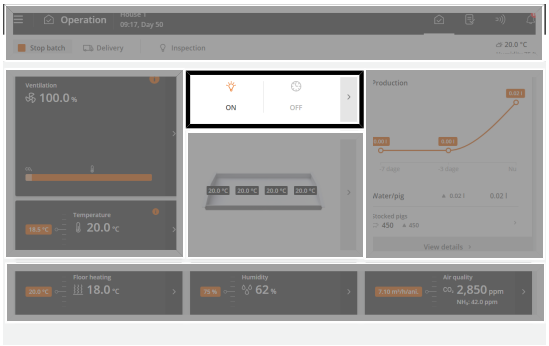
Water consumption

The controller records the water consumption in liters to provide a complete overview. The water consumption is also recorded in percent to make sudden changes visible.

Under normal conditions, the percentages will increase by a few percent per day as the age of the animals increases.

6.4 24-hour clock

The 24-hour clock function allows you to automatically turn on and off equipment at specific times or time intervals. In addition, the 24-hour clock allows you to choose how often equipment will run in a week. It is done by applying a week program.

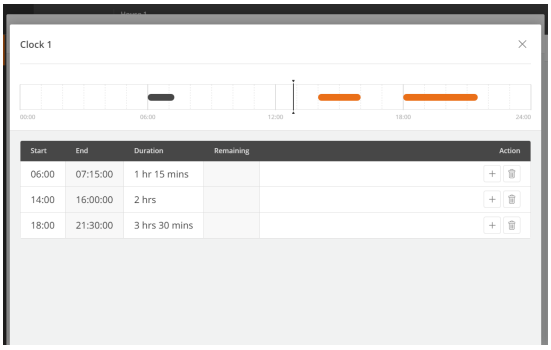


Operation. When 24-hour clock is on, it is displayed with a colored icon on the card **Program overview**.

The card provides access to view and change the programs of all the 24-hour clocks.

In each program you must set the following:

- Start time
- Duration



Operation | Program overview-card | **Clock**

Press the field in the column **Start** to set a start time.

Press the field in the column **Duration** to set the duration of the period.

Press + to add a new period, then set the start time and duration of the period.

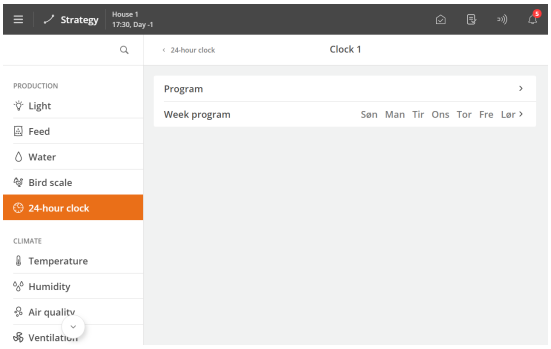
The blocks on the timeline show when and how long the 24-hour clock is on.

Outside the selected periods, the 24-hour clock is off.

Press to delete a period.

.

24-hour clock with week program



Menu button | **Strategy | Production |** **24-hour clock**

Select which days the 24-hour clock is on.

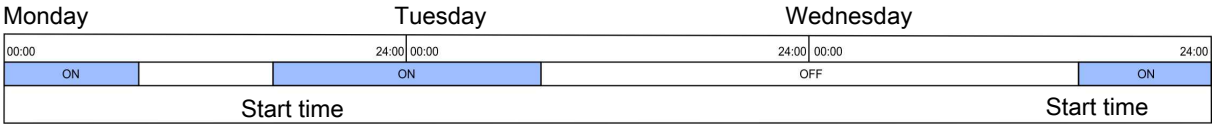


Figure 25: If an ON-time runs past midnight on a day when the 24-hour clock is not active, the function will remain ON until the time has elapsed.

7 Management

7.1 Equipment status

When monitoring equipment such as e.g. a current sensor for the individual components of the system, a complete overview can be seen in the menu **Operation | Climate equipment** card **| Equipment status**.

See also the section Equipment status.

7.2 Power reduction

The function is designed to limit the current consumption of the connected components during periods when the power supply is under load.

