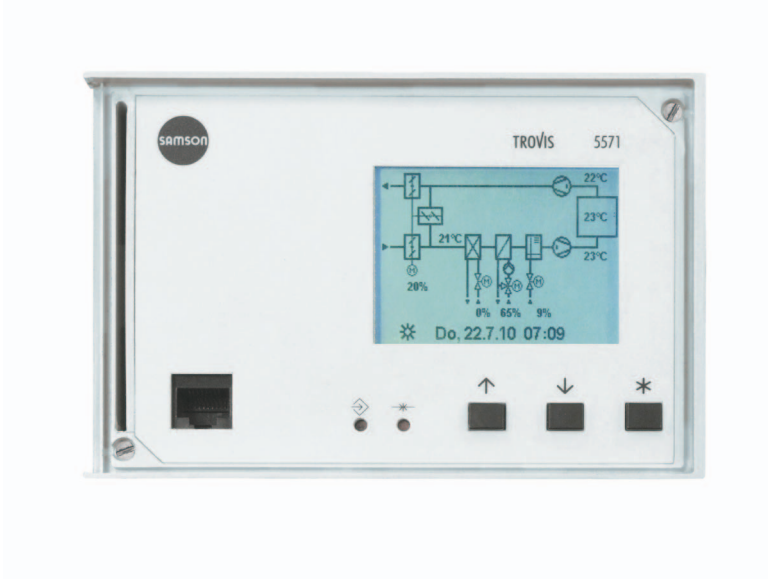
Automation System TROVIS 5500
Programmable Logic Controller (PLC)
TROVIS 5571

Standard Application Ventilation Control Luft71



Operating Instructions

EB 5571-3 EN

Firmware version 1.24

Edition November 2011

TROVIS® Electronics from SAMSON

CE

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Safety instructions

- These operating instructions (EB 5571-3 EN) describe the standard application Luft71, which can be transferred to the TROVIS 5571 Programmable Logic Controller (PLC).
  Read the Mounting and Operating Instructions EB 5571 EN for the TROVIS 5571 Programmable Logic Controller (PLC). These instructions contain important information on the installation, electrical connection, start-up and communication of the TROVIS 5571 Programmable Logic Controller.
- The device may only be assembled, started up or operated by trained and experienced personnel familiar with the product. Proper shipping and
- appropriate storage are assumed.
- The controller has been designed for use in electrical power systems. For wiring and maintenance, you are required to observe the relevant safety regulations.

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1 Operation

The application software is ready for operation with the default temperature and time schedule settings after it has been transferred to the TROVIS 5571 PLC.
On start-up, **the language as well as the current time and date** must be set in the controller. Refer to section 1.5.

1.1 Operating elements

1.1.1 Operating keys

The keys are located in the front panel of the PLC and protected by a Plexiglas door.

Changeover key
(press with pen or other pointed item)
Switch between the Operating level and Settings level

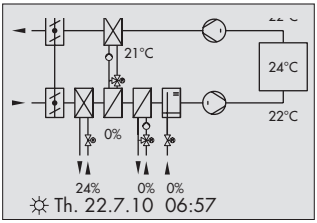
Reset key
(press with pen or other pointed item)
Resets the PLC.
NOTICE The application in the controller is deleted.

Cursor key(s)
– Navigate within levels
– Change values

Enter key
– Open levels
– Activate editing mode for parameters and function blocks
– Confirm entered settings

1.2 Display

After connecting the controller to the power supply, the current application and firmware version appear on the display. After pressing the ✳ key, the start screen appears, which also appears during operation. This start screen contains the current system scheme, time, date and information on operation.



1.3 Operating modes

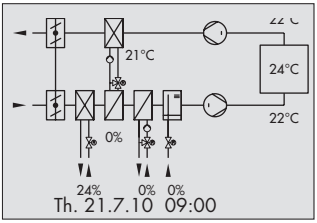
The following operating modes are available:

Automatic mode 🕘
The ventilation system is switched to day mode during the programmed times-of-use. Outside the times-of-use, the controller switches to the night mode.
The controller switches automatically between both operating modes.

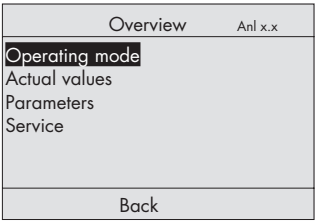
Day mode (rated operation) ☼
The set points for rated operation are used for control regardless of the entered time schedule and the summer mode.

Night mode ☽
The ventilation system is deactivated. The frost protection is active.

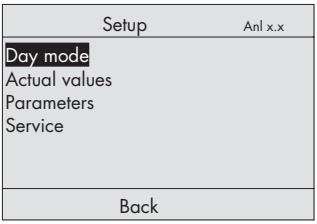
1.3.1 Setting the operating mode



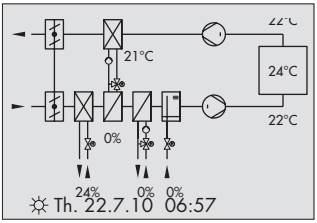
The controller with start screen



- Exit the start screen.
  Display: Overview
  The 'Operating mode' menu item is highlighted.
- Activate the editing mode for the operating mode.
  Display: The currently valid operating mode blinks.
- Select operating mode.



- Confirm selected operating mode.

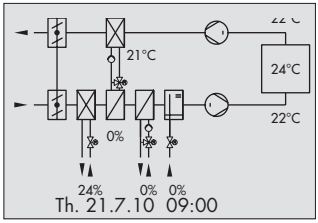


Exit setup menu

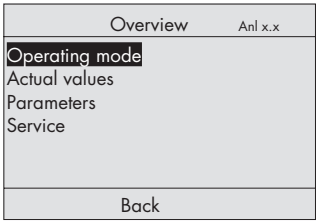
- Select 'Back'.
- Exit overview menu.
  Display: Start screen

1.4 Selecting the language

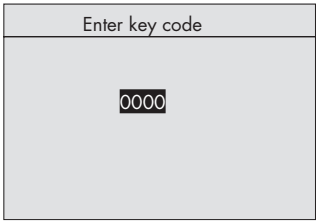
The standard application Luft71 is available in English, German and Slovenian.



The controller with start screen



✳ Exit the start screen.
Display: Overview
The 'Operating mode' menu item is highlighted.



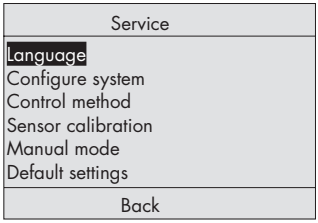
Opening the service menu

⇶ Activate the controller editing mode.
Display: Enter key code.
0000 blinks.

⇩ Enter application key code.

✳ Confirm application key code.
Display: Overview

⇩ Select Service.



✳ Open the service menu.
Display: Service
The 'Language' menu item is highlighted.

✳ Select 'Language' menu item.

⇩ Select language.

✳ Confirm language selected.

After selecting the language, exit the menu step-by-step and return to the start screen:

⇩ Select 'Back'.

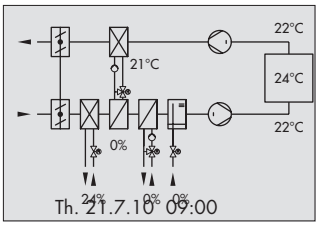
Exit overview menu.
Display: Start screen

1.5 Setting the system time

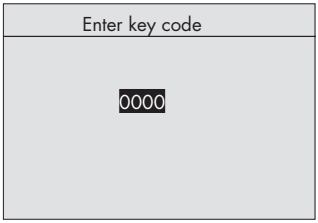
The current time and date need to be set immediately after start-up and after a power failure lasting more than 72 hours.

Set the system time in the Settings level under the menu item 'Date/Time' after pressing the changeover key and entering the system key code (see page 82). The **Automatic summer time** function can also be activated (on) or deactivated (off) in this menu item.

- **System time:** Time-dependent functions of the saved application are based on the system time set in the PLC.
- **Automatic summer time:** The summer time is automatically set on the last Sunday in March at 02:00 h and the winter time on the last Sunday in October at 03:00 h.



The controller with start screen



Activate the controller editing mode.
Display: Enter key code.
0000 blinks.

Enter the key code.

Settings level
Date/Time
RS-232/Slave
RS-485/Master
RS-232/Prog
Meter bus
Universal input type
Back

✳ Confirm the entered key code.
Display: Settings level
The 'Date/Time' menu item is highlighted.

Settings level
21.7.2010 10:00
RS-232/Slave
RS-485/Master
RS-232/Prog
Meter bus
Universal input type
Back

✳ Activate the 'Date/Time' menu item.
Display: System time (DD.MM.YYYY HH:MM)

✳ Activate the editing mode for the system time.
Display: Date (***DD***) blinks.

↓ Enter date.

✳ Confirm date entered.
Display: Month (***MM***) blinks.

↓ Enter month.

✳ Confirm month entered.
Display: Year (***YYYY***) blinks.

↓ Enter year.

✳ Confirm year entered.
Display: Time (***HH***) blinks.

↓ Enter hour.

✳ Confirm hour entered.
Display: Minutes (***MM***) blink.

↓ Enter minutes.

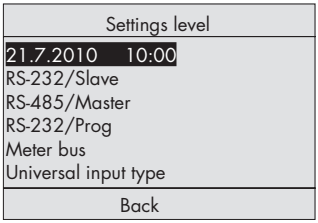
Settings level
Automatic summer time? On
RS-232/Slave
RS-485/Master
RS-232/Prog
Meter bus
Universal input type
Back

✳ Confirm minutes entered..
Display: "Automatic summer time? __" blinks

If required, change the current setting (on/off) of the **Automatic summer time** function.

↑ Activate function: Automatic summer time? On

↓ Deactivate function: Automatic summer time? Off



⊛ Exit the 'Date/time' menu item.
Display: Settings level

Exiting the settings level

⇩ Select 'Back'.

⊛ Exit settings level.
Display: Start screen

Note: *If no key is pressed for two minutes, the PLC automatically returns to the start screen.*

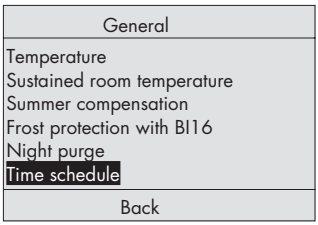
1.6 Entering time schedules

Two time schedules can be programmed for each day of the week. If only one time schedule is required, the start and stop times of the second schedule must be programmed to identical times.

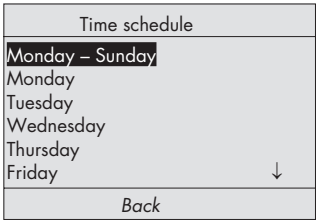
The controller is delivered with the default time schedule starting at 7:00 h and ending at 22:00 h.

The time schedule for the ventilation system is programmed in the menu **[Overview > Parameters > General]**.
The time schedule of the fans is programmed in the menu **[Overview > Parameters > Fans]**.

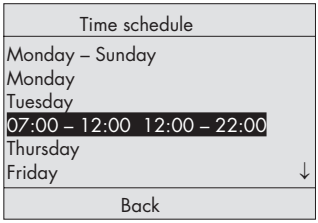
Use the arrow key ⇩ and enter key ⊛ to activate the editing mode for the 'Time schedule' menu item.



⇩ Select 'Time schedule' menu item.



✳ Activate the editing mode for the time schedule.
'Monday – Sunday' is highlighted.



↓ Select time period/day.

✳ Activate the editing mode for the time period/day.
Display: Current time-of-use periods
(HH:MM – HH:MM HH:MM – HH:MM)

✳ Activate the editing mode of the time period.
Display: Start time of the first time schedule blinks.

↓ Edit start time (steps of 30 minutes).

✳ Confirm start time.
Display: Stop time of the first time schedule blinks.

↓ Edit stop time (steps of 30 minutes)

✳ Confirm stop time.
Display: Start time of the second time schedule blinks.

The second time schedule is set like the first time schedule.

To set the time schedules for each day, repeat the instructions in the fields highlighted in gray.

After programming all the time schedules, exit the menu step-by-step and return to the start screen:

↓ Select 'Back'.

✳ Exit overview menu.
Display: Start screen

1.7 Entering vacations

During a vacation period, the system is constantly in the night mode. All safety functions are active. Vacations can be programmed.

Vacations must be programmed in the menu **[Overview > Parameters > General]**.

Use the arrow key ↓ and enter key ✳ to activate the 'Vacations' menu item.

