industrie technik®

USER MANUAL

ROOM CONTROLLER

EVOLUTION

SERIES AHU-xxxSx1

Modbus

18/06/2018 Version 1.0.7

EN

TABLE OF CONTENT

AHU room controller

1. Technical features

Power:	110...230 Vca ±10%, 50/60 Hz
Power consumption:	max 1.3W
Operating temperature:	0 - 50°C
Display:	backlit LCD display
Inputs:	2 potential free contacts 2 or 3 NTC10K sensors USB for parameter configuration and software updates
Outputs:	3 analogue outputs 0... 10 V (R_L > 10K) depending on model 5 SPST relays, 250 V AC, 3 A (AC1) depending on model
Communications:	Modbus RTU (Slave) depending on model
Temperature reading range:	-15 - 90°C
Dimensions:	128 x 80 x 55.5 mm
Installation:	3 module flush-mounted box
Protection class:	IP30, class 2
EU compliance standard:	EN 60730-1, EN 61000-6-3, EN 61000-6-1

2. Code selection

Room controller:

AHU	-	x	x	x	S	x	1

Version:

1 digital output + 3 analogue outputs + 3 analogue inputs	**0**
2 digital outputs + 2 analogue outputs + 3 analogue inputs	**1**
3 digital outputs + 1 analogue output + 3 analogue inputs	**2**
3 digital outputs + 2 analogue outputs + 2 analogue inputs	**3**
5 digital outputs + 0 analogue outputs + 3 analogue inputs	**4**

Communications:

Without bus	**S**
Modbus	**M**

Clock:

Without clock	**S**
With clock	**C**

Internal sensor:

Temperature	**T**
Temperature + humidity	**H**

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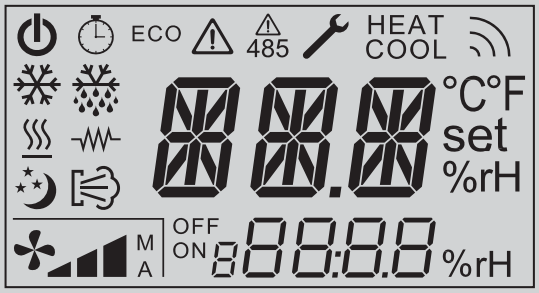
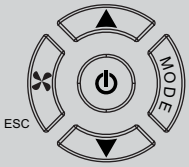
3. Display, keypad and icons





	Display A
	Display B
	On/Off
flashing	Timer extension on
continuously displayed	Clock setting
ECO	Economy or boost function on
	General alarm
485	Communications alarm
	Parameters menu
HEAT COOL	Work season
	Max fan working hours overtaken alarm
	Cooling or free cooling on
flashing	Battery frost protection or heat exchanger frost protection on
flashing	Condensate alarm
continuously displayed	Dehumidification on
flashing	Air change request
continuously displayed	Humidification on
	Heating or free heating on
	Electric resistance on
	Holiday function
flashing	Free cooling or free heating on
M A	Fan speed M = manual speed selection A = automatic speed selection

OFF ON	ON = heat recovery on OFF = heat recovery off OFF blinking = heat recovery off for free cooling/heating or due to heat exchanger frost protection alarm ON/OFF alternating blinking = modulating bypass damper of the heat exchanger with cross-flow partially open (free heating or free cooling in progress)
8	Display C time zone number on
	Free cooling or free heating on
Keyboard	
	On/Off, navigation and confirm key
	Change setpoint, navigation and value entry keys
ESC	Speed type key and **ESC** operation in navigation
MODE	Manual season or occupation change key or operating mode (see *"MODE button functionality" page 10*)

4. Quick access parameter setting

The controller carries out the following operations with a simple button press:
- Switch on and off
- Configuration of the setpoint or setpoint offset
- Fan operating mode
- **MODE** button functionality

The **MODE** button can be assigned to one quick access function and two normal access functions, depending on the parameter 195 (see *"MODE button functionality" page 10*)
195=0: season change (if it is local, for 2-pipe systems)
195=1: timer extension.
195=2: operating mode (without clock, using the timer, holiday)

• Keypad lock

To lock the keypad, press the ESC MODE buttons at the same time; the display shows the text LK for one second.
When any button is pressed, it is no longer possible to access the parameters and the display shows LK.

To unlock the keypad, press the ESC MODE buttons again; the display shows NLK for one second.

• Switch on and off

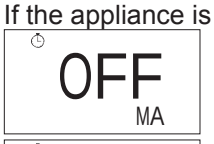
The appliance can be switched on or off in 4 different ways:
- manually using the keypad,
- from an external contact,
- using the timer,
- from Modbus

If the unit has been switched off by remote contact, it can only be restarted by inserting the contact in the ON position.
If the remote contact is in the ON position, 210=0,
it is possible to turn the unit on with a source other than the one used to turn it off.
Example:
If the unit has been switched off by the timer, it can be restarted manually or via modbus or by external contact.
If the remote contact is in the ON position, 210=1,
if the unit has not been switched off manually (via modbus or timer), it can be restarted with any source. But if the unit has been switched off manually, it can only be restarted manually.
To put the unit in the on/off position manually, press the ⏻ button until ON or OFF is displayed.
To use the external contact as a way of switching the unit on/off, configure the contact as "Remote On/Off" (015=2 (DI1)

or 017=2 (DI2) or 019=9 (AI1 used as DI) or 021=9 (AI2 used as DI) or 023=9 (AI3 used as DI)).

Example for digital input 1 (015=2):
Unit ON= (016=0)
Unit OFF= (016=0)
Unit ON= (016=1)
Unit OFF= (016=1).

To switch the unit on/off using the timer periods, configure the 199=1 parameter and set the timer switch on timer periods (see *"6. TIMER PERIODS operation and configuration (Model AHU-xxCSx1)" page 12*) To switch the unit on/off via modbus function, write in the register 9267 (see *"42. Modbus (for AHU-xMxSx1 models)" page 138*.
If the appliance is switched off, the display shows the mode in which it was switched off.



MA = manually switched off using keypad.

rEM = switched off using remote contact.

MOd = switched off by modbus.

tiMb = switched off using the timer period (if 199=1).

If the appliance is switched off, all of the outputs are deactivated except for the main control output in heating mode if the frost protection function is activated (see *"26. Frost protection operation of the heating battery" page 110*).

• Setpoint and setpoint offset configuration

Depending on the control method chosen, the climate setpoint is configured manually or calculated automatically.
- For compensation controls based on the external temperature, the operating setpoint is automatically calculated based on the compensation parameters and the external temperature (see *"15. Control with setpoint compensation" page 37*).
By pressing the or button, the user can only view the compensated calculated setpoint.
- For the other types of control, cascade or fixed point 2-pipe or 4-pipe, it is possible to modify the 107 setpoint (for the 2-pipe operation in heating mode), 108 (for the 2-pipe operation in cooling mode) or 109 (for the 4-pipe functionality) if 204=0 or a change of ±x°C from the setpoint if 204=1 by pressing the or buttons.
When a setpoint is changed, the **"set"** icon flashes. The value can be changed using the or buttons. Any change is automatically saved.

If 204=1 (COMFORT function activated), a change of ±x°C from the setpoint is defined by the parameter 205.
This function is used when the application needs to set a setpoint which is not accessible to the user.
By pressing the or button, the value of the setpoint offset to be applied to the operating setpoint is displayed. The **"°C"** or **"°F"** icon flashes, based on the current operating unit. The value can be changed using the or button; every change is automatically saved.

To exit the setpoint configuration menu, wait 4 seconds or press the button.

• Fan operating mode

This paragraph can be applied only when one or more modulating fan are present, or with a 2, 3-speed on/off ventilator and manualy regulated (009=0)

Press button , the icon flashes with the indication of the fancoil operating mode on display B.

Press button one or more times to select the fan operating mode:
SPE1=control with speed 1,
SPE2=control with speed 2,
SPE3=control with speed 3.
The value is automatically saved.
To exit the menu, wait for 4 seconds until display B stops flashing.

• MODE button functionality

Depending on the value of parameter 195, the function is selected by quick access by pressing the MODE button. The other 2 functions can, however, be accessed by pressing the ESC MODE buttons.

Access to the rapid function using the MODE button:

- If 195=0 (quick access to the local season change configuration if no contact is configured as remote season change)

  Press the MODE button, the **"HEAT"** (for heating) or **"COOL"** (for cooling) icon flashes depending on the current configuration and the same flashing text appears on display B.

  Press the MODE button to change the setting. The value is automatically saved. To exit the menu, wait for 4 seconds or press the ESC button.

- If 195=1 (quick access to the timer extension configuration)
  The extended running function extends operation with the base setpoint by excluding the economy function and the "non-occupied holiday" function for a time corresponding to parameter 198 if the timer function parameter 199=0.
  With 199=1 (switch on/off using the timer) the timer extension function enables continued operation in the ON mode by excluding the timer periods for a period of time corresponding to parameter 198.

  Press the MODE button, noOC flashes on the display B (to stop the timer extension if started) or OC and the ⏲ icon flashes on display B (to activate the timer extension).

  Press the MODE button to change the setting. The value is automatically saved.

  To exit the menu, wait for 4 seconds or press the ESC button.