The controller is notified that the power supply is insufficient. It can then turn off or limit the current consumption to the following functions:

- Ventilation
- Main light, slave light and extra light
- Feeding system (pan feeding and layer feeding)
- 24-hour clock

Menu button | Strategy | Power reduction | Climate

Power reduction enabled	Selecting whether power reduction should be applied to ventilation. This will enable a reduction in the ventilation level.
Ventilation setpoint	Setting the degree of ventilation to be ventilated when power reduction is active.

Menu button | Strategy | Power reduction | Production | Main light

Main light power reduction enabled	Selecting whether power reduction should be applied to main light. It will allow a reduction of the light intensity.
Main light intensity reduced by	Setting the required light intensity when power reduction is active.

Corresponding settings for slave light and extra light.

Menu button | Strategy | Power reduction | Production | Feed system

Enable power reduction	Selecting whether power reduction should be applied to the feeding system (pan feeding and layer feeding only). It will pause feeding. However, during pan feeding, the cross auger and the silo auger will continue to fill the feed dispenser until the feed requirement is met.

Menu button | Strategy | Power reduction | production | 24-hour clock

Clock 1 power reduction enabled	Selecting whether power reduction should be applied on the 24-hour clock. This will pause the equipment that the 24-hour clock controls.

8 Alarm settings

The 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.

See also the section Alarms [▷ 25].

8.1 Climate

8.1.1 Temperature alarms

Menu button | **Settings** | **Alarms | Climate | Temperature**

Actual alarm limit	The temperature alarm has a variable alarm limit. It is, e.g., possible to compensate for changes in the outside temperature. Display of the temperature limit that will trigger the alarm.
Absolute high temperature	The alarm for absolute high temperature is triggered by an actual temperature, such as 32°C. The controller triggers the absolute high temperature alarm when just one inside temperature sensor measures a temperature that exceeds this setpoint. The absolute high temperature is set as a temperature curve.
High temperature limit	The temperature alarm for high temperature is only activated when the batch status is active. The alarm is set as an excess temperature to **Temperature setpoint**.
Low temperature limit	Alarm for excessively low temperature in relation to the **Temperature setpoint**.

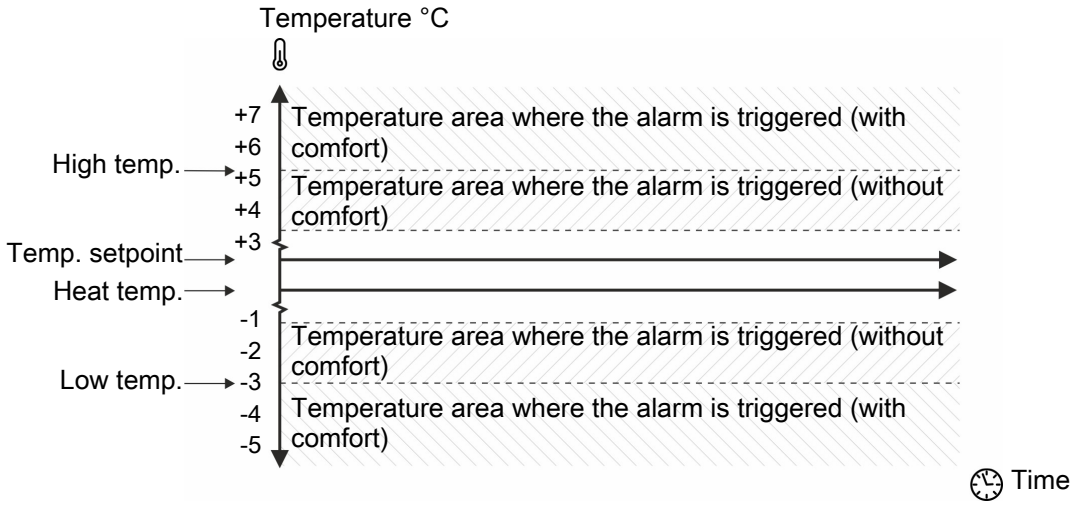


Figure 26: Alarm high and low temperature

If the 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 subtract 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.