General
Sustained room temperature Summer compensation Frost protection with BI16 Night purge Time schedule Vacations
Back

↓ Select 'Vacations' menu item.

General
Sustained room temperature Summer compensation Frost protection with BI16 Night purge Time schedule 00.00.–00.00.
Back

✳ Activate 'Vacations' menu item.
Display: 00.00.-00.00. (TT.MM.-TT.MM.)

General
Sustained room temperature Summer compensation Frost protection at BE16 Night purge Time schedule 00.00.–00.00.
Back

✳ Activate the editing mode for vacations.
Display: 0 (first figure for day of month) blinks.

↑ Select date (repeated selection and entry of figures).

✳ Confirm

General
Sustained room temperature Summer compensation Frost protection with BI16 Night purge Time schedule 10.01.–20.01.
Back

Note: *To delete vacation, set the date setting to 00.00.-00.00.*

After setting the vacations, exit the menu step-by-step and return to the start screen:

⇩ Select 'Back'.

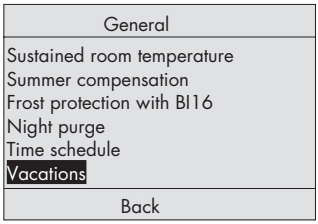
✳ Exit overview menu.
Display: Start screen

1.8 Entering public holidays

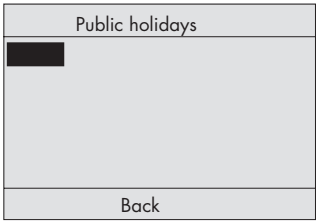
The time schedule programmed for Sunday apply on public holidays. No public holidays are ready programmed.

Public holidays must be programmed in the menu **[Overview > Parameters > General]**.

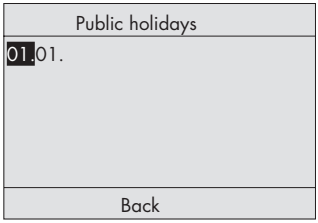
Use the arrow key ⇩ and enter key ✳ to activate the 'Public holidays' menu item.



⇩ Select 'Public holidays' menu item.



✳ Activate 'Public holidays' menu item.
Display: Public holidays

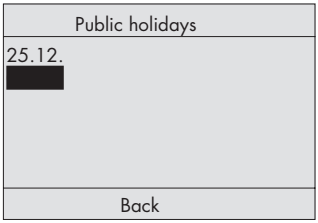


✳ Activate the editing mode for public holidays.
Display: 01. (day of month) blinks.

⇧ Select day of month.

✳ Confirm selected day.
Display: 01. (month) blinks.

⇧ Select month.



Confirm selected month.

Set other public holidays in the same manner as described above.

Deleting public holiday

Select the public holiday to be deleted.

Activate the public holiday.
Display: Date blinks.

Select – – .

Confirm that the public holiday is to be deleted.

After setting all public holidays, exit the menu step-by-step and return to the start screen:

Select 'Back'.

Exit overview menu.
Display: Start screen

1.9 Setting parameters

Note: *Configure the system (see section 2.1.1) before setting any parameters. The parameters of the ventilation application are reset to the default settings on changing the system code number.*

Use the arrow key and enter key (↓ and ✳) to select parameters in the menus (🗗) described in section 10.

✳ Activate the editing mode for the parameter.

↓ Change the parameter.

✳ Confirm parameter setting.

After setting the parameters, exit the menu step-by-step and return to the start screen:

↓ Select 'Back'.

✳ Exit overview menu.
Display: Start screen

2 Start-up

2.1 System code numbers

In the Service menu, the required system code number can be selected after entering the key number of the application. The application key number can be found on 82. To avoid unauthorized use of the key number, remove the page or make the key number unreadable.

Six control valves are available which can be selected or unselected as required. A system code number is assigned to each configurable system.

	Heating register	Cooling register	Humidifier	Dehumidifier	Mixed air damper	Heat recovery unit
System Anl 0	•	–	–	–	–	–
System Anl 1	•	•	–	–	–	–
System Anl 2	•	–	–	–	•	–
System Anl 3	•	–	–	–	–	•
System Anl 4	•	•	–	–	•	–
System Anl 5	•	•	–	–	–	•
System Anl 6	•	•	•	•	–	–
System Anl 7	–	•	–	–	–	–
System Anl 8	•	•	•	–	•	–
System Anl 9	•	•	•	–	–	•
System Anl 10	•	•	•	•	•	–
System Anl 11	•	•	•	•	–	•
System Anl 12	–	•	–	–	•	–
System Anl 13	–	•	–	–	–	•
System Anl 14	–	•	•	–	•	–
System Anl 15	–	•	•	–	–	•
System Anl 16	–	–	•	–	•	–
System Anl 17	–	–	•	–	–	•
System Anl 18	•	–	•	–	•	–
System Anl 19	•	–	•	–	–	•

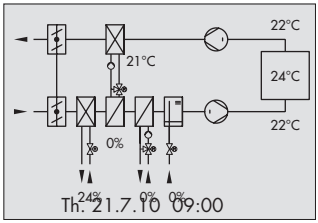
2.1.1 Configuring the system

Note:
- *Perform the electrical connection described in section 9 before configuring the system.*
- *Changing the system code number (Anl x) causes the ventilation application parameters to be reset to their default settings.*

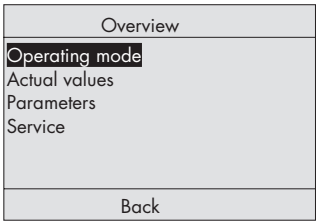
All the systems described in section 2.1.1 can be set using the system configuration. Use the arrow keys ↑ ↓ and enter key ✳ to perform the settings.

Example: System Anl 5 is to be configured.

	Heating register	Cooling register	Humidifier	Dehumidifier	Mixed air damper	Heat recovery unit
System Anl 5	•	•	–	–	–	•



The controller with start screen



✳ Exit the start screen.
Display: Overview
The 'Operating mode' menu item is highlighted.

Enter key code

0000

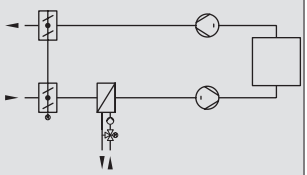
Opening the service menu

- Activate the controller editing mode.
  Display: Enter key code.
  0000 blinks.
- Enter application key code.
- Confirm application key code.
  Display: Overview
- Select Service.
- Open the service menu.
  Display: Service
  The 'Language' menu item is highlighted.
- Select 'Configure system'

Service

Language
Configure system
Control method
Sensor calibration
Manual mode
Default settings

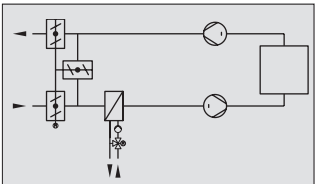
Back



System with heating register

Activating the system configuration and selecting heating register

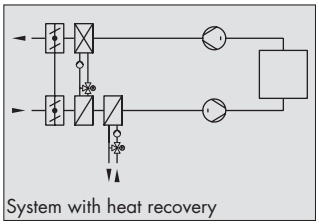
- Activate 'Configure system' menu item.
  The system selection starts with a system with heating register.



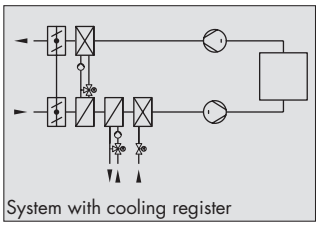
System with mixed air chamber

Selecting heat recovery

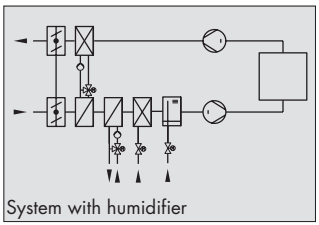
- Confirm heating register.
  The system selection shows the system with mixed air chamber.
- Deselect mixed air chamber.


System with heat recovery

✳ Confirm that you want to deselect the mixed air chamber.
The system selection shows the system with heat recovery.

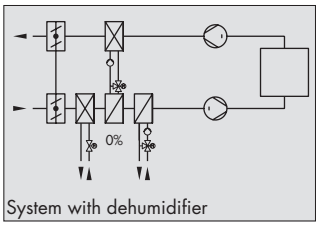

System with cooling register

✳ Confirm the heat recovery.
The system selection shows the system with heat recovery unit.


System with humidifier

✳ Confirm cooling register.
The system selection shows the system with humidifier.

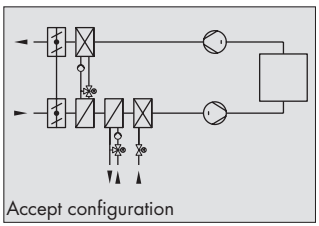
↑ Deselect humidifier.



System with dehumidifier

✳ Confirm that you want to deselect the humidifier.
The system selection shows the system with dehumidifier.

↑ Deselect dehumidifier.


Accept configuration

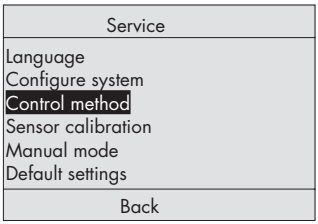
✳ Confirm that you want to deselect the dehumidifier.
The system configuration is complete and can be adopted.

✳ Accept system configuration
The controller returns to the Service menu.

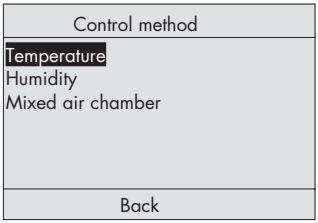
Setting the control method

The various control methods are described in section 4 for the temperature and humidity control. The settings for the mixed air chamber are described in section 5.2.2.

Proceed as follows to change the control method:



- Select the 'Control method' menu item.



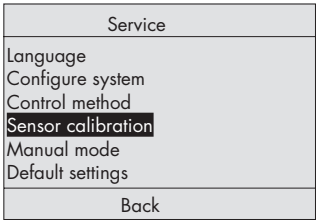
- Activate 'Control method' menu item.
  Display: Control method
- Select parameter.
- Activate the editing mode for parameter.
- Set the parameter.
- Confirm the setting.

After the system has been configured, exit the menu step-by-step and return to the start screen:

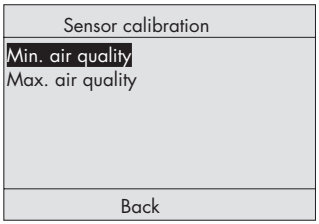
- Select 'Back'.
- Exit overview menu.
  Display: Start screen

2.2 Calibrating sensors

The air quality sensor can be calibrated by setting the minimum and maximum values.
The calibration is performed in the Service menu (-> see page 20 for details on how to open Service menu).



↓ Select 'Sensor calibration' menu item.



✳ Activate 'Sensor calibration' menu item.
Display: Sensor calibration

✳ Activate minimum value.

↓ Set minimum value.

✳ Confirm the setting.

↓ Select maximum value.

↓ Set maximum value.

✳ Confirm the setting.

After the air quality sensor has been calibrated, exit the menu step-by-step and return to the start screen:

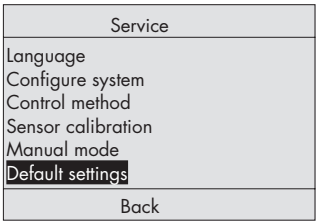
↓ Select 'Back'.

✳ Exit overview menu.
Display: Start screen

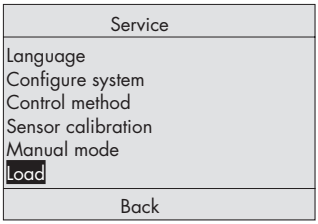
2.3 Loading default settings

Just the parameters of the ventilation system can be reset to their default settings without the standard application Luft71 being deleted from the PLC.

The default settings are loaded in the Service menu (-> see page 20 for details on how to open Service menu).



↓ Select 'Default settings' menu item.



✳ Activate 'Default settings' menu item.
Display: Load

✳ Confirm.
The default settings are loaded.

Note: *Loading of the default settings can be canceled by selecting 'Cancel' and confirming by pressing ✳.*

After the default settings have been loaded, exit the menu step-by-step and return to the start screen:

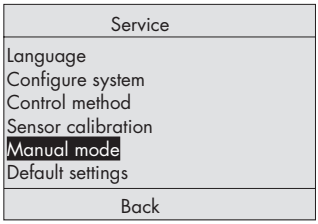
↓ Select 'Back'.