- If 195=2 (quick access to the operating mode configuration)
  The operating mode function is used to select whether to control with or without the timer periods (if the parameter 199=0, it is controlled using the timer periods see *"6. TIMER PERIODS operation and configuration (Model AHU-xxCSx1)" page 12*) or with "non-occupied/holiday" mode (see *"9. Operating setpoint, economy/BOOST, holiday modes" page 17*).

  If 199=0 the timer periods are functioning for normal/economy-boost operation:

  push the MODE button,
  nOrM flashes on display B (for control without the timer periods) or
  tiMB flashes on display B and the ⏲ icon (for normal/economy-boost control using the timer periods) or
  HOLY flashes on display B and the ☽ icon (for control in the "non-occupied/holiday" mode).

  If 199=1 the timer periods are functioning for switching the unit on/off:

  push the MODE button,
  nOrM flashes on display B (for control without the timer periods) or
  HOLY flashes on display B and the ☽ icon (for control in "non-occupied/holiday" mode).

  Press the MODE button one or more times to select the control mode. The value is automatically saved.

  To exit the menu, wait for 4 seconds or press the ESC button.

Non-quick access to the functions using the keypad ESC MODE:

- If the **MODE** button quick access function is set to local season change (195=0), to access the other functions, press the ESC and MODE buttons at the same time to enter the menu for changing the extended running and operating mode functions:

Parameter	Description	Default	Min	Max
MOC	Timer extension noOC=timer extension off OC=with timer extension (for the duration corresponding to the parameter 198 -The economy/boost function and the non-occupied/holiday function are excluded if 199=0 -the appliance stays switched on if 199=1).	noOC	noOC	OC
MOD	Operating mode with 199=0: nOrM=operation without timer periods tiMb=operation using the timer periods HOLY=non-occupied/holiday operation	nOrM	nOrM, tiMb, HOLY	
	Operating mode with 199=1: nOrM=operation without timer periods HOLY=non-occupied/holiday operation	nOrM	nOrM, HOLY	

Press the ▲ or ▼ button to select a parameter and the ⏻ button to enter change mode; display B flashes with the current parameter value.
Then press the ▲ or ▼ button to change the value.

Press the ⏻ button to save the configuration, or the ESC button to quit without saving the changes.

To exit the menu, press the ESC button again or wait for about 10 seconds.

If the timer extension is on, the ⏱ icon flashes for the time set in parameter 198.
If the timer extension function is not active, the ⏱ icon is off.

- If the **MODE** button quick access function is set to timer extension (195=1), to access other functions, press the ESC and MODE buttons at the same time to enter the menu for changing the operating mode and the seasonal change function.

Parameter	Description	Default	Min	Max
MOD	Operating mode with 199=0: nOrM=operation without timer periods tiMb=operation using the timer periods HOLY=non-occupied/holiday operation	nOrM	nOrM, tiMb, HOLY	
	Operating mode with 199=1: nOrM=operation without timer periods HOLY=non-occupied/holiday operation	nOrM	nOrM, HOLY	
SEA	Local season change (local season change configuration for 2-pipe systems): HEAT=heating mode CooL=cooling mode	HEAT	HEAT	COOL

Press the ▲ or ▼ button to select a parameter and the ⏻ button to enter change mode; display B flashes with the current parameter value.
Then press the ▲ or ▼ button to change the value.

Press the ⏻ button to save the configuration, or the ESC button to quit without saving the changes.

To exit the menu, press the ESC button again or wait for about 10 seconds.

■ If the **MODE** button quick access function is set to operating mode (195=2), to access the other functions, press the ESC and MODE buttons at the same time to enter the menu for changing the seasonal change function and timer extension.

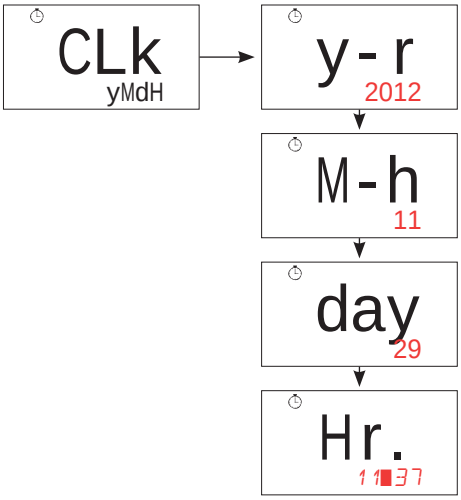
Parameter	Description	Default	Min	Max
SEA	Local season change (local season change configuration for 2-pipe systems): HEAT=Heating mode CooL=Cooling mode	HEAT	HEAT	COOL
MOC	Timer extension noOC=timer extension off OC=with timer extension (for the duration corresponding to the parameter 198 the economy/boost function and the non-occupied/holiday function are excluded if 199=0, the appliance stays switched on if 199=1).	noOC	noOC	OC

Press the ▲ or ▼ button to select a parameter and the ⏻ button to enter change mode; display B flashes with the current parameter value.
Then press the ▲ or ▼ button to change the value.

Press the ⏻ button to save the configuration, or the ESC button to quit without saving the changes.

To exit the menu, press the ESC button again or wait for about 10 seconds.

5. DATE and TIME setting (Model AHU-xxCSx1)



Press the ▲ and ▼ buttons together.
CLK appears on display A and yMdH on display B.
Press the ⏻ button to enter the date and time setting menu.

Parameter	Description	Min	Max
CLk	Date and time setting menu		
Y-r	Year	2012	2100
M-h	Month	1	12
day	Day	1	31
Hr.	Time (hour)	0	23
	Minutes	0	59

Press the ▲ or ▼ button to select a parameter to be modified and the ⏻ button to enter edit mode; display B flashes with the current value of the parameter.
Then press the ▲ or ▼ button to change the value.

Press the ⏻ button to save the configuration, or the ESC button to quit without saving the changes.

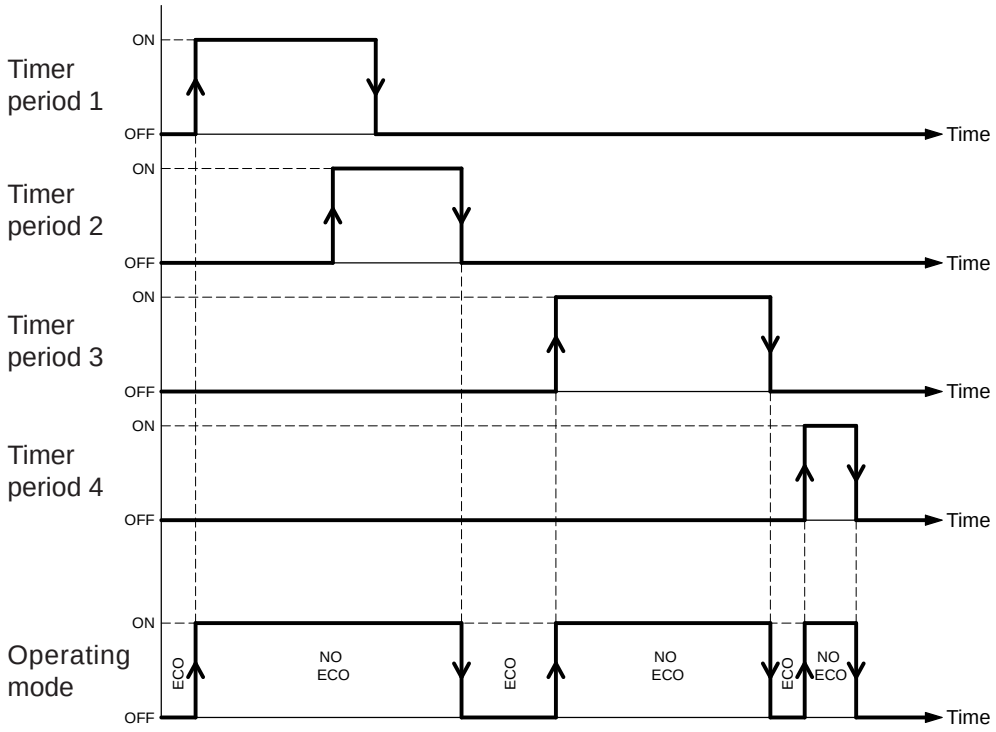
To exit the menu, press the ESC button again or wait for about 120 seconds.

Note: setting parameter 197=1 for the European zone or 197=2 for the USA zone, the unit is able to automatically update for daylight savings time. If parameter 197=0 (other regions), the automatic update for daylight savings time is disabled.