Summer temp. 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. It will thus postpone the time when the high temperature alarm is triggered. The controller only triggers the alarm if the inside temperature also exceeds the high temperature alarm.

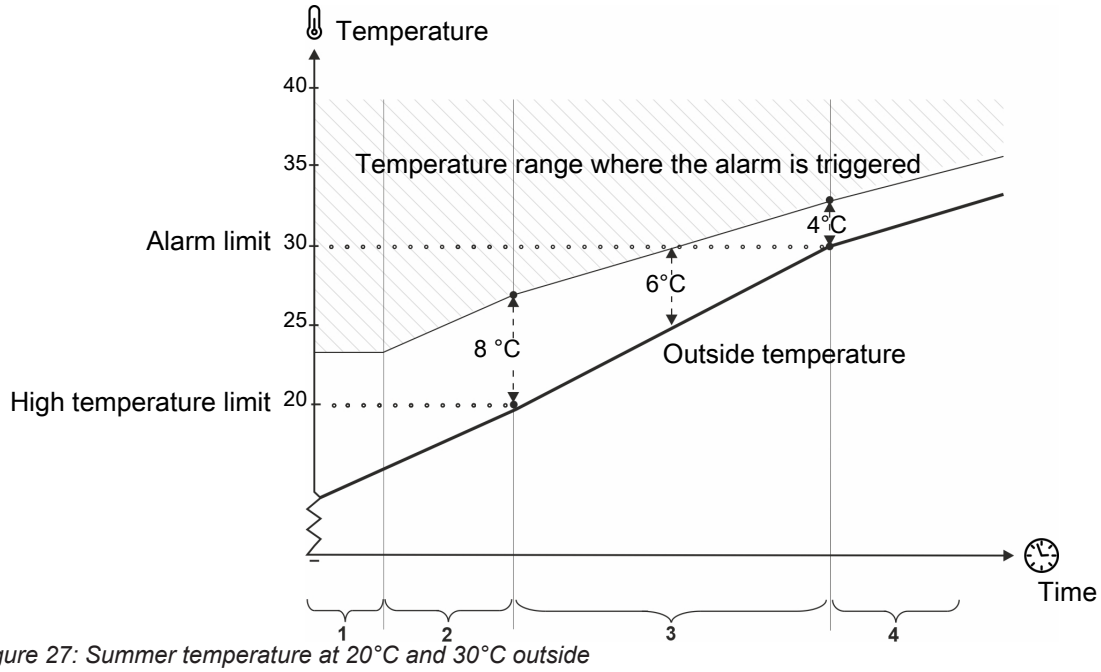


Figure 27: Summer temperature at 20°C and 30°C outside

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.*

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 controller generates an alarm when the temperature difference between the Front and the Rear zones exceeds the set number of degrees.
Temperature surveillance	The alarm can be generated at batch stop. In the event of this alarm, the controller will start all of the ventilation again. To exit the alarm state, the controller must be returned to active.

8.1.2 Humidity alarm

Menu button | **Settings** | **Alarms** | **Climate** | **Humidity**

Absolute high humidity limit	The 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.

8.1.3 Inlet and outlet alarm

Menu button | **Settings** | **Alarms** | **Climate** | **Inlet and outlet alarm**

Inlet and outlet alarm	The inlet and outlet alarms are technical alarms. The 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.

Alarm type	
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.
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.

8.1.4 Sensor alarm

Menu button | **Settings** | **Alarms** | **Climate**

Error inside temperature sensor	The controller triggers an alarm if the sensor is short-circuited or disconnected. Without this sensor, the 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 %. The alarm is always a hard alarm.
Error outside temperature sensor	The controller triggers an alarm if the outside temperature sensor is short-circuited or disconnected.
Error outside temperature sensor low (-35°C)	Selection of whether the controller should monitor whether there is an error in the outside temperature sensor. The function is intended for use in areas where the outside temperature usually does not fall below -30 °C.
Misplaced outside sensor	The alarm indicates whether the sensor is exposed to solar heating and therefore displays an incorrect outside temperature. The 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.
Error floor heating temperature sensor	The controller triggers an alarm if the sensor is short-circuited or disconnected. The alarm is always a hard alarm.