✳ Exit overview menu.
Display: Start screen

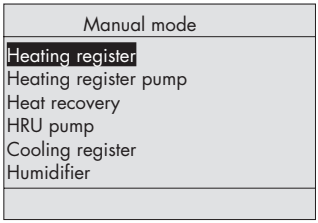
3 Manual mode

All the outputs are set in the manual mode. Refer to wiring plan (-> section 9).

The setting of the manual mode is performed in the Service menu (-> see page 20 for details on how to open Service menu).



↓ Select 'Manual mode' menu item.



✳ Activate 'Manual mode' menu item.
The outputs of the ventilation system are shown one after the other.

↓ Select output.

✳ Activate the output.

↓ Change the output.
Setting for heating register, heat recovery, cooling register, humidifier: 0 to 100 %
Setting for heating register pump, HRU pump, fans: ON, OFF

✳ Confirm the setting.

After completing the setting in the manual mode, exit the menu step-by-step and return to the start screen:

↓ Select 'Back'.

✳ Exit overview menu.
Display: Start screen

Note: *In manual mode, all the operating states of the controller outputs cease to be in force, i.e. the control signals and switchting states of the binary outputs are retained regardless of the input variables. If the output variables have been changed in the manual mode, these states are retained until the user exits the manual mode.*

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4 Control method and system components

4.1 Ventilation and temperature control in air-conditioning systems

In temperature control, various control methods are differentiated between: Supply air control, exhaust air control, exhaust air cascade control, room control and room cascade control.

4.1.1 Supply air temperature control

The sensor input UE01 is the controlled variable input by default.

The supply air temperature is controlled by a PID algorithm with an adjustable *Supply air set point*. Depending on the system code number, the temperature control loop has between one and three sequence outputs that are adapted to the dynamics of the corresponding system components using the *Kp*, *Tn* and *Tv* control parameters.

Functions such as return flow temperature limit (-> section 6.3), summer compensation (-> section 6.6), manual set point correction (-> section 8.2) or condensation detection (-> section 7.1.5) can shift the set point. The supply air can be controlled based on the outdoor temperature (section 6.9.1).

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Temperature = Supply air control	Supply air control	Supply air control, Exhaust air control, Exhaust air cascade control, Room control, Room cascade control

[Overview > Parameters > General]

Parameter	Default	Setting range
Supply air set point	22 °C	0 to 50 °C

4.1.2 Exhaust air temperature control

The sensor input UE02 is the controlled variable input by default.

The exhaust air temperature is controlled by a PID algorithm with an adjustable *Exhaust air set point*. Depending on the system code number, the temperature control loop has between one and three sequence outputs that are adapted to the dynamics of the corresponding system components using the Kp, *Tn* and *Tv* control parameters (-> section 5.2).

Functions such as return flow temperature limit (-> section 6.3), summer compensation (-> section 6.6), manual set point correction (-> section 8.2) or condensation detection (-> section 7.1.5) can shift the set point. The supply air can be controlled based on the outdoor temperature.

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Temperature = Exhaust air control	Supply air control	Supply air control, Exhaust air control, Exhaust air cascade control, Room control, Room cascade control

[Overview > Parameters > General]

Parameter	Default	Setting range
Exhaust air set point	22 °C	0 to 40 °C

4.1.3 Exhaust air temperature cascade control

The sensor input UE02 is the controlled variable input for the exhaust air temperature and the sensor input UE01 is the controlled variable input for the supply air temperature by default.

The exhaust air temperature control loop is implemented as a P control loop with adjustable *Exhaust air set point* and *Kp master loop*.

The supply air temperature is controlled by a PID control algorithm with adjustable *Set point of slave loop*. Depending on the system code number, the supply air temperature control loop has between one and three sequence outputs that are adapted to the dynamics of the corresponding system components using the *Kp, Tn* and *Tv* control parameters (-> section 5.2).

The parameters – *Supply air minimum limit* and *Supply air maximum limit* – restrict the set point shift which arises when the exhaust air temperature control loop takes influence on the supply air temperature control loop. Each deviation in exhaust air temperature by the amount x causes a shift of the supply air temperature set point by the amount x multiplied by the *Kp master loop* parameter.

- x = *Exhaust air **set** point* – **Actual** exhaust air temperature
- Supply air set point$_{new}$ = *Set point of slave loop + x ∗ Kp master loop*

NOTICE
If the calculated set point is not within the limit, the Supply air minimum limit *or* maximum limit *applies as the new set point.*

Shifts in the set point which are caused by return flow temperature limit (-> section 6.3), summer compensation (-> section 6.6), manual set point correction (-> section 8.2) or condensation detection (-> section 7.1.5) have an unrestricted effect on the exhaust air set point.

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Temperature = Exhaust air cascade control	Supply air control	Supply air control, Exhaust air control, Exhaust air cascade control, Room control, Room cascade control

[Overview > Parameters > General]

Parameters	Default	Setting range
Exhaust air set point	22 °C	0 to 40 °C
Set point of slave loop	22 °C	0 to 50 °C
Kp master loop	1	0.1 to 99.9
Supply air minimum limit	18 °C	0 °C to Supply air maximum limit
Supply air maximum limit	26 °C	Supply air minimum limit to 50 °C

4.1.4 Room temperature control

The sensor input UE03 is the controlled variable input by default.

The room temperature is controlled by a PID algorithm with an adjustable *Room set point*. Depending on the system code number, the temperature control loop has between one and three sequence outputs that are adapted to the dynamics of the corresponding system components using the Kp, *Tn* and *Tv* control parameters (-> section 5.2).

Functions such as return flow temperature limit (-> section 6.3), summer compensation (-> section 6.6), manual set point correction (-> section 8.2) or condensation detection (-> section 7.1.5) can shift the set point.

[Overview > Service > Control method]

Parameter	Default	Setting range
Temperature = Room control	Supply air control	Supply air control, Exhaust air control, Exhaust air cascade control, Room control, Room cascade control

[Setup > Parameters > General]

Parameter	Default	Setting range
Room set point	22 °C	0 to 40 °C

4.1.5 Room temperature cascade control

The sensor input UE03 is the controlled variable input for the room temperature and the sensor input UE01 is the controlled variable input for the supply air temperature by default.

The room temperature control loop is implemented as a P control loop with adjustable *Room set point* and KP master loop.

The room temperature control loop is implemented as a PID control loop with adjustable *Room set point*. Depending on the system code number, the supply air temperature control loop has between one and three sequence outputs that are adapted to the dynamics of the corresponding system components using the *Kp, Tn* and *Tv* control parameters (-> section 5.2).

The parameters – *Supply air minimum limit* and *Supply air maximum limit* – restrict the set point shift which arises when the exhaust air temperature control loop takes influence on the room temperature control loop. Each deviation in room temperature by the amount x causes a shift of the supply air temperature set point by the amount x multiplied by the *Kp master loop* parameter.

- x = *Room **set** point* – **Actual** room temperature
- Supply air set point$_{new}$ = *Set point of slave loop + x ∗ Kp master loop*

NOTICE
If the calculated set point is not within the limit, the Supply air minimum limit *or* maximum limit *applies as the new set point.*

Shifts in the set point which are caused by return flow temperature limit (-> section 6.3), summer compensation (-> section 6.6), manual set point correction (-> section 8.2) or condensation detection (-> section 7.1.5) have an unrestricted effect on the room set point.

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Temperature = Room cascade control	Supply air control	Supply air control, Exhaust air control, Exhaust air cascade control, Room control, Room cascade control

[Overview > Parameters > General]

Parameters	Default	Setting range
Room set point	22 °C	0 to 40 °C
Set point of slave loop	22 °C	0 to 50 °C
Kp master loop	1	0.1 to 99.9
Supply air minimum limit	18 °C	0 °C to Supply air maximum limit
Supply air maximum limit	26 °C	Supply air minimum limit to 50 °C

4.2 Humidity control in air-conditioning systems

In humidity control, various control methods are differentiated between: Supply air, exhaust air, room control, exhaust air cascade control and room cascade control.

4.2.1 Supply air humidity control

The sensor input U07 is the controlled variable input by default.

The supply air humidity is controlled by a PID control algorithm with an adjustable *Supply air set point*. The humidity control loop can be used for just humidifying or for humidifying and dehumidifying depending on the control method. In humidifying and dehumidifying mode, the cooling register is controlled in sequence to the humidifier.

The requirements of the humidity control loop for dehumidifying and the temperature control loop for cooling are converted internally into a common control signal Y3 for the cooling register. Each output can be adapted to the dynamics of the corresponding system components using the Kp, *Tn* and *Tv* control parameters that are adjustable (-> section 5.2).

A set point correction (-> section 8.3) affects closed-loop control by shifting the set point.

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Humidity = Supply air control	Supply air control	Supply air control, Exhaust air control, Exhaust air cascade control, Room control, Room cascade control

[Overview > Parameters > General]

Parameter	Default	Setting range
Supply air set point	50 %RH	0 to 100 %RH

4.2.2 Exhaust air humidity control

The sensor input U08 is the controlled variable input by default.

The exhaust air humidity is controlled by a PID control algorithm with an adjustable *Exhaust air set point*. The humidity control loop can be used for just humidifying or for humidifying and dehumidifying depending on the control method. In humidifying and dehumidifying mode, the cooling register is controlled in sequence to the humidifier.

The requirements of the humidity control loop for dehumidifying and the temperature control loop for cooling are converted internally into a common control signal Y3 for the cooling register. Each output can be adapted to the dynamics of the corresponding system components using the Kp, *Tn* and *Tv* control parameters that are adjustable (-> section 5.2).

A set point correction (-> section 8.3) affects closed-loop control by shifting the set point.

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Humidity = Exhaust air control	Supply air control	Supply air control, Exhaust air control, Exhaust air cascade control, Room control, Room cascade control

[Overview > Parameters > General]

Parameter	Default	Setting range
Exhaust air set point	50 %RH	0 to 100 %RH

4.2.3 Exhaust air humidity cascade control

The sensor input UE08 is the controlled variable input for the exhaust air humidity and the sensor input UE07 is the controlled variable input for the supply air humidity by default.

The master control loop is implemented as a P control loop with adjustable *Exhaust air set point* and Kp master loop.

The exhaust air humidity control is implemented by a PID control algorithm with adjustable *Set point of slave loop*. The humidity control loop can be used either just for humidifying or for humidifying and dehumidifying by involving the cooling register in sequence to the humidifier.

The requirements of the humidity control loop for dehumidifying and the temperature control loop for cooling are converted internally into one common control signal Y3 for the cooling register. Each output can be adapted to the dynamics of the corresponding system components using the Kp, *Tn* and *Tv* control parameters that are adjustable (-> section 5.2).

The set point of the supply air humidity control loop is shifted depending on the system deviation in the exhaust air or room humidity control loop.

Each deviation in humidity by the amount x shifts the supply air set point by the amount x multiplied by the parameter *Kp master loop* parameter within the range *Supply air minimum limit* and *Supply air maximum limit*.

- x = *Exhaust air **set** point* – **Actual** exhaust air humidity
- Supply air set point$_{new}$ = *Set point of slave loop + x * Kp master loop*

NOTICE
If the calculated set point is not within the limit, the Supply air temperature minimum limit *or* maximum limit *applies as the new set point.*

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Humidity = Exhaust air cascade control	Supply air control	Supply air control, Exhaust air control, Exhaust air cascade control, Room control, Room cascade control

[Overview > Parameters > General]

Parameter	Default	Setting range
Exhaust air set point	50 %RH	0 to 100 %RH
Set point of slave loop	50 %RH	0 to 100 %RH
Kp master loop	1.0	0.1 to 99.9
Supply air minimum limit	40 %RH	0 %RH to Supply air maximum limit
Supply air maximum limit	60 %RH	Supply air minimum limit to 100 %RH

4.2.4 Room humidity control

The sensor input U08 is the controlled variable input by default.

The room humidity is controlled by a PID control algorithm with an adjustable *Room set point*. The humidity control loop can be used for just humidifying or for humidifying and dehumidifying depending on the control method. In humidifying and dehumidifying mode, the cooling register is controlled in sequence to the humidifier.

The requirements of the humidity control loop for dehumidifying and the temperature control loop for cooling are converted internally into a common control signal Y3 for the cooling register. Each output can be adapted to the dynamics of the corresponding system components using the Kp, *Tn* and *Tv* control parameters that are adjustable (-> section 5.2).