6. TIMER PERIODS operation and configuration (Model AHU-xxCSx1)

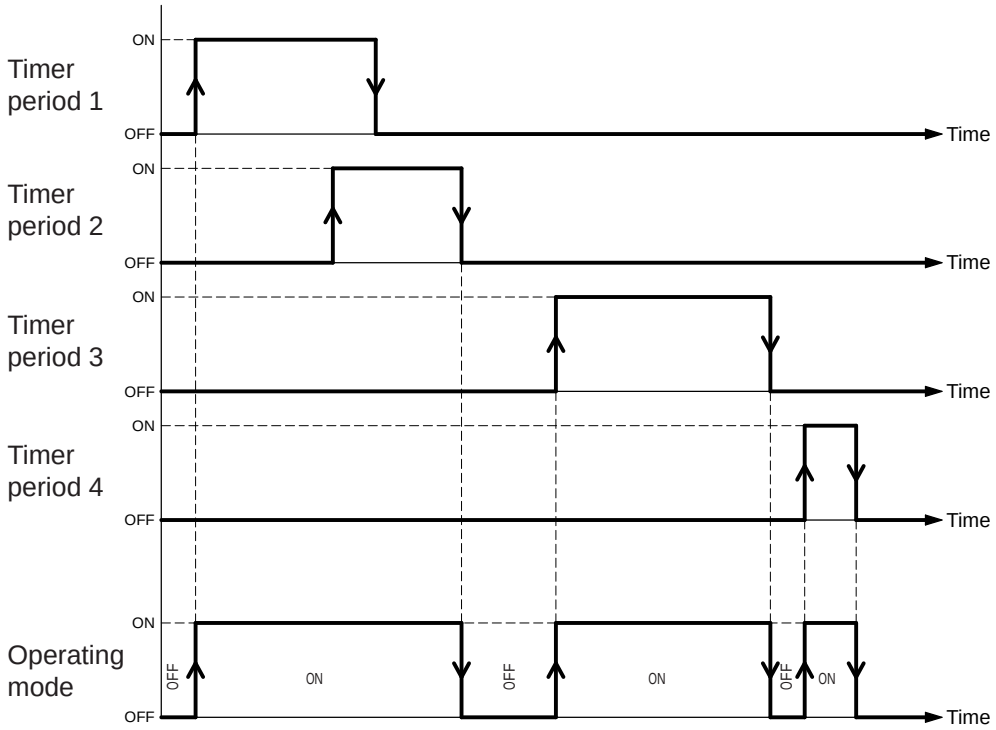
Depending on parameter 199,the timer periods can be assigned to normal/economy control (199=0) or to switching the appliance on/off (199=1).
It is possible to use up to 4 time zones per day.

- With 199=0 control is normal within an ON timer period (control with base setpoints). Outside of ON periods, the controller operates in economy/boost mode (see *"9. Operating setpoint, economy/BOOST, holiday modes" page 17*).



ECO = economy/boost mode, NO **ECO** = normal mode (control with base setpoint).

- With 199=1, in an ON period, the appliance is switched on. Outside the ON periods, the controller is switched off, and only the frost protection function is activated if parameter 188=1.



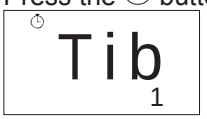
OFF = appliance switched off, **ON** = appliance switched on.

To operate using a timer period, set the start time (ON) and the end time (OFF).
If the start time (ON) is equal or previous to the end time (OFF), the correspondent timer period is excluded.
If one timer period falls within another timer period, the first start time and the last end time will be used by the system.

To modify a timer period proceed as follows:
Press the ▲ and ▼ buttons together, the main menu is displayed:

Press the ▲ button , the following screen is displayed:

Press the ⏻ button, the screen appears with the number 1 flashing corresponding to timer period 1:



Press the ▲ or ▼ button to select the timer period to be modified.
Press the ⏻ button and the screen is displayed showing the day of the flashing timer period:

Press the ▲ or ▼ button to select the required day.
Press the ⏻ button, the screen displays the day, timer period number and the starting time (ON) of the flashing period:

Press the ▲ or ▼ button to select the desired hour.
Press the ⏻ button, the timer period starting time stops flashing and is saved to the memory. The minutes field of the start of the selected timer period starts flashing.
Press the ▲ or ▼ button to select the desired minutes.
Press the ⏻ button, the minutes of the starting time of the timer period stop flashing and are saved to the memory.
The screen for setting the end time of the timer period displays:

Press the ▲ or ▼ button to select the desired hour.
Press the ⏻ button, the timer period end time stops flashing and is saved to the memory. The minutes field of the end of the selected timer period starts flashing.
Press the ▲ or ▼ button to select the desired minutes.
Press the ⏻ button, the minutes of the end time of the timer period stop flashing and are saved to the memory.
The screen for selecting the timer period day is displayed (flashing).
Press the ESC button to return to the timer period selection menu:

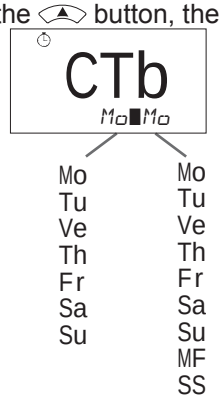
Press the ESC button to return to the main menu or repeat the procedure to set another timer period.

Parameter	Description	Min	Max
WPR	Timer period settings menu		
Tib	Timer period selection	1	4
x	Day of the week Mon = Monday; Tue = Tuesday; Wed = Wednesday; Thu = Thursday; Fri = Friday; Sat = Saturday; Sun = Sunday	Mon	Sun
ON	Start of timer period (hours)	0	23
	Start of timer period (minutes)	0	59
OFF	End of timer period (hours)	0	23
	End of timer period (minutes)	0	59

7. Duplication of TIMER PERIODS (Model AHU-xxCSx1)

It is possible to copy the settings of the timer periods of a day on another single day or on 5 days from Monday to Friday or on 2 days from Saturday to Sunday.
To copy the timer periods from one day to another day follow the procedure described below.
Press the ▲ and ▼ buttons together, the main menu is displayed:

Press the ▲ button, the following screen is displayed:



Day to be copied: destination day

Press the ⏻ button, the day to be copied flashes.
Select the day to copy with the ▲ and ▼ buttons.
Press the ⏻ button, the day to which the periods will be copied starts to flash.
If you set "MF" as the destination, the selected day will be copied to the days from Monday to Friday.
If you set the destination as "SS", the selected day will be copied to the days of Saturday and Sunday.

Press the ⏻ button to make the duplication or press the ESC button to cancel.

Parameter	Description	Min	Max
CTb	Copy periods (Mo, tu, UE, tH, Fr, SA, Su)	Mo	SS
Mo	Monday		
Tu	Tuesday		
Ve	Wednesday		
Th	Thursday		
Fr	Friday		
Sa	Saturday		
Su	Sunday		
MF	copy to Monday, Tuesday, Wednesday, Thursday and Friday		
SS	copy to Saturday and Sunday		

8. Control sensors

It is possible to set regulation with
- 2-pipe fixed point (014=0) or 4-pipe fixed point (014=3),
- 2-pipe compensated (014=1) or 4-pipe compensated (014=4),
- cascade (014=2).

Depending on the type of control desired, select the appropriate sensors according to the table below:

Types of control	Control sensor	Settings
2 or 4-pipe fixed point	Room	Internal: 019≠1 and 021≠1 and 023≠1 and 106=0
		Remote: 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3) and 106=100
	Supply	019=2 (AI1) or 021=2 (AI2) or 023=2 (AI3)
2 or 4-tube compensation (*)	Room	Internal: 019≠1 and 021≠1 and 023≠1 and 106=0
		Remote: 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3) and 106=100
	Supply	019=2 (AI1) or 021=2 (AI2) or 023=2 (AI3)
Cascade	Room + Supply	Room with internal sensor: 019≠1 and 021≠1 and 023≠1 and 106=0
		Room with remote sensor: 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3) and 106=100
		Supply: 019=2 (AI1) or 021=2 (AI2) or 023=2 (AI3)

(*) Set an external sensor to carry out compensation: 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

When a remote room sensor is used, the sensor inside the controller can also be used to create the control sensor. Define the weight (parameter 106) of the remote sensor with respect to the internal sensor. By this way optimized control is achieved on a room with differing temperature from one part to another.
Examples with 019=1 (sensor connected to input AI1 defined as the remote control sensor):
- parameter 106 = 0 -> the internal sensor is only taken into account if a remote sensor has been defined,
- parameter 106 = 100 -> the remote sensor is only taken into account, while the internal sensor is excluded.
- parameter 106 = 25 -> the working temperature is calculated taking into account a weight of 25% for the remote room sensor, and a weight of 75% for the internal room sensor.

In the event that one or more sensors are configured as remote control sensors (019=1 and/or 021=1 and/or 023=1), only one sensor is considered to be associated with the internal sensor: the one with the highest priority.
Sensor **AI1** has priority over sensor **AI2** and sensor **AI2** has priority over sensor **AI3**.
Note: if no analogue input is used as a remote sensor (019≠1 and 021≠1 and 023≠1), the internal sensor is used as the control sensor even if 106 is not equal to 0.

Cascade control mode uses the control sensor and the room setpoint to calculate the supply setpoint.
The control is performed on the supply temperature (see *"11. Logic of heating and cooling batteries" page 22*).
It is essential to associate a supply sensor with one of the sensor inputs to be able to use this type of control: 019=2 (AI1) or 021=2 (AI2) or 023=2 (AI3).

9. Operating setpoint, ECONOMY/BOOST, HOLIDAY MODES

If one of the digital contacts is configured as a “non-occupied/holiday” remote contact 015=3 (DI1) or 017=3 (DI2) or an analogue input is configured as a “non-occupied/holiday” contact 019=10 (AI1) or 021=10 (AI3) or 023=10 (AI3) the “non-occupied/holiday” mode can be activated if the corresponding contact is in the appropriate position (see *“36. Digital and analogue input logic” page 127*).

2-pipe systems (014**= 0, 1):**
In the “non-occupied/holiday” mode, the heating setpoint is decreased by 121 (see the 2-pipe heating graph, *WHS*), the cooling setpoint is increased by 121 (see the 2-pipe cooling graph, *WCS*).