8.1.5 Tunnel cooling sensor alarm

Menu button | **Settings** | **General** | **Alarms** | **Climate**

Alarm for tunnel opening failure	The controller triggers an alarm when the tunnel cooling temperature exceeds the outside temperature by the number of degrees you set for **Tunnel cooling sensor alarm limit. Tunnel opening failure** The alarm is only active at tunnel ventilation.
Cooling pump failure	The controller triggers an alarm when the tunnel cooling temperature exceeds the outside temperature by the number of degrees you set for **Tunnel cooling sensor alarm limit. Cooling pump limit**

Tunnel cooling sensor 1 alarm	The controller triggers an alarm if the sensor is short-circuited or disconnected. In case of sensor failure, the controller will adjust tunnel cooling according to the outside temperature + 2 °C.

8.1.6 Pressure sensor

Menu button | **Settings | General | Alarms | Climate**

Pressure sensor	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. The controller triggers an alarm when the pressure in the house drops below or exceeds the settings of **Pressure high limit**/**Pressure low limit**.

8.1.7 Auxiliary sensor, CO2 and NH3 alarm

Menu button | **Settings | Alarms | Climate**

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

8.1.8 Emergency control

8.1.8.1 Emergency opening

The 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 (negative pressure)	Yes	Yes
Pressure low alarm (positive pressure)	No	No
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.

8.1.8.2 Temperature-controlled emergency opening

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 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 setting can be read off in the display together with **Temperature setpoint**.

Warning at emergency temp.

The 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 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 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.

8.1.8.3 Emergency inlet

The emergency inlet 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 trigger

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 enables the air inlet to be opened during a hot season where the air inlet, under normal conditions, is not triggered by the normal high temperature alarm limit.

8.2 Production

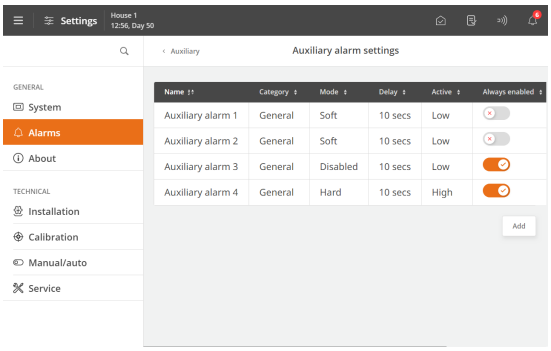
8.3 Auxiliary

8.3.1 Auxiliary alarms

It is possible to create a number of auxiliary alarms. For example, the controller may give an alarm from a connected motor controller, a water pump or other equipment.

The alarms can be sorted within each column by pressing the heading.

Menu button | **Settings | Alarms | Auxiliary | Auxiliary alarm settings**



Press **Add** to add a new alarm.

Press **Name** to name the alarm.

Press **Category** to add the alarm to a category.

Select the alarm type **Hard**, **Soft** or **Disabled**.

Set a delay, if required. In this way, the alarm signal can be delayed so that the alarm is not triggered when the alarm limit is briefly exceeded.

Set the activation to take place in the event of high or low input.

Select if the alarm should be active always or from a specific day number.

To delete an auxiliary alarm, press the icon .

After creating the alarm, see the menu | **Installation | Show connection** for information about where to connect the extra equipment.

8.4 Master/Client alarms

If the controller is set up to share equipment with other controllers, it gives an alarm if the connection between the controllers is lost. A ‘Client’ controller will continue to regulate according to the latest received value from the ‘Master’ controller equipment until the network connection is restored.