A set point correction (-> section 8.3) affects closed-loop control by shifting the set point.

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Humidity = Room control	Supply air control	Supply air control, Exhaust air control, Exhaust air cascade control, Room control, Room cascade control

[Overview > Parameters > General]

Parameter	Default	Setting range
Room set point	50 %RH	0 to 100 %RH

4.2.5 Room humidity cascade control

The sensor input UE08 is the controlled variable input for the room humidity and the sensor input UE07 is the controlled variable input for the supply air humidity by default.

The master control loop is implemented as a P control loop with adjustable *Room set point* and KP master loop.

The supply air humidity control is implemented by a PID control algorithm with adjustable *Set point of slave loop*. The humidity control loop can be used either just for humidifying or for humidifying and dehumidifying by involving the cooling register in sequence to the humidifier.

The requirements of the humidity control loop for dehumidifying and the temperature control loop for cooling are converted internally into one common control signal Y3 for the cooling register. Each output can be adapted to the dynamics of the corresponding system components using the Kp, *Tn* and *Tv* control parameters that are adjustable (-> section 5.2).

The set point of the supply air humidity control loop is shifted depending on the system deviation in the room humidity control loop

Each deviation in humidity by the amount x shifts the supply air set point by the amount x multiplied by the parameter *Kp master loop* parameter within the range *Supply air minimum limit* and *Supply air maximum limit*.

- x = *Room **set** point* – **Actual** room humidity
- Supply air set point$_{new}$ = *Set point of slave loop + x * Kp master loop*

NOTICE
If the calculated set point is not within the limit, the Supply air minimum limit *or* maximum limit *applies as the new set point.*

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Humidity = Room cascade control	Supply air control	Supply air control, Exhaust air control, Exhaust air cascade control, Room control, Room cascade control

[Overview > Parameters > General]

Parameter	Default	Setting range
Room set point	50 %RH	0 to 100 %RH
Set point of slave loop	50 %RH	0 to 100 %RH
Kp master loop	1.0	0.1 to 99.9
Supply air minimum limit	40 %RH	0 %RH to Supply air minimum limit
Supply air maximum limit	60 %RH	Supply air minimum limit to 100 %RH

5 Inputs and outputs

5.1 Inputs

The assignment of the inputs depends on the system code number and the control method. Sensors that are required for the selected control methods are always activated.

If a sensor is defective and fails, it is indicated by ⚠ on the start screen. Sensors not required for a control method are automatically deselected when no measured value exists.

5.2 Outputs

5.2.1 Heating register (systems Anl. 0, 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 18, 19)

The heating register is controlled from the control output Y1. The heating register control is implemented by a PID control algorithm with the adjustable Kp, *Tn* and *Tv* control parameters.

The operating action of the control output Y1 can be reversed. The default setting of the operating action is a heating capacity 0 to 100 % = 0 to 10 V.

An electric air heater can be controlled by the binary output BA5 depending on Y1.

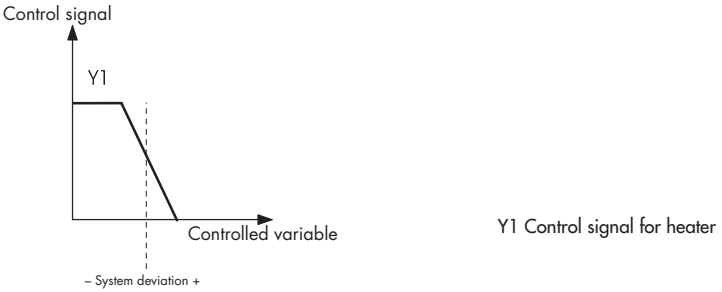

Fig. 1 · Output signal in system Anl. 0

[Overview > Parameters > Heating register]

Parameters	Default	Setting range
Kp	0.5	0.1 to 99.9
Tn	60 s	1 to 999 s
Tv	0 s	0 to 999 s

Parameters	Default	Setting range
Operating action	0 % = 0 V, 100 % = 10 V	0 % = 0 V, 100 % = 10 V/ 0 = 10 V; 100 = 0 V

5.2.2 Mixed air chamber (systems Anl. 2, 4, 8, 10, 12, 14, 16, 18)

Mixed air chamber in sequential mode

The mixed air chamber is controlled by the Y2 output which can be adapted to the dynamics of the mixed air chamber using the *Kp*, *Tn* and *Tv* control parameters. The *Minimum outdoor air rate* parameter guarantees an minimum proportion of outdoor air.

The operating action of the control output Y2 can be reversed. The default setting is an outdoor air rate of 0 to 100 % which corresponds to a control signal of 0 to 10 V.

On feedforwarding the outdoor temperature, the **summer mode** function is taken into account (–> section 6.9.3). By additionally feedforwarding the exhaust air temperature, the automatic

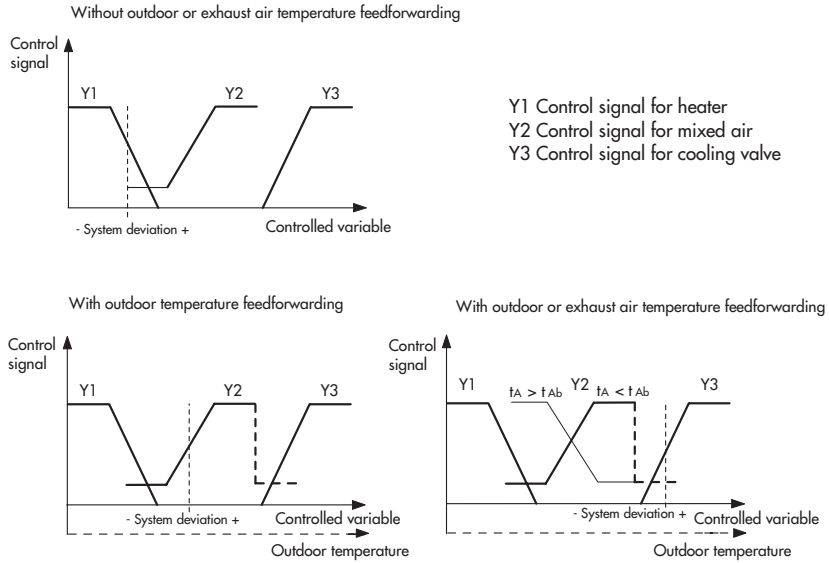

Fig. 2 · Various output signals, e.g. in system Anl. 4

reversal of the operating action takes effect. If the operating action of the control output Y2 is automatically reversed due to changing temperatures, while the control is in the sequence range Y1 or Y3, the mixed air chamber is then reversed with a constant changing rate of 15 % per minute. In case a considerable temperature difference between the exhaust air and extract air temperature exists due to the waste heat generated by the fans, the extract air temperature can also be selected as the measured variable instead of the exhaust air temperature. To do this, the extract air function must be set to 'On' in the Service menu.

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Mixed chamber = Sequential mode	Sequential mode	Sequential mode, Independent mode, Outdoor temp.-controlled

[Overview > Parameters > Mixed air chamber]

Parameters	Default	Setting range
Minimum outdoor air rate	20 %	0 to 100 %
Kp	0.5	0.1 to 99.9
Tn	60 s	1 to 999 s
Tv	0 s	0 to 999 s
Operating action	0 % = 0 V, 100 % = 10 V	0 % = 0 V, 100 % = 10 V/0 = 10 V, 100 = 0 V

Independent mixed air temperature control

The independent mixed air temperature control is implemented by a PID control algorithm with adjustable *Mixed air temp. set point*. The Y2 output is adapted to the dynamics of the mixed air chamber using the *Kp*, *Tn* and *Tv* control parameters. The *Minimum outdoor air rate* parameter guarantees a minimum proportion of outdoor air. The operating action of the control output Y2 can be reversed. The default setting is an outdoor air rate of 0 to 100 % which correspond to a control signal of 0 to 10 V.

On feedforwarding the outdoor temperature, the **summer mode** function is taken into account (–> section 6.9.3). By additionally feedforwarding the exhaust temperature, the automatic reversal of the operating action takes effect.

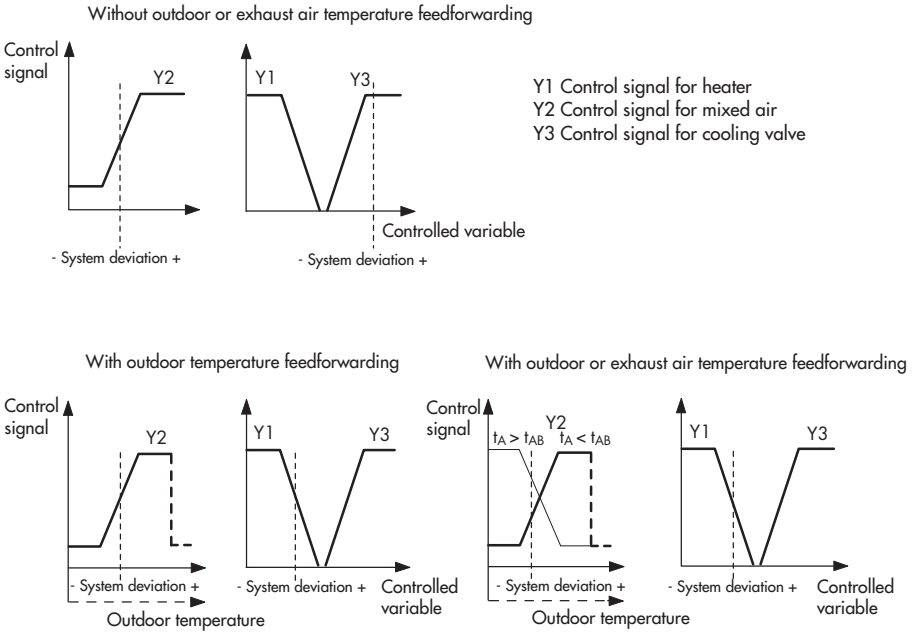

Fig. 3 · Various output signals, e.g. in system Anl. 4

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Mixed chamber = Independent mode	Sequential mode	Sequential mode, Independent mode, Outdoor temp.-controlled

[Overview > Parameters > Mixed air chamber]

Parameters	Default	Setting range
Mixed air temp. set point	18 °C	10 to 30 °C
Minimum outdoor air rate	20 %	0 to 100 %
Kp	0.5	0.1 to 99.9

Parameters	Default	Setting range
Tn	60 s	1 to 999 s
Tv	0 s	0 to 999 s
Operating action	0 % = 0 V, 100 % = 10 V	0 % = 0 V, 100 % = 10 V/0 = 10 V, 100 = 0 V

Outdoor temperature-controlled mixed air chamber

For the outdoor temperature-controlled mixed air chamber, two outdoor temperature thresholds are determined with the *Min. outdoor air rate when outdoor temperature lower* and *100 % outdoor air when outdoor temp. greater* parameters which result in a characteristic curve for controlling the mixed air chamber. The *Minimum outdoor air rate* parameter guarantees the required minimum proportion of the outdoor air.

The **summer mode** (–> section 6.9.3) is always available with this operation mode.

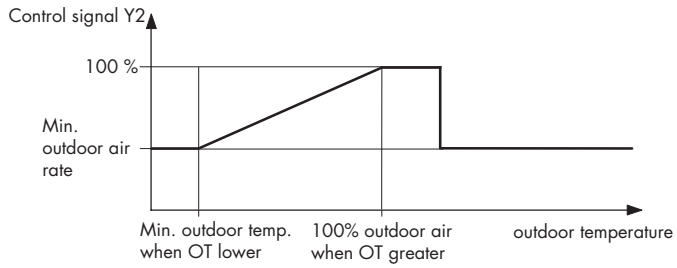

Fig. 4 · Outdoor temperature controlled mixed air chamber

[Overview > Service > Control method]
(see page 20 for details on how to open Service menu)

Parameter	Default	Setting range
Mixed air chamber = Outdoor temp.-controlled	Sequential mode	Sequential mode, Independent mode, Outdoor temp.-controlled

[Overview > Parameters > Mixed air chamber]

Parameters	Default	Setting range
Min. outdoor air rate when outdoor temp. lower	0 °C	–10 to 50 °C
100 % outdoor air when outdoor temp. greater	18 °C	–10 to 50 °C
Minimum outdoor air rate	20 %	0 to 100 %

5.2.3 Heat recovery (HRU) (systems Anl. 3, 5, 9, 11, 13, 15, 17, 19)

The heat recovery is controlled from the control output Y2. It is implemented by a PID control algorithm with the *Kp*, *Tn* and *Tv* control parameters.