4-pipe systems (014=2, **3, 4):**
In the “non-occupied/holiday” mode, the heating activation point is decreased by 121 (see 4-pipe graph, *WHS*) and the cooling activation point is increased by 121 (see 4-pipe graph, *WCS*).

The icon is displayed to indicate that the “non-occupied/holiday” mode is active.

If one of the digital contacts is configured as an “economy or boost” remote contact 015=4 (DI1) or 017=4 (DI2) or an analogue input is configured as an economy/boost contact 019=11 (AI1) or 021=11 (AI3) or 023=11 (AI3), the economy or boost mode can be activated if the corresponding contact is in the appropriate position (see *“36. Digital and analogue input logic” page 127*).
In “economy / boost” mode, the choice between economy or boost depends on the signal from the parameter 120.

2-pipe systems (014**= 0, 1):**
If 120<0 the boost function is available:
The heating setpoint is increased by 120 (see 2-pipe heating graph, *WHS*), the cooling setpoint is reduced by 120 (see 2-pipe cooling graph, *WCS*)

If 120>0, the economy mode is taken into account:
The heating setpoint is reduced by 120 (see 2-pipe heating graph *WHS*), the cooling setpoint is increased by 120 (see 2-pipe cooling graph, *WCS*)

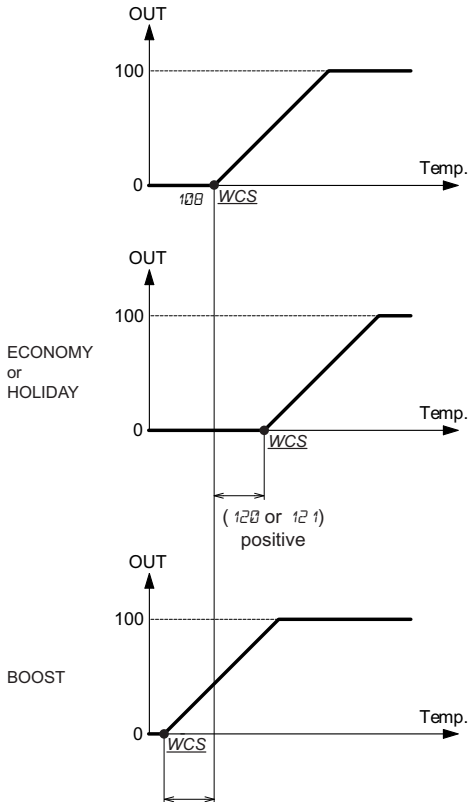
4-pipe systems (014**=2, 3, 4):**
If 120<0, the boost mode is not available:
The “boost” mode is not available in 4-pipe operation. The parameter is not considered if negative.

If 120>0, the economy mode is taken into account:
In “economy” mode, the heating activation point is reduced by 120 (see 4-pipe graph, *WHS*) and the cooling activation point is increased by 120 (see 4-pipe graph, *WCS*).

The “**ECO**” icon is displayed to signal the “economy or boost” mode.

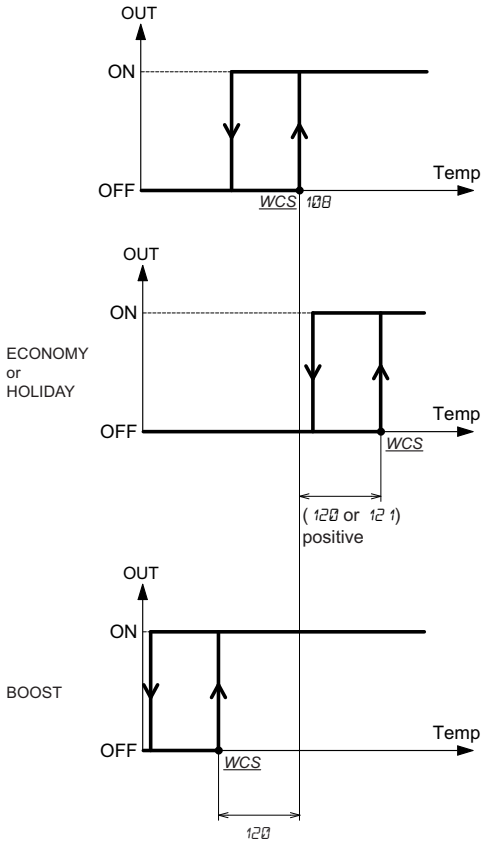
The “non-occupied/holiday” mode has priority over the economy mode when both modes are activated.

2-pipe graph (analogue output, cooling mode)



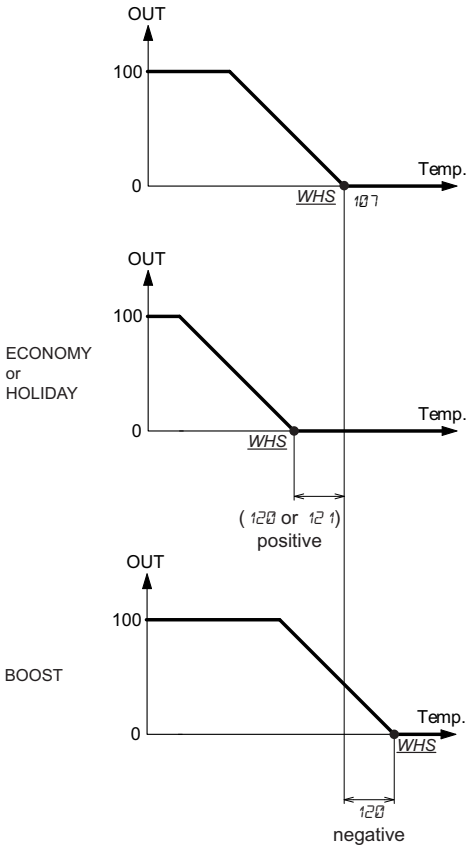
108: 2-pipe cooling setpoint
WCS: activation point, cooling mode

2-pipe graph (digital output, cooling mode)



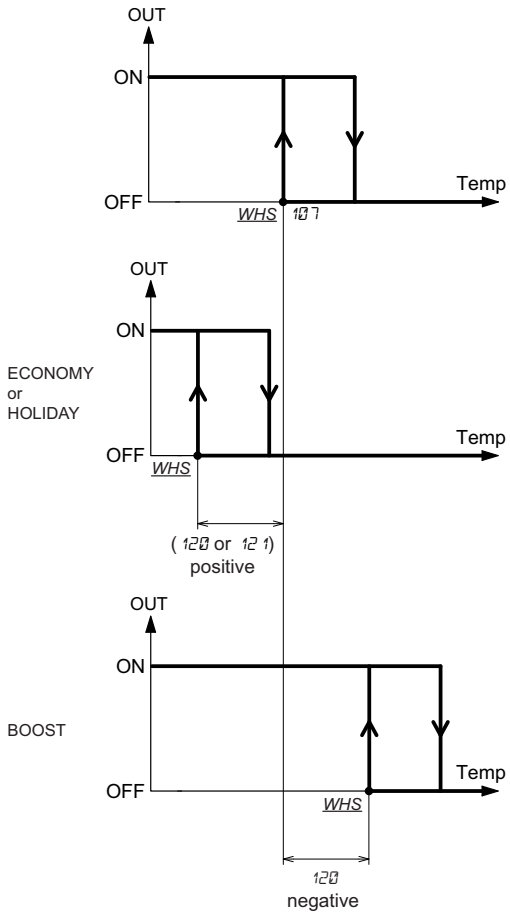
108: 2-pipe cooling setpoint
WCS: activation point, cooling mode

2-pipe graph (analogue output, heating mode)



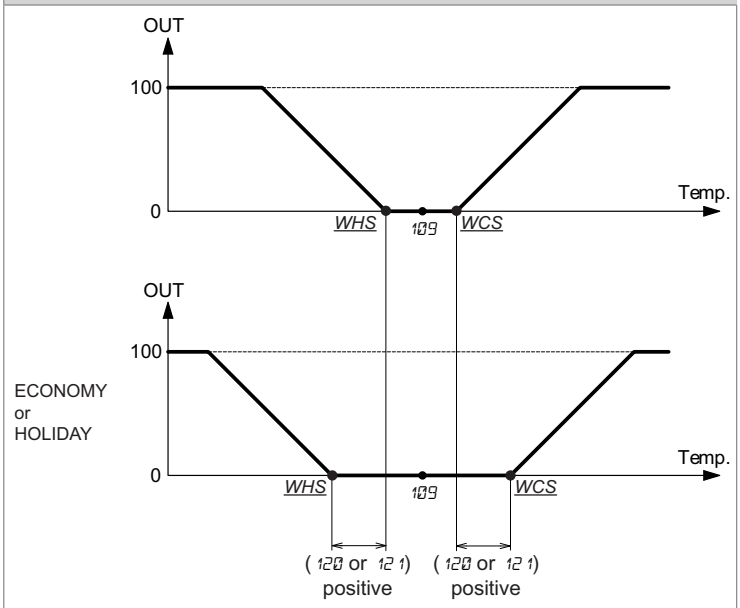
107: 2-pipe heating setpoint
WHS: activation point, heating mode

2-pipe graph (digital output, heating mode)



107: 2-pipe heating setpoint
WHS: activation point, heating mode

4-pipe graph (analogue outputs)



109: 4-pipe setpoint
WCS: activation point, cooling mode
WHS: activation point, heating mode

Note: the Boost function **(**120 negative) is not available in 4-pipe mode.