Menu button | **Settings** | **Alarms**

Connection to Client lost	Select the alarm type **Hard**, **Soft** or **Disabled**.
Connection to Master lost	

8.5 Equipment status

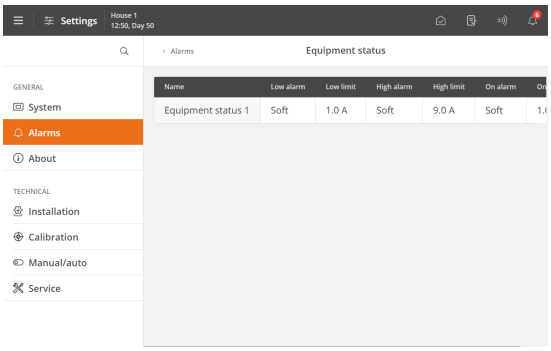
When connecting monitoring equipment such as e.g.,a current sensor for the individual components of the system (stepless and MultiStep fans), it is possible to get an alarm which can indicate the possible fault type.

There are 3 alarm types:

Low alarm	Possible equipment failure. The equipment may be disconnected by mistake. Alarm due to missing current consumption. For example, MultiStep/stepless may be activated and the power consumption too low, if the emergency stop at the fan is activated.
High alarm	The equipment shows signs of wear. Alarm due to excessive current consumption.
ON alarm	The equipment is active, but should not be in relation to the controller's regulation. Alarming due to current consumption, which should not be there. For example, MultiStep/stepless may be activated and the current consumption too high, if there is an emerging defect in the fan.

Alarms are only triggered when a limit has been exceeded for 5 minutes.

The alarms are set up to match the connected monitoring equipment. This is done in the menu **Alarms | Equipment status**



Select the alarm type **Hard**, **Soft**, or **Disabled**.

First read the current consumption during normal operation to get an indication of the voltage ranges.

Then set voltage ranges for **Low limit**, **High limit** and **Alarm if ON**.

9 Maintenance instructions

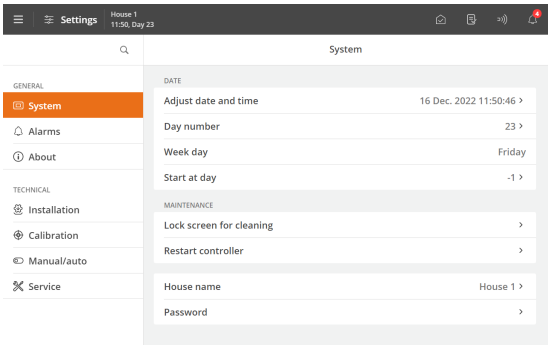
The controller requires no maintenance to function correctly.

You should test the alarm system every week.

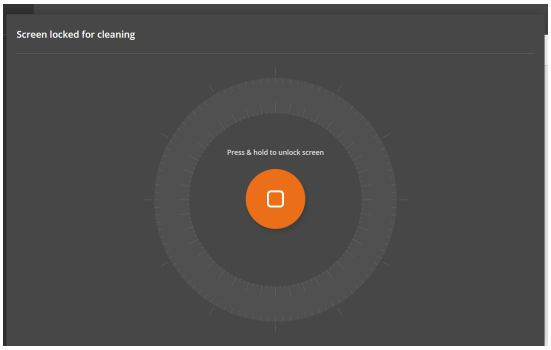
Use only original spare parts.

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

Lock screen for cleaning



When the controller is to be cleaned, it is possible to lock the screen to avoid inadvertent operation during cleaning.

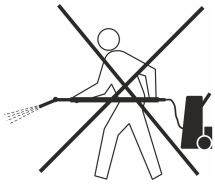


Press Menu button | **Settings | General | System | Maintenance | Lock screen for cleaning** to lock the screen.

Press and hold for 5 seconds to unlock the screen.

The controller automatically cancels the lock after 15 minutes.

9.1 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

9.2 Recycling/Disposal

The label indicates that the product must not be disposed of as general refuse disposal and must be treated as electronic waste.

The label indicates that the product is suitable for recycling.

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.

99-94-0646 06/2025 GB • 2025-06-02 • en-US

Big Dutchman International GmbH • Calveslage • Auf der lage 2 • 49377 Vechta; Germany
Tel. +49(0)4447/801-0 • Fax +49(0)4447/801-237 • big@bigdutchman.com