The operating action of the control output Y2 can be reversed. The default setting is a heat recovery capacity of 0 to 100 % which corresponds to a control signal from 0 to 10 V.

If the measured outdoor temperature and exhaust air temperature are available, the automatic reversal of the operating action for the heat recovery can be activated.

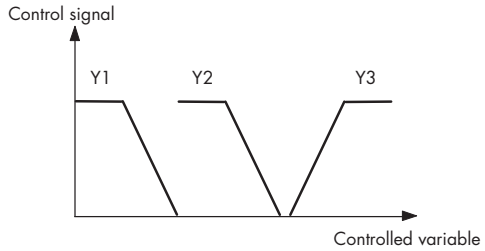

Fig. 5 · Output signal in system Anl. 5

[Overview > Parameters > Heat recovery]

Parameters	Default	Setting range
Kp	0.5	0.1 to 99.9
Tn	60 s	1 to 999 s
Tv	0 s	0 to 999 s
Operating action	0 % = 0 V, 100 % = 10 V	0 % = 0 V, 100 % = 10 V/0 = 10 V, 100 = 0 V

5.2.4 Cooling register (systems Anl. 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)

The cooling register is controlled from the control output Y3. It is implemented by a PID control algorithm with the *Kp*, *Tn* and *Tv* control parameters. In systems with humidity control, the demands made by the humidity control loop for humidifying or the temperature control loop for cooling are converted internally into one common control signal Y3 for the cooling register.

The operating action of the control output Y3 can be reversed. The default setting is a cooling capacity of 0 to 100 % which corresponds to a control signal from 0 to 10 V.

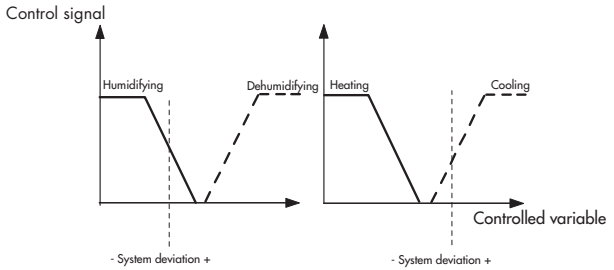

Fig. 6 · Output signal in system Anl. 6

[Overview > Parameters > Cooling register]

Parameters	Default	Setting range
Kp	0.5	0.1 to 99.9
Tn	60 s	1 to 999 s
Tv	0 s	0 to 999 s
Operating action	0 % = 0 V, 100 % = 10 V	0 % = 0 V, 100 % = 10 V/0 = 10 V, 100 = 0 V

5.2.5 Humidifier (systems Anl. 6, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19)

The humidifier is controlled over control output Y4. The humidifier control is implemented by a PID control algorithm with the *Kp*, *Tn* and *Tv* control parameters

The operating action of the control output Y4 can be reversed. The default setting is a humidifier capacity of 0 to 100 % which corresponds to a control signal of 0 to 10 V.

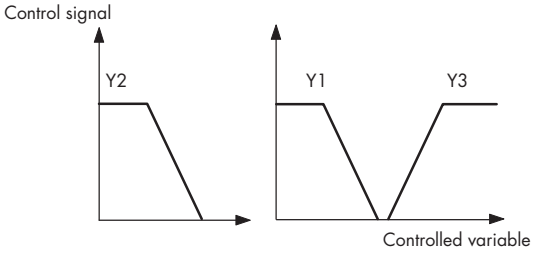

Fig. 7 · Output signal in system Anl. 9

[Overview > Parameters > Humidifier]

Parameters	Default	Setting range
Kp	0.5	0.1 to 99.9
Tn	60 s	1 to 999 s
Tv	0 s	0 to 999 s
Operating action	0 % = 0 V, 100 % = 10 V	0 % = 0 V, 100 % = 10 V/0 = 10 V, 100 = 0 V

5.2.6 Fans with variable speed (systems Anl. 0, 1, 2, 3, 4, 5, 7, 12, 13)

The analog output Y4 can be used to control the speed of the fans and the air volume flow rate based on the air quality. If the air quality falls below *Air quality set point*, the air volume is increased based on the *Min. air volume flow rate*.

When an **exhaust air cascade control or a room temperature cascade control** is used, the controller can be programmed to increase the air volume flow rate when the supply air temperature limit is reached to eliminate the system deviation as quickly as possible. This function has priority over the air quality control. After the system deviation has been balanced out, the air quality

control is enabled again. The function is activated when the *Factor of change Kp* is selected greater than 0.

The air quality control is implemented by a PI control algorithm with *Kp* and *Tn* control parameters. The operating action of the air quality input can be reversed.

Example: The supply air temperature has reached ist minimum permissible value at 50 % air volumee flow rate (YAA = 50 %).

- Exhaust air set point = 22 °C
- Actual exhaust air temperature = 24 °C
- Factor of change Kp = 5

$$\mathbf{YAA}_{\mathbf{new}} = YAA + XD * KP$$

$$= 0.5 + \frac{(24\,°C - 22\,°C)}{40\,°C} * 5 = 0.75 \rightarrow 75\,\%$$

(XD is the percentage error in relation to the measuring range. Its maximum limit is 10 %).

The system runs at an air volume flow rate of 75 % to reduce the excess temperature more quickly.

[Overview > Parameters > Fans > Air volume flow rate]

Parameters	Default	Setting range
Min. air volume flow	25 %	0 to 100 %
Factor of change Kp	0.0	0.0 to 10.0

[Overview > Parameters > Fans > Air quality]

Parameters	Default	Setting range
Air quality set point	50	0 to 50
Kp	0.5	0 to 100
Tn	60 s	1 to 999 s

Note:

– *The air quality can only be controlled when an air quality sensor UE09 is connected.*
– *If the system runs with humidifiers, the air quality can alternatively be controlled as described in section 7.1.3.*

6 Control functions

6.1 Supply air temperature limitation

The supply air temperature limitation is used to reduce the draft when supply air that is fairly cold is blown in. The temperature range within which the supply air temperature may vary is determined by *Supply air minimum limit* and *Supply air maximum limit*. If the supply air temperature is the controlled variable, i.e. for supply air temperature control or exhaust air or room temperature cascade control, the controller only permits set point shifts within this range.

If UE01 is only used as a limit input, i.e. for exhaust air or room temperature control, this deviation is included in the closed-loop control when the supply air temperature exceeds or fall below the limits, to counter any further drifting of the supply air temperature.

[Overview > Parameters > General > Temperature]

Parameter	Default	Setting range
Supply air minimum limit	18 °C	0 °C to Supply air maximum limit
Supply air maximum limit	26 °C	Supply air minimum limit to 50 °C

6.2 Supply air humidity limitation

For exhaust air or room humidity control, *Supply air minimum limit* and *Supply air maximum limit* restrict the humidity range within which the supply air humidity may vary. If it leaves this range, the deviation is included in the system deviation to prevent any further drifting of the supply air humidity.

The main purpose of the supply air humidity maximum limit is to prevent condensation forming in the supply air duct.

[Setup > Parameters > General > Humidity]

Parameter	Default	Setting range
Supply air minimum limit	40 %RH	0 %RH to Supply air maximum limit
Supply air maximum limit	60 %RH	Supply air minimum limit to 100 %RH

6.3 Return flow temperature limitation

The temperature range within which the actual return flow temperature may vary in normal operation is determined by *Minimum limit* and *Maximum limit 1*. If the return flow temperature moves towards these limits, the set point is corrected (for cascade control, the set point of the exhaust air or room temperature):

Approaching the *Minimum limit*, the set point is directly raised by the amount x multiplied by the *Limit factor* by the amount x that the return flow temperature falls below.

- x = *Minimum limit* – Actual return flow temperature
- Supply air temperature set point$_{new}$ = *Supply air set point* + x ∗ *Limit factor*

Approaching the *Maximum limit 1*, the set point is directly lowered by the amount x multiplied by the *Limit factor* by the amount x that the return flow temperature exceeds.

- x = Actual return flow temperature – *Maximum limit 1*
- Supply air temperature set point$_{new}$ = *Supply air set point* – x ∗ *Limit factor*

The supply air limitation function has priority!

[Overview > Parameters > Heating register > Return flow temperature limit]

Parameters	Default	Setting range
Minimum limit	20 °C	0 °C to Maximum limit 1
Maximum limit 1	70 °C	Minimum limit to 50 °C
Limit factor	1	0 to 10

6.3.1 Variable return flow temperature maximum limitation

If an outdoor temperature sensor exists, it is possible to vary the return flow temperature limitation. The following parameters apply for the upper variable limit of the return flow temperature: *Maximum limit 1, Outdoor temp. 1, Maximum limit 2, Outdoor temp. 2.*
The gray shaded area in Fig. 8 indicates the permissible return flow temperatures.

If the *Maximum limit 1* is exceeded by the amount x, the set point (for cascade control, the set point of the exhaust air or room temperature) is reduced by the amount x multiplied with the *Limit factor*.

- x = Actual return flow temperature – *Maximum limit 1*
- Supply air temperature set point$_{new}$ = *Supply air set point* – x ∗ *Limit factor*

The supply air temperature limitation has priority!

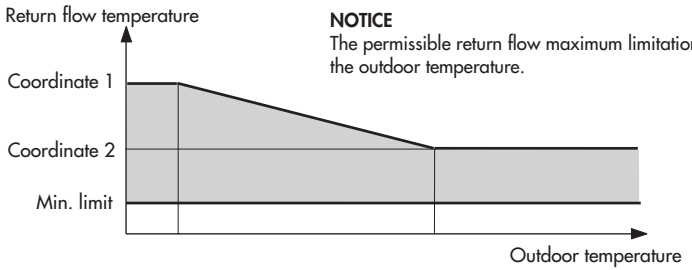

Fig. 8 · Variable return flow temperature maximum limit

[Overview > Parameters > Heating register > Return flow temperature limit]

Parameters	Default	Setting range
Minimum limit	20 °C	0 °C to Maximum limit 1
Maximum limit 1	70 °C	Minimum limit to 50 °C
Maximum limit 2	70 °C	Minimum limit to 50 °C
Limit factor	1	0 to 10
Outdoor temp. 1	5 °C	–50 to 20 °C
Outdoor temp. 2	20 °C	–50 to 20 °C

6.4 Sustained room temperature

If a room temperature sensor is connected, the *Sustained room temperature* is monitored when the system is in the night mode. If the actual room temperature falls below this limit, at first the start-up mode is initiated. Then the supply air temperature is controlled constantly to the set point *Supply air maximum limit* (minus 1 °C). When the room temperature has reached the *Sustained room temperature* (plus 2 °C), the sustained room temperature function and usually the operation of the entire system is ended.

[Overview > Parameters > General]

Parameter	Default	Setting range
Sustained room temperature	15 °C	0 to 20 °C
Supply air maximum limit	26 °C	Supply air minimum limit to 50 °C

6.5 Night purge

When the system is deactivated in the time schedule, the night air can be used to cool the rooms under certain conditions: the fan operation (speed 1) is enabled and, if necessary, the mixed air chamber is reversed to 100 % outdoor air rate. The night purge is only enabled when the **summer deactivation** function (–> section 6.9.2) is active and, in addition, the following conditions are met:

- The actual room temperature is greater than the temperature in *Start* and
- The temperature difference between the actual room temperature and the outdoor temperature is greater than *Difference*

The night purge can be set to start at 0:00 h at the earliest, 4:00 h at the latest – depending on the programmed time schedule. The controller must be programmed to start the night purge at the latest possible point in time. It is limited to two hours at the maximum. If the actual room temperature falls below the room temperature limit entered in *Stop*, the night purge is ended earlier.

[Overview > Parameters > General > Night purge]

Parameters	Default	Setting range
Start	24 °C	Stop to 50 °C
Stop	18 °C	10 °C to Start
Difference	5 °C	0 to 50 °C

6.6 Summer compensation (systems Anl. 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)

The function is basically available for all systems with a cooling register. This **summer compensation** function lets the temperature set points for supply air, exhaust air and room be shifted in a linear manner using two coordinates. For this purpose, the following parameters must be defined:

- *Enabled when outdoor temp. is greater*: the temperature set point is raised from this outdoor temperature onwards
- *Set point at outdoor temp. 32 °C*: determines the gradient of the characteristic curve

Example:
In systems with room control, the supply air temperature set point is to be raised at an outdoor temperature greater than 25 °C. At 32 °C the supply air temperature set point should be 26 °C.