It is possible to display the operating setpoint by configuring the parameter 193 or 194 to 6. In this case, in heating mode, the value corresponding to *WHS* is displayed, in cooling mode the value corresponding to *WCS* is displayed.

If no contacts are configured in “non-occupied/holiday” or “energy saving / boost” mode, and if the operating mode has been set manually with timer periods (Mod=timb) and the timer period function 199=0 (see *“4. Quick access parameter setting” page 8*), then regulation is controlled within the timer periods with the base setpoints. In this case, “display C” (see *“3. Display, keypad and icons” page 7*) shows the active timer period. Outside of the timer period, economy/boost mode is active.
Otherwise, the contact or sensor status configured in “non-occupied/holiday” or “economy/boost” mode has priority and the timer periods are not considered (**AH-xxCSx1** models).

If none of the contacts or sensors are configured in “non-occupied/holiday” or “economy/boost” mode and if operating mode is in holiday mode (manually configured using quick access parameters → see *“MODE button functionality” page 10*), then regulation is controlled with the holiday mode. Otherwise the contact or sensor status configured in the “non-occupied/holiday” or “economy/boost” mode has priority over the manual configuration.
When timer extension mode is activated manually, it takes priority over energy saving / boost, holiday (see *“28. Timer extension or forced presence modes” page 110*) and the timer period modes (**AHU-xxCSx1** models).

10. Batteries for temperature and humidity control

The configuration for the AHU batteries for temperature and humidity control is carried out using the following parameters
- heating type battery 002,
- cooling type battery 003,
- post-heating type battery 004.
- humidifier type battery 006.
- dehumidifier type battery 007.

Battery	Type of battery	Setting
Heating battery	No heating battery	002=0
	Modulating electrical resistance	002=1
	Modulating heating valve	002=2
	Electrical resistance on/off	002=3
	Heating valve on/off	002=4
Cooling battery	No cooling battery	003=0
	Modulating cooling valve	003=1
	Cooling valve on/off	003=2
Mixed-use heating/cooling battery	No mixed-use battery	-
	Modulating mixed-use valve	002=2 and 003=1
	Mixed-use valve on/off	002=4 and 003=2
Post-heating battery	No post-heating battery	004=0
	Post-modulating resistance	004=1
	Modulating post-heating valve	004=2
	Post resistance on/off	004=3
	Post-heating valve on/off	004=4
Humidifier	No humidifier	006=0
	Modulating humidifier	006=1
	Humidifier on/off	006=2
Dehumidifier	No dehumidifier	007=0 and 003=0
	Dehumidification through modulating cooling battery	007=0, 003=1,
	Modulating dehumidifier	007=1
	Dehumidifier on/off	007=2

Set the outputs to activate the selected batteries as indicated in the table below:

Element	Settings
Modulating electrical resistance	030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3)
Modulating heating valve	030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3)
Electrical resistance on/off	025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)
Heating valve on/off	025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5)

Modulating cooling valve	030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3)
Cooling valve on/off	025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5)
Modulating mixed-use valve	030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3)
Mixed-use valve on/off	025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5)
Modulating post-heating resistance	030=8 (AO1) or 031=8 (AO2) or 032=8 (AO3)
Modulating post-heating valve	030=7 (AO1) or 031=7 (AO2) or 032=7 (AO3)
Post-heating resistance on/off	025=9 (DO1) or 026=9 (DO2) or 027=9 (DO3) or 028=9 (DO4) or 029=9 (DO5)
Post-heating valve on/off	025=8 (DO1) or 026=8 (DO2) or 027=8 (DO3) or 028=8 (DO4) or 029=8 (DO5)
Modulating humidifier	030=10 (AO1) or 031=10 (AO2) or 032=10 (AO3)
Humidifier on/off	025=16 (DO1) or 026=16 (DO2) or 027=16 (DO3) or 028=16 (DO4) or 029=16 (DO5)
Dehumidification through cooling battery	030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3)
Modulating dehumidifier	030=11 (AO1) or 031=11 (AO2) or 032=11 (AO3)
Dehumidifier on/off	025=17 (DO1) or 026=17 (DO2) or 027=17 (DO3) or 028=17 (DO4) or 029=17 (DO5)

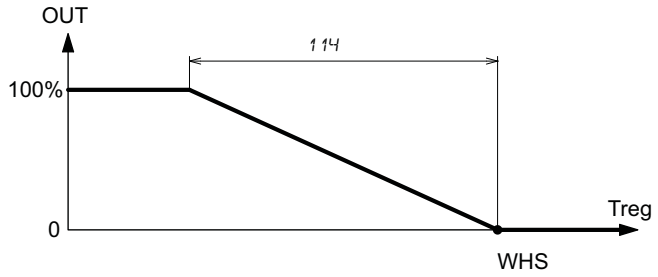
11. Logic of heating and cooling batteries

The operating mode of the heating and cooling battery is based on the following parameters:
- 014: type of controller selected,
- 002: type of heating battery,
- 003: type of cooling battery.

• 2-pipe HEATING controller (014=0 or 1)

The "**HEAT"** icon is displayed to indicate that the heating mode is active.

Modulating controller:
- The PI type controller operates in the following way for modulating control:

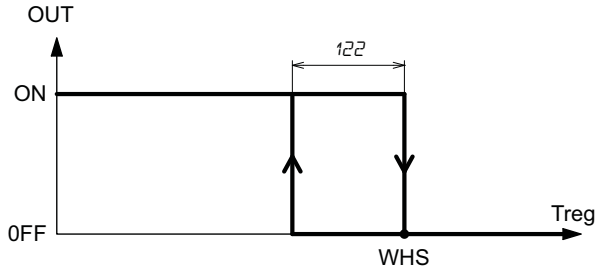


Treg: control sensor
WHS = 107 if the regulation is set at a fixed point (014=0) or calculated setpoint based on compensation (014=1)
OUT: modulating output:
- modulating valve if 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3).
- modulating electrical resistance if 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3).
- modulating mixed-use valve if 002=2 and 003=1 and 030=5 (AO1) or 031=5 (AO2) of 032=5 (AO3).

114: proportional heating band.

If the operating temperature drops below *WHS,* the valve starts to open or the modulating electrical resistance starts to be modulated. The icon is displayed if a valve is controlled, the icon for modulating heating heater.
The modulating valve or eletrical resistance can be controlled with PI action if the integral heating time 115 does not equal 0 or, with proportional action only if 115=0.
The (or) icon switches off if the modulating valve (or the electrical resistance) closes (or is no longer powered).

On/off controller
- The on/off type controller operates in the following way:



Treg: control sensor
WHS = 107 if the controller is set at a fixed point (014=0) or calculated setpoint based on compensation (if 014=1)
OUT: output on/off:
- on/off valve if 002=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5).
- electrical resistance on/off if 002=3, 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)
- mixed-use valve on/off if 002=4, 003=2, 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5).

122: hysteresis for on/off output.

If Treg < (WHS - 122), the valve (or the electrical resistance) is activated. The (or) icon is displayed.
If Treg >= WHS, the valve (or electrical resistance) is deactivated. The (or) icon is switched off.

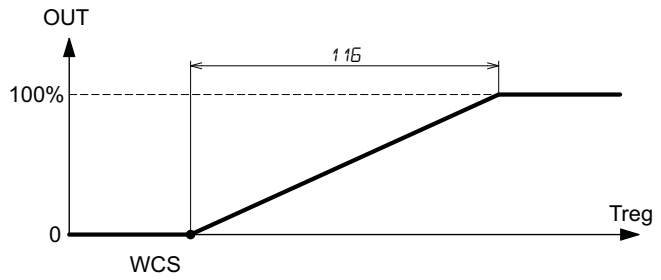
*Note: In case the winter compensation is used (*130=2 or 3), you must pair an external sensor with an analogue input 019=3 (AO1) or 021=3 (AO2) or 023=3 (AO3).

• 2-pipe HEATING control (014=0 or 1) without mid-season mode (013=0)

The “**COOL”** icon is displayed to indicate that cooling mode is active.

Modulating controller:

- The PI type controller operates in the following way for modulating control:



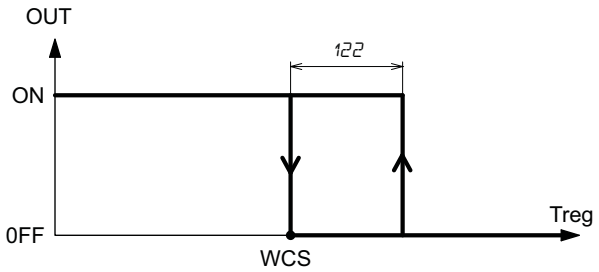
Treg: control sensor
WCS = 108 if the controller is set at a fixed point (014=0) or calculated setpoint based on compensation (if 014=1)
OUT: modulating output:
- modulating valve if 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3).
- modulating mixed-use valve if 002=2 and 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).

116: proportional cooling band.

If the operating temperature rises above *WCS*, the modulating valve starts to open. The ❄ icon is displayed.
The valve can be controlled with PI action if the integral time 117 does not equal 0 or with proportional action only if 117=0.
The ❄ icon switches off if the valve closes.

On/off controller

- The on/off type controller operates in the following way:



Treg: control sensor
WCS = 108 if the controller is set at a fixed point (014=0) or calculated setpoint based on compensation (if 014=1)
OUT: output on/off:
- on/off valve if 003=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5).
- mixed-use valve on/off if 002=4, 003=2, 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5).

122: hysteresis for on/off output.

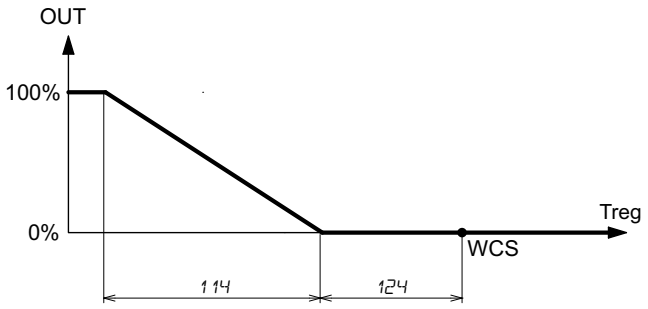
If Treg > (*WCS* + 122*),* the valve is activated. The ❄ icon is displayed.
If Treg <= *WCS,* the valve is disabled and the ❄ icon is switched off.

Note: In case the winter compensation is used (130=1 or 3), you must pair an external sensor with an analogue input 019=3 (AO1) or 021=3 (AO2) or 023=3 (AO3).

- **2-pipe COOLING control (014=0 or 1) with mid-season mode (013=1)**

The “**COOL”** icon is displayed to indicate that cooling mode is active.
If there is a sudden reduction in the temperature during the summer, the mid-season mode can be used to warm up using a heating element which can be modulating or on/off.

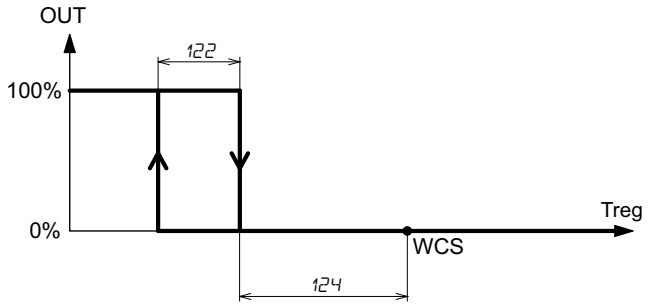
Mid-season mode with modulating heating element:



Treg: control sensor
WCS = 108 if the controller is set at a fixed point (014=0) or calculated setpoint based on compensation (if 014=1)
124: differential activation of heating in the summer season
114: proportional band of heating controller
OUT: modulating electrical resistance if 002=*1 and* 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3).

If Treg < *WCS* - 124, the modulating electrical resistance is directed to heat, the icon is displayed and remains displayed until the temperature rises above this threshold.
The modulating resistance can be controlled with PI action if the integral heating time 115 does not equal 0 or, with proportional action only if 115=0.

Mid-season mode with on/off heating element:



Treg: control sensor
WCS = 108 if the controller is set at a fixed point (014=0) or calculated setpoint based on compensation (if 014=1)
124: differential activation of heating in the summer season
122: hysteresis for on/off output
OUT: electrical resistance on/off if 002=*3,* 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5).

If Tref < (*WCS* - 124 - 122*),* the electrical resistance is activated. The icon is displayed.
If Treg >= (*WCS* - 124*),* the electrical resistance is disabled and the icon is switched off.

Note: In case the winter compensation is used (130=2 or 3), you must pair an external sensor with an analogue input 019=3 (AO1) or 021=3 (AO2) or 023=3 (AO3).

- **4-pipe controller (014=3 or 4)**

In 4-pipe mode, the operating season is automatically selected based on the room temperature, the 4-pipe room setpoint 109 if 014=3 or the calculated winter compensation setpoint if 014=4 and 130=2 or 3, the neutral zone 123.
Based on the controller selection, 2 setpoints are calculated:

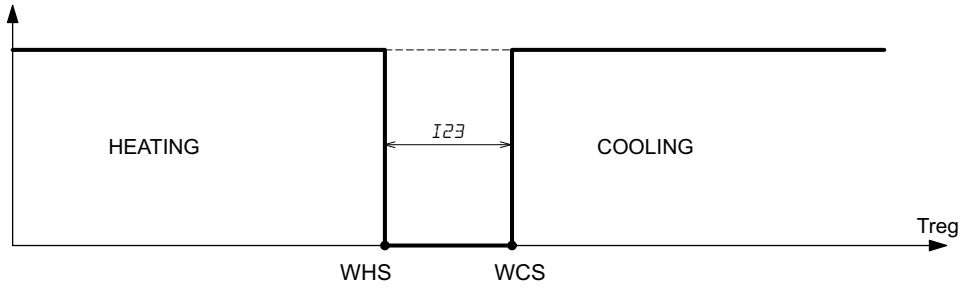
if 014=3:

- WHS = heating setpoint =109 - (123/2)
- WCS = cooling setpoint =109 + (123/2)

if 014=4:

- WHS = calculated winter compensated setpoint - (123/2)
- WCS = calculated winter compensated setpoint + (123/2)

If the temperature rises above WCS, the operating season is considered to be cooling and the "**COOL"** icon is displayed.
If the temperature falls below WHS, the operating season is considered to be heating and the "**HEAT"** icon is displayed.

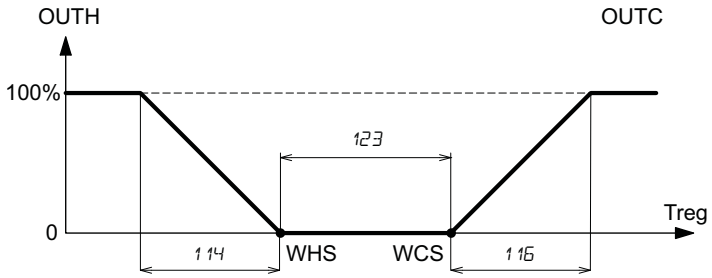


Note: When the unit is turned on, if the temperature Treg is in the neutral zone, the season is considered to be heating.

The mid-season activation parameter 013 has no influence on the 4-pipe controller and is not taken into consideration.

Modulating heating and cooling control:

- The PI type controller operates in the following way for modulating control:



Treg: control sensor
WHS = calculated heating setpoint
WCS = calculated cooling setpoint
123: *neutral zone*
114: *proportional heating band.*
116: *proportional cooling band.*
OUTH: modulating heating output:

- *modulating valve if* 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3).
- *modulating electrical resistance if* 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3).

OUTC: modulating cooling output:

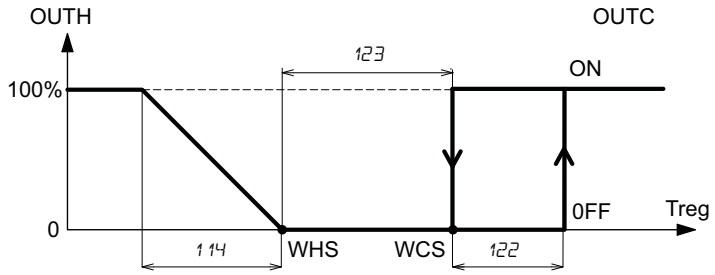
- *modulating valve if* 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3).

If the operating temperature drops below *WHS*, the heating valve starts to open or the modulating electrical resistance starts to be modulated. The icon is displayed if a valve is controlled, the icon for modulating eletrical resistance.
The valve or electrical resistance element can be controlled with PI action if the integral heating time 115 does not equal 0 or, with proportional action only if 115=0.
The (or) icon switches off if the heating or modulating valve (or the electrical resistance) closes (or is no longer powered) when Treg >= WHS.

If the operating temperature rises above *WCS*, the modulating cooling valve starts to open. The ❄ icon is displayed.
The valve can be controlled with PI action if the integral time 117 does not equal 0 or with proportional action only if 117=0.
The ❄ icon switches off if the valve closes when Treg <= WCS.

Modulating heating control and cooling on/off:

- The PI type controller operates in the following way for modulating control:



Treg: control sensor
WHS = calculated heating setpoint
WCS = calculated cooling setpoint
123: neutral zone
122: hysteresis for on/off output.
114: proportional heating band
OUTH: modulating heating output:
- *modulating valve if* 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3).
- *modulating electrical resistance if* 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3).

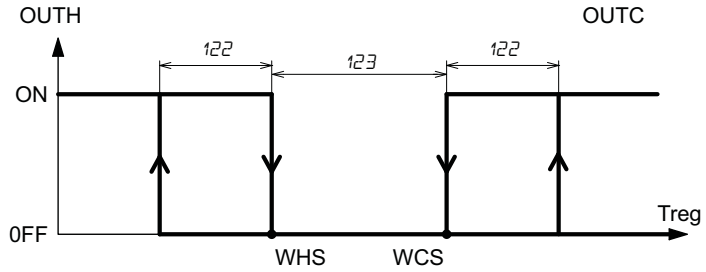
OUTC: cooling output on/off:
- *on/off valve if* 003=*2 and* 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5).