- Supply air set point = 22 °C
- *Enabled when the outdoor temp. is greater* = 25 °C

Set point at outdoor temp. 32 °C = 26 °C

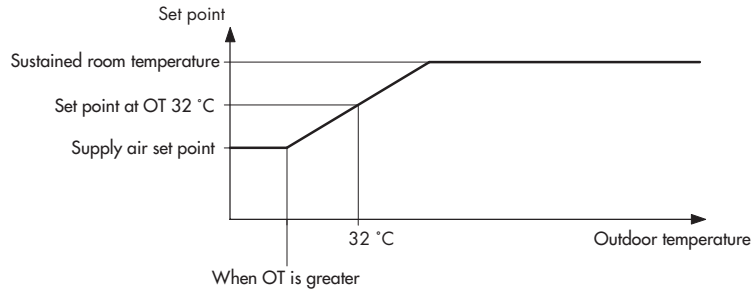

Fig. 9 · Summer compensation

[Overview > Parameters > General > Summer compensation]

Parameters	Default	Setting range
Enabled when outdoor temp. is greater	26 °C	–50 to 40 °C
Set point at outdoor temp. 32 °C	26 °C	0 to 40 °C

6.7 Fan operation dependent on room temperature/room humidity (systems Anl. 0, 1, 2, 3, 4, 5, 7, 12, 13)

Room temperature

This function can be selected with room temperature control, room temperature cascade control and two-speed fan operation. The fan speed 2 is activated (parallel to the associated time schedule), depending on the room temperature or the fan speed increases (-> section 7.1.3). Using the *Speed 2 for room temperature control* parameter, it is possible to determine whether the speed 2 is to be activated whenever the limit (*Room set point* + *Speed 2 for room temperature control*) is exceeded (*Speed 2 for room temperature control* > 0) or fallen below (*Speed 2 for room temperature control* < 0).

[Overview > Parameters > Fan]

Parameter	Default	Setting range
Speed 2 for room temperature control	0 K	–10 to 10 K

Room humidity

This function can be selected with room humidity control, room humidity cascade control or with systems including room humidity measurement and two-speed fan operation. The fan speed 2 is activated (parallel to the associated time schedule), depending on the room humidity or the fan speed increases (-> section 7.1.3).

In systems that have a **mixed air chamber** (systems Anl. 2, 4, 12), the outdoor air rate is additionally increased if the set point *Speed 2 for room humidity control* is exceeded.

[Overview > Parameters > Fan]

Parameter	Default	Setting range
Speed 2 for room humidity control	0 %RH	1 to 10 %RH

6.8 Air quality control using the mixed air chamber (systems Anl. 2, 4, 8, 10, 12, 14, 16, 18)

The **air quality control using the mixed air chamber** function is available in systems with mixed air chamber. The control signal Y2 is made up of two control signals that exist internally and originate from the temperature control loop and the air quality control loop.

If the measured air quality falls below *Air quality set point*, the outdoor air rate determined so far just by the temperature control loop is increased dependent on the *Kp* and *Tn* control parameters. Under optimal conditions, i.e. the *Air quality set point* is exceeded, the outdoor air rate can be gradually reduced by the PI control algorithm until it reaches *Minimum outdoor air rate*, (-> section 5.2.2) provided the temperature control loop does not demand the opposite.

[Overview > Parameters > Fans]

Parameters	Default	Setting range
Air quality set point	50	1 to 100
Kp	0.5	0.1 to 99.9
Tn	60 s	1 to 999 s

6.9 Outdoor temperature-compensated control

6.9.1 Outdoor temperature-compensated supply air control
(systems Anl. 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)

The function is basically available in systems with cooling register and, additionally, in system Anl 0. The **summer compensation** function (–> section 6.6) can also be used for an outdoor temperature-compensated supply air control. The *Enabled when outdoor temp. is greater* parameter determines from which outdoor temperature onwards the *Supply air set point* should be reduced. The *Set point at outside temp. 32 °C* parameter determines also the gradient of the characteristic curve.

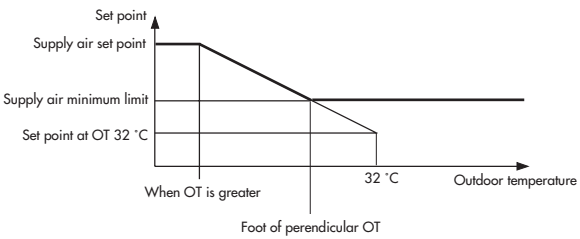

Fig. 10 · Outdoor temperature-compensated supply air control

[Overview > Parameters > General]

Parameter	Default	Setting range
Supply air set point	22 °C	0 to 40 °C

[Overview > Parameters > General > Summer compensation]

Parameter	Default	Setting range
Enabled when outdoor temp. is greater	26 °C	–50 to 40 °C
Set point at outside temp. 32 °C	26 °C	0 to 40 °C

Example:
A heating register is to heat the supply air to 35 °C when the outdoor temperature is –15 °C .
The foot of perpendicular is to be at 15 °C outdoor temperature/20 °C supply air temperature.

- Supply air temperature set point = 35 °C
- *Enabled when outdoor temp. is greater = –15 °C*
- *Set point at outside temp. 32 °C* = 32 °C
- *Supply air minimum limit* = 20 °C
- Foot of perpendicular outdoor temperature = 15 °C

The calculation of the temperature required for *Set point at outdoor temp. 32 °C* results in: =

$$\text{Supply air set point} - \frac{(32\,^{\circ}\text{C} - \textit{Enabled when outdoor temp. is greater}) * (\textit{Supply air set point} - \textit{Supply air minimum limit})}{\textit{Foot of perpendicular outdoor temperature} - \textit{Enabled when outdoor temp. is greater}}$$

-> Set point at outdoor temp. 32 °C = 11.5 °C

6.9.2 Summer deactivation (systems Anl. 0, 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 18, 19)

In summer, the heating register is switched off when the daily mean outdoor temperature (measured every hour between 6:00 and 22:00 h) is above the *Mean outdoor temperature* within a defined time period. If the summer deactivation is active, the heating register is switched off at 22:00 h for the next 24 hours, i.e. control signal Y1 = 0 % and pump output BA1 = OFF.
If the outdoor temperature falls below the limit, the heating register control is enabled from 22:00 h for the next 24 hours, providing it is required by the time schedule or operating mode.

[Overview > Parameters > Heating register > Summer deactivation]

Parameter	Default	Setting range
Time period	01.06–30.09	Configurable as required
Mean outdoor temperature	18 °C	0 to 30 °C

6.9.3 Summer mode (systems Anl. 2, 4, 8, 10, 12, 14, 16, 18)

The **summer mode** function runs in all systems that have a mixed air chamber and outdoor temperature feedforward. When the outdoor temperatures exceed *Summer mode enabled*, the system runs with a minimum outdoor air rate to avoid operation with 100 % outdoor air.

Summer mode can also be used in systems with cooling register in which it is better to prevent operation with just outdoor air at high outdoor temperatures for reasons of energy efficiency.

[Overview > Parameters > Mixed air chamber]

Parameter	Default	Setting range
Summer mode enabled	22 °C	0 to 40 °C

7 Control functions

7.1 System start-up mode

Normally, all ventilation systems switch to standard operation first after a start-up phase when an external demand for operation is made while the system is in the deactivated state or in manual mode. The duration of the start-up is determined by the *Pump advance running time* parameter.
Two options exist to suppress the start-up partially or totally:

1. *Pump advance running time = 0*
2. When the outdoor temperature is fedforward, the following must apply:
   The outdoor temperature must be lower than *Enable outdoor temperature.*

If the ventilation system starts to run according to the programmed time schedule, then the start-up mode already starts to run before the time schedule commences by the time period entered in *Pump advance running time*. The fans are enabled exactly when the time schedule starts.

If, however, the ventilation system must run due to an external demand for operation or due to a changeover in operating mode, the fans are first enabled after a time entered in *Pump advance running time*. By enabling the heating register circulation pump, the control signal Y1 for the heating register is enabled:

- Without the temperature sensor UE06 in the heating register return flow pipe, the control output Y1 runs either 100 % control signal or is set to the fixed value entered in *Control signal limit for Y1*. The *Control signal limit for Y1* only takes effect when the start-up function is active.
- With the temperature sensor UE06 the value entered in *Maximum limit 1* is the set point for the warm-up of the heating register during the start-up phase. Y1 varies corresponding to the system deviation.

The system start-up mode is canceled after the determined heating register's return flow temperature is reached when system is running due to a changeover of the operating mode or by the signal at the binary input.

All other control outputs – also the control output Y2 of an independent mixed air temperature control – usually do not run a control signal during the start-up mode. The control output Y2 is enabled when the fans are enabled. Before the control output Y3 (cooling register) can be enabled, the *Pump advance running time* must elapse a second time. In the supply air control loop, the *Supply air maximum limit* is set at first as the set point. Within five minutes, this value is run in a linear manner to the current supply air set point.

Note: *The day symbol ☼ blinks on the start screen to indicate that the start-up mode is active.*

[Overview > Parameters > Heating register > Start-up mode]

Parameters	Default	Setting range
Enable outdoor temperature	5 °C	0 to 10 °C
Pump advance running time	5 min	0 to 15 min
Control signal limit for Y1	100 %	0 to 100 %
Maximum limit 1	70 °C	Minimum limit to 100 °C

[Overview > Parameters > General]

Parameter	Default	Setting range
Supply air maximum limit	26 °C	Supply air minimum limit to 50 °C

7.1.1 Circulating air mode after system start-up

After the system start-up mode has finished, first the circulating air mode is run until the room or exhaust air temperature set point (±0.5 °C) has been reached. This function can be selected in systems with a mixed air chamber, with room or exhaust air temperature control and in systems that have room cascade control or exhaust air cascade control.

[Overview > Parameters > Mixed air chamber]

Parameter	Default	Setting range
Circulating air mode	OFF	ON, OFF

7.1.2 Enabling fan speed 1

Basically, the fan speed 1 is enabled over the binary output BA3 at the programmed start of the time schedule.

When an **external demand for operation** is made, the fan speed 1 may possibly be enabled with a delay due to the start-up mode (-> section 8.4).

In the event of malfunctions "system frost protection" or "missing fan operational feedback", the fans are deactivated immediately.

7.1.3 Enabling fan speed 2

The fan speed 2 is controlled over binary output BA4. It is enabled either:

- by the time schedule for the fans
- by an external demand for fan speed 2
- depending on the air quality
- depending on the room temperature in room temperature or room temperature cascade control and/or depending on the room humidity

After fan speed 2 has been demanded when the system is deactivated, first fan speed 1 is enabled. Speed 2 is only enabled after the *Delay before speed 2* has elapsed. When the speed 2 is switched back to speed 1, the fans are switched off. Speed 1 is only enabled after the delay time has elapsed.

The delay time is still taken into account even if the fans are activated in manual mode.

[Overview > Parameters > Fans]

Parameters	Default	Setting range
Delay before speed 2	0 s	0 to 60 s
Switching state for speed 2	BA3=OFF, BA4=ON	BA3=BA4=ON, BA3=OFF, BA4=ON
Time schedule	7:00 to 22:00 h	Configurable as required, refer to section 1.6

Fan speed based on air quality

If the air quality falls below the *Air quality set point*, the operation of fan speed 2 is demanded. The fans are switched back to fan speed 1 when the air quality has risen to a value greater than *Air quality set point + Differential gap of speed 2 –> 1*, provided that the time schedule for fan speed 2 do not require the opposite.

[Setup > Parameters > Fans > Air quality]

Parameters	Default	Setting range
Air quality set point	50	0 to 100
Differential gap of speed 2 –> 1	5	5 to 30

7.1.4 Operation feedback of fans

The operation feedback of the fans can be evaluated at the binary input UE15. If the floating NO contact closes – after the fans are enabled and the delay time (*Fan operation feedback*) has

elapsed – the ventilation system is deactivated. **STOP** blinks on the display. First when the next time schedule starts, a new attempt to start is automatically made.

[Setup > Parameters > Fans]

Parameter	Default	Setting range
Fan operation feedback	180 s	0 to 180 s

7.1.5 Condensation detection

In all systems with cooling register with a dehumidifying function, a condensation monitor can be connected for chilled ceilings. As soon as condensation is detected in normal operation, the set point of the closed-loop control is raised by 3 °C. If the condensation monitor indicates normal state again, the set point correction is reset.

7.1.6 Circulation pump control for the heating register

The circulation pump of the heating register is controlled over the binary output BA5.

If the system starts to run according to the time schedule **with the start-up mode**, the circulation pump is switched on before the time schedule starts by the time entered in *Pump advance running time*. **Without start-up mode**, the circulation pump is activated at the earliest when the time schedule begins (-> section 7.1).

In **systems with an outdoor temperature sensor**, the circulation pump runs depending on the *Enable stand-by monitoring* parameter: If the outdoor temperature is above this limit and the control signal Y1 is 0 % for approximately three minutes, the circulation pump is switched off. First when Y1 > 0 %, it is activated again.

[Overview > Parameters > Heating register]

Parameter	Default	Setting range
Enable stand-by monitoring	0 °C	–50 to 10 °C

When the system is deactivated during the programmed time schedule, the circulation pump of the heating register is switched off after three minutes lag time. During the summer deactivation, the circulation pump of the heating register basically remains switched off. It runs daily for approximately one minute to prevent it from becoming jammed up.

7.1.7 Circulation pump control for heat recovery

In systems with heat recovery, the binary output BA6 controls the HRU pump. This pump is only activated when the control signal is Y2 > 0 %. If Y2 is 0 % for longer than three minutes when the system is running, the circulation pump is deactivated. First when Y2 > 0 % it is activated again. The HRU pump is deactivated three minutes after the time schedule ends.

The HRU pump is activated at least once every 24 hours for approximately one minute to prevent it from becoming jammed up.

7.1.8 Electric air heater

The binary output BA6 can also be used to control an electric air heater in on/off operation instead of the HRU pump. BA6 is then controlled depending on the control signal Y1. The control signal Y1 is additionally available!

8 System-wide functions

8.1 System frost protection

Frost protection HRU

This function ensures that the heat recovery unit does not freeze on the outside. If the HRU return flow temperature or, alternatively, the extract air temperature measured directly at the heat recovery unit falls below *Min. limit temperature*, the frost protection function is started: the heat recovery unit is released from the sequential mode. The *Min. limit temperature* is used as the set point for an independent temperature control of this unit to make sure that it does not cool down any further. The frost protection HRU remains active until the control signal Y2 for heat recovery has risen to a value of 95 %; directly after that, the sequential mode is reactivated.

When the frost protection HRU is active, the symbol ❄ blinks on the display.

[Overview > Parameters > Heat recovery unit]

Parameter	Default	Setting range
Min. limit temperature	3 °C	1 to 10 °C

Frost protection of the heating register

This function is used to protect the heating register from being damaged by frost. Depending on the binary input BI16, the system runs or the frost protection function is run. If the the floating NO contact at BI16 closes, the frost protection function starts: the fans are deactivated and the circulation pump of the heating register is activated; a 100 % signal is issued at the control output of the heating register Y1. When the frost protection function is active, **STOP** and the symbol ❄ blink on the display.
The frost protection function is also active in manual mode.

[Overview > Parameters > General]

Parameter	Default	Setting range
Frost protection with BI16	OFF	ON, OFF

8.2 External correction of the temperature set point

The set point can be changed by a potentiometer connected to input UE10. A correction is possible in the range from −5 °C (potentiometer setting 1000 Ω) to +5 °C (potentiometer setting 2000 Ω) provided the supply air temperature limitation in a supply air temperature control permits it.

8.3 External correction of the humidity set point

In all air-conditioning systems, the humidity set point can be changed by a potentiometer connected to input UE11. A correction is possible in the range from –20 %RH (potentiometer setting 1000 Ω) to +20 %RH (potentiometer setting 2000 Ω) provided the supply air temperature limitation in a supply air temperature control permits it.

8.4 External demand for operation

The operation of the ventilation system can be controlled with the binary inputs UE12 and UE13.

If the ventilation system is in the automatic mode (🕘), the binary inputs UE12 and UE13 have the following effect:

- UE12 and UE13 = OFF: The system runs according to the programmed time schedule
- UE12 = ON, UE13 = OFF: The system runs even outside the programmed time schedule
- UE12 = OFF, UE13 = ON: The system does not run even during the programmed time schedule

If the ventilation system is in the night mode (☽), only UE12 is relevant for the external demand for operation:

- UE12 = OFF: The system is not running
- UE12 = ON: The system runs according to the programmed time schedule

The system runs taking into account the start-up mode.

8.5 External demand for fan speed 2

The fan speed 2 can be demanded over the binary input UE14 whenever UE14 = ON.

9 Terminal assignment

Legend

AA	Analog output (0 to 10 V)
AE	Analog input
BA	Binary output
BE	Binary input

AF	Outdoor temperature sensor, Pt 1000
AbF	Exhaust air temperature sensor, Pt 1000
AbFF	Exhaust air humidity sensor, 0 to 10 V
BM $_{V}$	Operational feedback of fan, BE
Ext Bdf $_{OFF}$	External demand for operation OFF, BE
Ext Bdf $_{ON}$	External demand for operation ON, BE
Ext Bdf $_{F2}$	External demand for fan speed 2, BE
FG H	Humidity potentiometer, 1000 to 2000 Ω
FG T	Temperature potentiometer, 1000 to 2000 Ω
LF	Air quality sensor, 0 to 10 V
RF	Room temperature sensor, Pt 1000
RüF	Return flow temperature sensor for heating register, Pt 1000
SM $_{Condensate}$	Condensate error, BE
SM $_{Frost}$	Frost protection error, BE
WRG/FF	HRU/extract air temperature sensor, Pt 1000
ZuF	Supply air temperature sensor, Pt 1000
ZuFF	Supply air humidity sensor, 0 to 10 V

ST1	Fan speed 1 enabled
ST2	Fan speed 2 enabled

UP_{Heat}	Circulation pump (heating register)
UP_{HRU}	Circulation pump (heat recovery unit)

Y1	Control signal for heater
Y2	Control signal for mixed air/ Control signal for heat recovery unit
Y3	Control signal for cooling valve
Y4	Control signal for humidifier

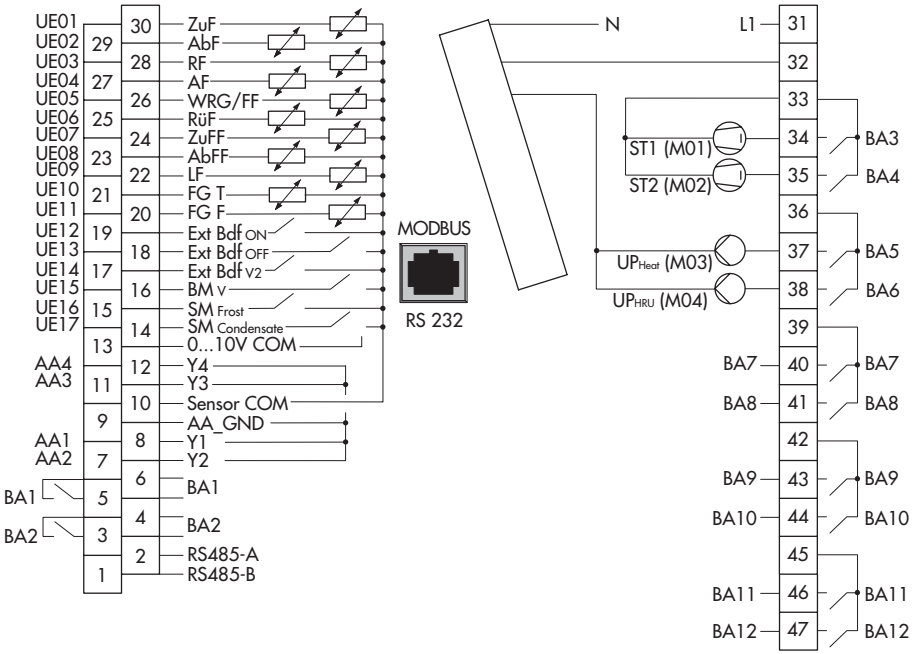

Fig. 11 · Electrical connection

10 Appendix

10.1 Menu structure

10.1.1 Heating register

[Overview > Parameters > Heating register]

Parameters	Setting range	Default	Comment
Start-up mode			
Enable outdoor temperature	0 to 10 °C	5 °C	Outdoor temperature limit for starting the system start-up mode
Pump advance running time	0 to 15 min	5 min	Time for starting start-up mode in advance in automatic mode
Control signal limit for Y1	0 to 100 %	100 %	Max. control signal at control output Y1 during start-up mode; value applies to ventilation systems without sensor UE07 (heating register return flow pipe)
Enable stand-by monitoring	–50 to 10 °C	0 °C	Outdoor temperature limit for starting the circulation pump of the heating register; value only applies to ventilation system with sensor UE05 (outdoor temperature)
Summer deactivation			
Time period	Configurable as required	01.06 to 30.09	Period valid for summer deactivation
Mean outdoor temperature	0 to 30 °C	18 °C	Outdoor temperature limit at which the summer deactivation is activated
Return flow temperature limit			
Minimum limit	0 °C to Maximum limit 1	20 °C	Min. return flow temperature in normal operation
Maximum limit 1	Minimum limit to 50 °C	70 °C	Max. return flow temperature in normal operation or max. return flow temperature with *Outdoor temp. 1* (variable return flow temperature maximum limitation)

Parameters	Setting range	Default	Comment
Outdoor temp. 1	–50 to 20 °C	5 °C	Specified outdoor temperature for variable return flow temperature maximum limitation)
Maximum limit 2	Minimum limit to 50 °C	70 °C	Max. return flow temperature with *Outdoor temp. 2* (variable return flow temperature maximum limitation)
Outdoor temp. 2	–50 to 20 °C	5 °C	Specified outdoor temperature for variable return flow temperature maximum limitation)
Limit factor	0 to 10	1	Factor for setback of supply air temperature set point when the return flow temperature is exceeded
PID control parameters			
Kp	0.1 to 99.9	0.5	Gain factor
Tn	1 to 999 s	60 s	Reset time
Tv	0 to 999 s	0 s	Derivative-action time
Operating action	0% = 0V, 100 % = 10V; 0 = 10V, 100 = 0V	0% = 0V, 100 % = 10V	Operating direction of control signal Y1

10.1.2 Mixed air chamber

[Overview > Parameters > Mixed air chamber]

Parameters	Setting range	Default	Comment
Mixed air temp. set point	10 to 30 °C	18 °C	Set point for independent mode for mixed air temperature control
Minimum outdoor air rate	0 to 100 %	20 %	Minimum proportion of outdoor air
Min. outdoor air rate when outdoor temp. lower	–10 to 50 °C	0 °C	Outdoor temperature threshold at Y2 = *Minimum outdoor air rate* (outdoor temperature-controlled mixed air chamber)
100 % outdoor air rate when outdoor temp. greater	–10 to 50 °C	18 °C	Outdoor temperature threshold at Y2 = 100 % (outdoor temperature-controlled mixed air chamber)
Summer mode enabled	0 to 40 °C	22 °C	Outdoor temperature limit for starting summer mode

Parameters	Setting range	Default	Comment
Circulating air mode	ON, OFF	OFF	After start-up mode has finished, the circulating air mode runs until the room or exhaust air temperature set point is reached
PID control parameters			
Kp	0.1 to 99.9	0.5	Gain factor
Tn	1 to 999 s	60 s	Reset time
Tv	0 to 999 s	0 s	Derivative-action time
Operating action	0% = 0V, 100 % = 10V; 0 = 10V, 100 = 0V	0% = 0V, 100 % = 10V	Operating action of the control signal Y2

10.1.3 Heat recovery

[Overview > Parameters > Heat recovery]

Parameters	Setting range	Default	Comment
Min. limit temperature	1 to 10 °C	3 °C	Outdoor temperature limit for HRU frost protection
PID control parameters			
Kp	0.1 to 99.9	0.5	Gain factor
Tn	1 to 999 s	60 s	Reset time
Tv	0 to 999 s	0 s	Derivative-action time
Operating action	0% = 0V, 100 % = 10V; 0 = 10V, 100 = 0V	0% = 0V, 100 % = 10V	Operating direction of control signal Y2

10.1.4 Cooling register

[Overview > Parameters > Cooling register]

Parameter	Setting range	Default	Comment
PID control parameters			
Kp	0.1 to 99.9	0.5	Gain factor
Tn	1 to 999 s	60 s	Reset time
Tv	0 to 999 s	0 s	Derivative-action time