If the operating temperature drops below *WHS*, the heating valve starts to open or the modulating electrical resistance starts to be modulated. The ♨ icon is displayed if a valve is controlled, the ⏦ icon for a modulating electrical resistance.
The valve or modulating electric resistance can be controlled with PI action if the integral heating time 115 does not equal 0 or, with proportional action only if 115=0.
The ♨ (or ⏦) icon switches off if the modulating valve (or the electrical resistance) closes (or is no longer powered) when Treg >= WHS.

If Treg > (*WCS* + 122*),* the cooling valve is activated. The ❄ icon is displayed.
If Treg <= *WCS,* the cooling valve is deactivated and the ❄ icon is switched off.

Controlling heating and cooling on/off:

- The PI type controller operates in the following way for modulating control:



Treg: control sensor
WHS = calculated heating setpoint
WCS = calculated cooling setpoint
123: neutral zone
122: *hysteresis for on/off output.*
OUTH: heating output on/off:
- *on/off valve if* 002=*4 and* 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5).
- *electrical resistance on/off if* 002=*3*, 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)

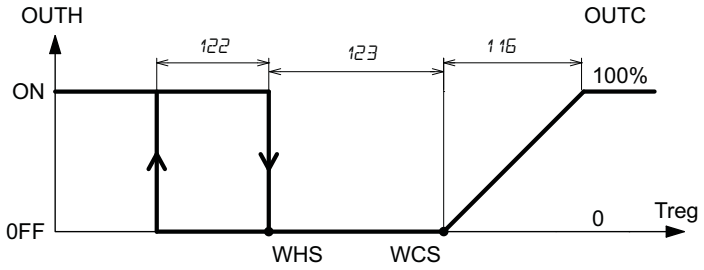
OUTC: cooling output on/off:
- *on/off valve if* 003=*2 and* 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5).

If Treg < (*WHS* - 122*),* the heating valve (or electrical resistance) is activated. The (or) icon is displayed.
If Treg >= WHS, the heating valve (or electrical resistance) is disabled. The (or) icon is switched off.

If Treg > (*WCS* + 122*),* the cooling valve is activated. The icon is displayed.
If Treg <= *WCS,* the cooling valve is deactivated and the icon is switched off.

Controlling modulating heating and cooling on/off:

- The PI type controller operates in the following way for modulating control:



Treg: control sensor
WHS = calculated heating setpoint
WCS = calculated cooling setpoint
123: neutral zone
122*: hysteresis for on/off output.*
116*: proportional cooling band*
OUTH: heating output on/off:
- *on/off valve if* 002=*4 and* 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5).
- *electrical resistance on/off if* 002=*3*, 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)

OUTC: modulating output:
- *modulating valve if* 003=*1 and* 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3).

If Treg < (*WHS* - 122*),* the heating valve (or electrical resistance) is activated. The (or) icon is displayed.
If Treg >= WHS, the heating valve (or electrical resistance) is disabled. The (or) icon is switched off.

If the operating temperature rises above *WCS*, the modulating cooling valve starts to open. The icon is displayed.
The cooling valve can be controlled with PI action if the integral time 117 does not equal 0, or with proportional action only if 117=0.
The icon switches off if the cooling valve closes.

- **Cascade control (014=2)**

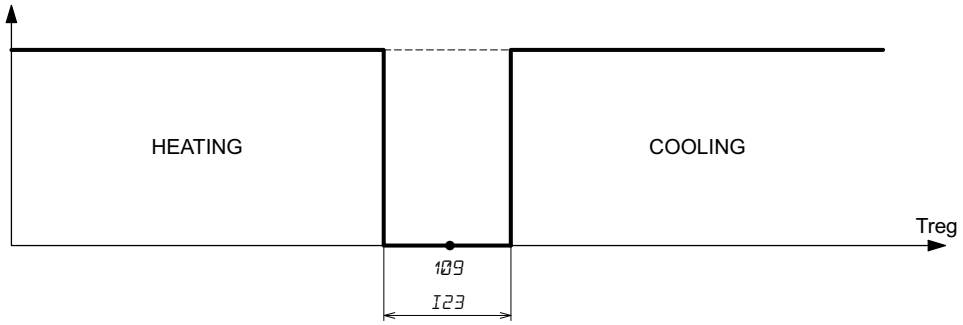
This type of operation is only possible if a modulating heating output and/or cooling output is defined, as shown below.

modulating heating output:
- modulating heating valve if 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3).
- modulating electrical resistance if 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3).

modulating cooling output:
- modulating valve if 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3).

In addition, a supply sensor must be present at the analogue input 019=2 (AI1) or 021=2 (AI2) or 023=2 (AI3).

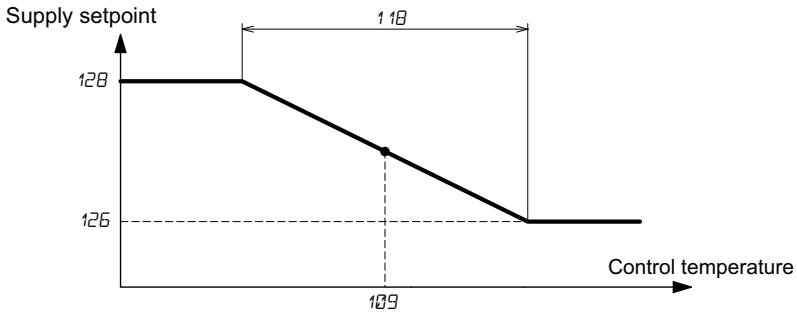
The operating season is automatically selected based on the room temperature, the 4-pipe controller setpoint 109 and the neutral zone 123.
If Treg < 109 - (123/2), the operating season is cooling, and the **"HEAT"** icon is displayed.
If Treg > 109 + (123/2), the operating season is cooling, and the **"COOL"** icon is displayed.



Treg: room sensor
109: *4-pipe setpoint control*
123: neutral zone

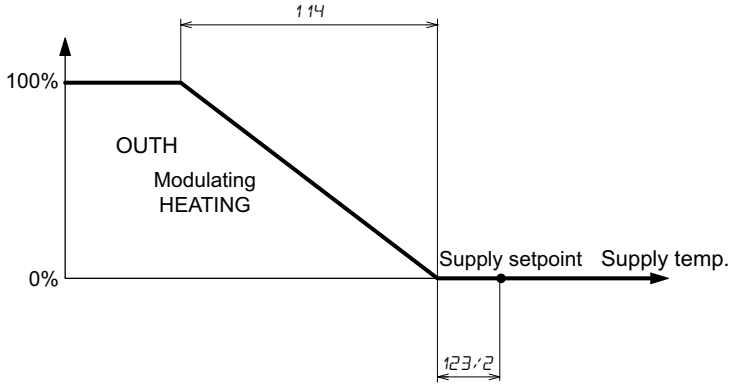
Note: when the unit is switched on, if the room temperature is in the neutral zone, the season is considered to be heating.

A first PI heating controller, called the master, calculates a supply setpoint ("set_supply"), taking the following parameters into account:
- room temperatures Treg,
- 4-pipe setpoint control 109
- proportional band for calculating the supply setpoint 118
- integral time for calculating the supply setpoint 119.



118: *proportional supply band*
109: *4-pipe setpoint control*

Control with a single heating valve:

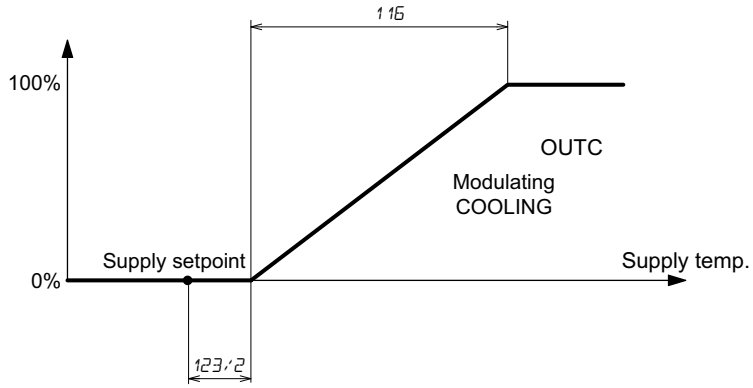


114: *proportional heating band*
123: neutral zone

The PI heating controller controls the heating valve, taking the following control parameters into account:
- supply temperature,
- supply set - neutral_zone (123) / 2,
- proportional band for heating supply control 114
- integral control time for heating supply 115.

If the temperature of the supply sensor is lower than the supply set - 123 / 2, the heating output valve (or modulating resistance) is active, the (or) icon is displayed.
The (or) icon switches off when the output of the heating slave PI controller is equal to 0.
The heating valve can be controlled with PI action if the integral time 115 does not equal 0, or with proportional action only if I15=0.