Operating action	0% = 0V, 100 % = 10V; 0 = 10V, 100 = 0V	0% = 0V, 100 % = 10V	Operating direction of control signal Y3

10.1.5 Humidifier

[Overview > Parameters > Humidifier]

Parameter	Setting range	Default	Comment
PID control parameters			
Kp	0.1 to 99.9	0.5	Gain factor
Tn	1 to 999 s	60 s	Reset time
Tv	0 to 999 s	0 s	Derivative-action time
Operating action	0% = 0V, 100 % = 10V; 0 = 10V, 100 = 0V	0% = 0V, 100 % = 10V	Operating direction of control signal Y4

10.1.6 Fans

[Overview > Parameters > Fans]

Parameters	Setting range	Default	Comment
Delay before speed 2	0 to 60 s	0 s	Delay before enabling fan speed 2 when demand exists and the system is in the deactivated mode
Switching state for speed 2	BA3=BA4=ON/ BA3=OFF, BA4=ON	BA3=OFF, BA4=ON	Activation of fan speed 2
Speed 2 for temperature control	-10 to 10 K	0 K	Parameter for calculating the limit* of the room temperature. The fan speed 2 is activated when this limit is exceeded (positive value) or fallen below (negative value). * Limit = *Room set point + Speed 2 for temperature control*
Speed 2 for room humidity control	1 to 10 %RH	0 %RH	Room humidity limit for raising outdoor air rate when fan operation is used to control the room humidity

Parameters	Setting range	Default	Comment
Fan operation feed-back	0 to 180 s	180 s	Delay to deactivate the ventilation system after NO contact closes at UE15
Air volume flow rate			
Min. air volume flow rate	0 to 100 %	25 %	Min. air volume flow rate for air quality control with variable fan speed
Factor of change Kp	0.0 to 10.0	0.0	Factor with which the exhaust air temperature change is included in recalculating the air volume flow rate
Air quality			
Air quality set point	0 to 100	50	Air quality limit at which the air volume flow rate/outdoor air rate is increased
Differential gap of speed 2 –> 1	5 to 30	5	The sum of the air quality set point and the adjusted value is used as limit for the air quality, at which the fan speed 2 is deactivated
Kp	0 to 100	0.5	Gain factor
Tn	1 to 999 s	60 s	Reset time
Time schedule			
Monday - Sunday	Configurable as required	7.00 to 22.00 h	Programming all days of the week together
Monday			Separate programming for each day of the week **NOTICE** Programming all days of the week together overwrites the time schedule programmed separately for each day of the week.
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

10.1.7 General

[Overview > Parameters > General]

Parameters	Setting range	Default	Comments
Temperature			
Supply air set point	0 to 50 °C	22 °C	Temperature set point for supply air control
Exhaust air set point	0 to 40 °C	22 °C	Temperature set point for exhaust air control and exhaust air cascade control
Room set point	0 to 40 °C	22 °C	Temperature set point for room control and room cascade control
Set point of slave loop	0 to 50 °C	22 °C	Temperature set point of slave loop for exhaust air cascade control and room cascade control
Kp master loop	0.1 to 99.9	1	Gain of the master loop for exhaust air cascade control and room cascade control
Supply air minimum limit	0 °C to Supply air maximum limit	18 °C	Lower limit for supply air temperature
Supply air maximum limit	Supply air minimum limit to 50 °C	26 °C	Upper limit for supply air temperature
Sustained room temperature	0 to 20 °C	15 °C	Room temperature limit at which the start-up mode is activated
Summer compensation			Outdoor temperature-controlled supply air control
Enabled when outdoor temp. is greater	–50 to 40 °C	26 °C	Outdoor temperature limit, at which the supply air temperature set point is reduced
Set point at outdoor temp. 32 °C	0 to 40 °C	26 °C	Supply air temperature set point at 32 °C outdoor temperature
Frost protection with BI16	ON, OFF	OFF	The frost protection is activated depending on the state of the binary input BI16.

Parameters	Setting range	Default	Comments
Humidity			
Supply air set point	0 to 100 %RH	50 %RH	Humidity set point for supply air control
Exhaust air set point	0 to 100 %RH	50 %RH	Humidity set point for exhaust air control and exhaust air cascade control
Room set point	0 to 100 %RH	50 %RH	Humidity set point for room control and room cascade control
Set point of slave loop	0 to 100 %RH	50 %RH	Humidity set point of slave loop for exhaust air cascade control or room cascade control
Kp master loop	0.1 to 99.9	1.0	Gain of master loop for exhaust air cascade control or room cascade control
Supply air minimum limit	0 %RH to Supply air maximum limit	40 %RH	Lower limit for supply air humidity
Supply air maximum limit	Supply minimum air limit to 100 %RH	60 %RH	Upper limit for supply air humidity
Night purge			
Start	Stop to 50 °C	24 °C	Room temperature limit at which the night purge is activated
Stop	10 °C to Start	18 °C	Room temperature limit at which the night purge is deactivated
Difference	0 to 50 °C	5 °C	Temperature difference limit (Room temperature – Outdoor temperature) at which the night purge is activated
Time schedule	Time schedule of the ventilation system		
Monday - Sunday	Configurable as required	7.00 to 22.00 h	Programming all days of the week together

Parameters	Setting range	Default	Comments
Monday Tuesday Wednesday Thursday Friday Saturday Sunday	Configurable as required	7.00 to 22.00 h	Separate programming for each day of the week **NOTICE** Programming all days of the week together overwrites the time schedule programmed separately for each day of the week.
Vacations	Configurable as required	–	Time period for night mode
Public holidays		–	Time period for day mode

10.1.8 Control method

[Overview > Service > Control method]

Parameters	Setting range	Default
Temperature	Supply air control Exhaust air control Exhaust air cascade control Room control Room cascade control	Supply air control
Humidity	Supply air control Exhaust air control Exhaust air cascade control Room control Room cascade control	Supply air control
Mixed air chamber	Sequential mode Independent mode Outdoor temp.-controlled	Sequential mode

10.1.9 Extract air temperature as measured variable with mixed air chamber

[Overview > Service > Control method]

Parameter	Setting range	Default
Extract air temperature	On, Off	Aus

10.2 Customized data

[Overview > Parameters > Heating register]

Parameters	Setting range	Default	Customized
Start-up mode			
Enable outdoor temperature	0 to 10 °C	5 °C	
Pump advance running time	0 to 15 min	5 min	
Control signal limit for Y1	0 to 100 %	100 %	
Enable stand-by monitoring	–50 to 10 °C	0 °C	
Summer deactivation			
Time period	Configurable as required	01.06 to 30.09	
Mean outdoor temperature	0 to 30 °C	18 °C	
Return flow temperature limit			
Minimum limit	0 °C to Maximum limit 1	20 °C	
Maximum limit 1	Minimum limit to 50 °C	70 °C	
Outdoor temp. 1	–50 to 20 °C	5 °C	
Maximum limit 2	Minimum limit to 50 °C	70 °C	
Outdoor temp. 2	–50 to 20 °C	5 °C	
Limit factor	0 to 10	1	
PID control parameters			
Kp	0.1 to 99.9	0.5	
Tn	1 to 999 s	60 s	
Tv	0 to 999 s	0 s	
Operating action	0 % = 0V, 100 % = 10 V; 0 = 10 V, 100 = 0 V	0% = 0 V, 100 % = 10 V	

[Overview > Parameters > Mixed air chamber]

Parameters	Setting range	Default	Customized
Mixed air temp. set point	10 to 30 °C	18 °C	
Minimum outdoor air rate	0 to 100 %	20 %	
Min. outdoor air rate when outdoor temp. lower	–10 to 50 °C	0 °C	
100 % outdoor air rate when outdoor temp. greater	–10 to 50 °C	18 °C	
Summer mode enabled	0 to 40 °C	22 °C	
Circulating air mode	ON, OFF	ON	
PID control parameters			
Kp	0.1 to 99.9	0.5	
Tn	1 to 999 s	60 s	
Tv	0 to 999 s	0 s	
Operating action	0% = 0 V, 100 % = 10 V; 0 = 10 V, 100 = 0 V	0 % = 0 V, 100 % = 10 V	

[Overview > Parameters > Heat recovery]

Parameters	Setting range	Default	Customized
Min. limit temperature	1 to 10 °C	3 °C	
PID control parameters			
Kp	0.1 to 99.9	0.5	
Tn	1 to 999 s	60 s	
Tv	0 to 999 s	0 s	
Operating action	0% = 0 V, 100 % = 10 V; 0 = 10 V, 100 = 0 V	0% = 0 V, 100 % = 10 V	

[Overview > Parameters > Cooling register]

Parameter	Setting range	Default	Customized
PID control parameters			
Kp	0.1 to 99.9	0.5	
Tn	1 to 999 s	60 s	
Tv	0 to 999 s	0 s	
Operating action	0% = 0V, 100 % = 10V; 0 = 10V, 100 = 0V	0% = 0V, 100 % = 10V	

[Overview > Parameters > Humidifier]

Parameters	Setting range	Default	Customized
PID control parameters			
Kp	0.1 to 99.9	0.5	
Tn	1 to 999 s	60 s	
Tv	0 to 999 s	0 s	
Operating action	0 % = 0 V, 100 % = 10 V; 0 = 10 V, 100 = 0 V	0 % = 0 V, 100 % = 10 V	

[Overview > Parameters > Fans]

Parameters	Setting range	Default	Customized
Delay before speed 2	0 to 60 s	0 s	
Switching state for speed 2	BA3=BA4=ON BA3=OFF, BA4=ON	BA3=OFF, BA4=ON	
Speed 2 for room temperature control	–10 to 10 K	0 K	
Speed 2 for room humidity control	1 to 10 %RH	0 %RH	
Fan operation feedback	0 to 180 s	180 s	
Air volume flow rate			
Min. air volume flow rate	0 to 100 %	25 %	
Air quality			

Parameters	Setting range	Default	Customized
Air quality set point	0 to 100	50	
Differential gap of speed 2 –> 1	5 to 30	5	
Kp	0 to 100	0.5	
Tn	1 to 999 s	60 s	
Time schedule			
Monday - Sunday	Configurable as required	7.00 to 22.00 h	
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

[Overview > Parameters > General]

Parameters	Setting range	Default	Customized
Temperature			
Supply air set point	0 to 50 °C	22 °C	
Exhaust air set point	0 to 40 °C	22 °C	
Room set point	0 to 40 °C	22 °C	
Set point of slave loop	0 to 50 °C	22 °C	
Kp master loop	0.1 to 99.9	1	
Supply air minimum limit	0 °C to Supply air maximum limit	18 °C	
Supply air maximum limit	Supply air minimum limit to 50 °C	26 °C	
Sustained room temperature	0 to 20 °C	15 °C	
Summer compensation			

Parameters	Setting range	Default	Customized
Enabled when outdoor temp. is greater	–50 to 40 °C	26 °C	
Set point at outdoor temp. 32 °C	0 to 40 °C	26 °C	
Frost protection with BI16	ON, OFF	OFF	
Humidity			
Supply air set point	0 to 100 %RH	50 %RH	
Exhaust air set point	0 to 100 %RH	50 %RH	
Room set point	0 to 100 %RH	50 %RH	
Set point of slave loop	0 to 100 %RH	50 %RH	
Kp master loop	0.1 to 99.9	1.0	
Supply air minimum limit	0 %RH to Supply air maximum limit	40 %RH	
Supply air maximum limit	Supply air minimum limit to 100 %RH	60 %RH	
Night purge			
Start	Stop to 50 °C	24 °C	
Stop	10 °C to Start	18 °C	
Difference	0 to 50 °C	5 °C	
Time schedule	Time schedule of ventilation systems		
Monday - Sunday	Configurable as required	7.00 to 22.00 h	
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

Parameters	Setting range	Default	Customized
Vacations	Configurable as required	–	
Public holidays		–	

[Overview > Service > Control method]

Parameters	Setting range	Default	Customized
Temperature	Supply air control Exhaust air control Exhaust air cascade control Room control Room cascade control	Supply air control	
Humidity	Supply air control Exhaust air control Exhaust air cascade control Room control Room cascade control	Supply air control	
Mixed air chamber	Sequential mode Independent mode Outdoor temp.-controlled	Sequential mode	

[Overview > Service > Control method]

Parameter	Setting range	Default	Customized
Extract air temperature	On, off	Off	

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EB 5571-3 EN 2011-11