Control with a single cooling valve:

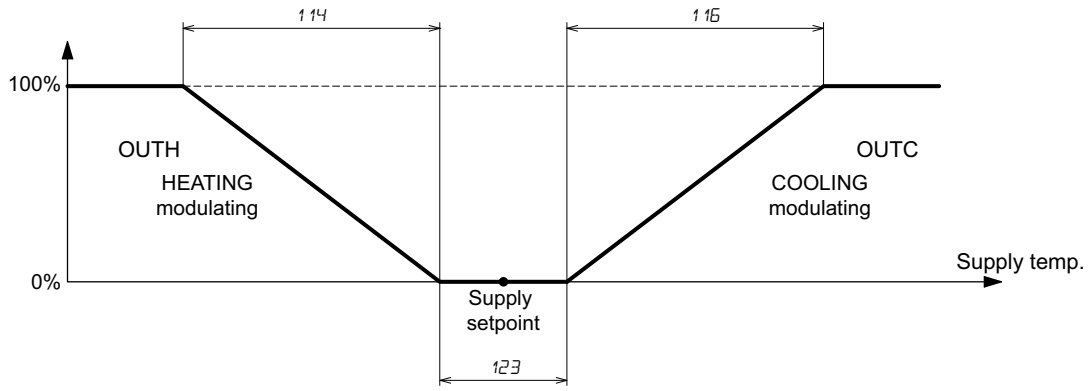


116: *proportional cooling band*
123: neutral zone

The PI cooling controller controls the cooling valves, taking the following control parameters into account:
- supply temperature,
- supply set + neutral_zone (123) / 2,
- proportional band for cooling supply control 116
- integral control time for cooling supply 117.

If the temperature of the supply sensor is higher than the supply set + 123 / 2, the cooling output valve is activated, and the icon is displayed.
The icon switches off when the output of the cooling slave PI controller is equal to 0.
The cooling valve can be controlled with PI action if the integral time 117 does not equal 0, or with proportional action only if 117=0.

Control with heating and cooling valve:
2 PI controllers control the modulating heating and cooling valves, based on the supply temperature, the calculated supply setpoint and the neutral zone 123.



The PI heating controller controls the heating valve, taking the following control parameters into account:
- supply temperature,
- supply set - neutral_zone (123) / 2,
- proportional band for heating supply control 114
- integral control time for heating supply 115.

The PI cooling controller controls the cooling valve, taking the following control parameters into account:
- supply temperature,
- supply set + neutral_zone (123) / 2,
- proportional band for cooling supply control 116
- integral control time for cooling supply 117.

If the temperature of the supply sensor is lower than the supply set - 123 / 2, the heating output valve (or modulating resistance) is active, the (or) icon is displayed. The cooling valve remains closed and the icon remains switched off.
The (or) icon switches off when the output of the heating slave PI controller is equal to 0.
The heating valve can be controlled with PI action if the integral time 115 does not equal 0, or with proportional action only if I15=0.

If the temperature of the supply sensor is higher than the supply set + 123 / 2, the cooling output valve is activated, and the icon is displayed. The heating valve remains closed and the (or) icon remains switched off.
The icon switches off when the output of the cooling slave PI controller is equal to 0.
The cooling valve can be controlled with PI action if the integral time 117 does not equal 0, or with proportional action only if 117=0.

12. Mixed-use valve

The mixed-use valve can only be controlled in 2-pipe mode (014=0 or 1) or cascade control (014=2).

To define a modulating mixed-use valve, set the parameters 002=2 and 003=1 and select the modulating output configured as a modulating mixed-use valve 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).

To define a mixed-use on/off valve, set the parameters 002=4 and 003=2 and select the digital output configures as an on/off mixed-use valve 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5).

Control is carried out for 2-pipe mode (014=0 or 1) in heating based on the logic of paragraph *“2-pipe HEATING controller (014=0 or 1)” page 22* and in cooling, based on the logic of the paragraph *“2-pipe COOLING control (014=0 or 1) with mid-season mode (013=1)” page 24*
Control is carried out in cascade mode (014=2) in heating as control with a single heating valve and in cooling as control with a single cooling valve of paragraph *“Cascade control (014=2)” page 28* .

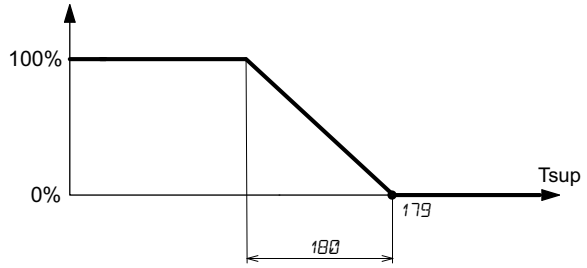
13. Post-heating battery logic

The post-heating battery can be used as battery for integration with the heating battery, as a post-heating battery following a reduction in temperature due to dehumidification, or as an additional heating stage.
Post-heating can be carried out using a modulating valve (004=2), an on/off valve (004=4), a modulating resistance (004=1), or an on/off resistance (004=3).
In addition, the post-heating battery uses the control sensor and the current operating setpoint for control.
In post-heating or in the additional heating stage, the battery uses the post-heating setpoint (parameter 179) and is controlled based on the supply temperature. In this case, an analogue input must be defined as a supply sensor: 019=2 (AI1) or 021=2 (AI2) or 023=2 (AI3).
Through the parameter 005 the post-heating battery's operation is selected:
- 005=0 post-heating only,
- 005=1 integration and post-heating. In the latter case, if no dehumidification is active, the post-heating battery works in integration mode; otherwise, in post-heating mode.
- 005=2 additional heating stage.

The control is proportional if the battery is modulating or on/off in other cases. The parameter 180 represents the proportional band or the hysteresis of the post-heating stage.

• Post-heating operation or additional modulating heating stage:

- post-heating (005=0) or additional heating stage (005=2) with valve: 004=2 and 030=7 (AO1) or 031=7 (AO2) or 032=7 (AO3).
- post-heating (005=0) or additional heating stage (005=2) with electrical resistance: 004=1 and 030=8 (AO1) or 031=8 (AO2) or 032=8 (AO3).

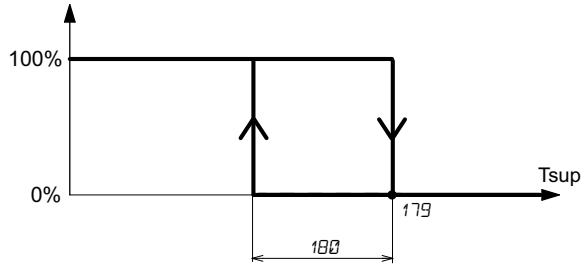


Tsup: supply temperature: 019=*2 (AI1) or* 021=*2 (AI2) or* 023=*2 (AI3)*
179*: post-heating setpoint*
180*: proportional post-heating band*

During control, the ♨ (or ⏦) icon is displayed if the signal applied to the valve (or the modulating resistance) is not equal to 0: Tsup<179.
The ♨ (or ⏦) icon is switched off if the signal applied to the valve (or the modulating resistance) is equal to 0 (Tsup>=179) and if the heating stage is also disabled.

• Post-heating operation or additional on/off heating stage:

- post-heating or additional heating stage with valve: 004=4 and 025=8 (DO1) or 026=8 (DO2) or 027=8 (DO3) or 028=8 (DO4) or 029=8 (DO5).
- post-heating or additional heating stage with electrical resistance: 004=3 and 025=9 (DO1) or 026=9 (DO2) or 027=9 (DO3) or 028=9 (DO4) or 029=9 (DO5).



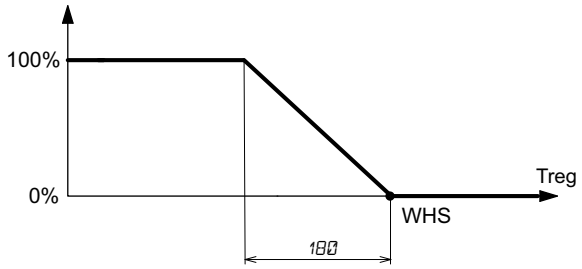
Tsup: supply temperature: 019=*2 (AI1) or* 021=*2 (AI2) or* 023=*2 (AI3)*
179*: post-heating setpoint*

180*: proportional post-heating band*

If Tsup < 179 -180 post-heating or the additional heating stage is activated, the (or) icon is displayed if the post-heating is a valve (or electrical resistance). If Tsup >= 179 post-heating (or the additional heating stage) is deactivated. The (or) icon switches off if the post-heating or the additional heating is a valve (or electrical resistance) and if the heating stage is also deactivated.

• Modulating integration operation:

- integrational stage with valve: 004=2 and 030=7 (AO1) or 031=7 (AO2) or 032=7 (AO3).
- integrational stage with electrical resistance: 004=1 and 030=8 (AO1) or 031=8 (AO2) or 032=8 (AO3).

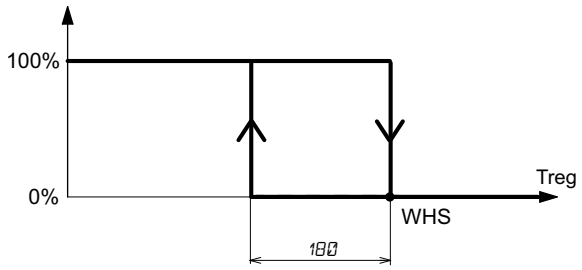


Treg: control temperature
WHS: heating control setpoint
180*: proportional post-heating band*

During control, the (or) icon is displayed if the signal applied to the valve (or the modulating resistance) in integration is not equal to 0: Tsup<WHS.
The (or) icon switches off if the signal applied to the valve (or the modulating resistance) in integration is equal to 0 (Tsup>=WHS) and if the heating stage is also deactivated.

• Integration on/off operations:

- integration stage with valve: 004=4 and 025=8 (DO1) or 026=8 (DO2) or 027=8 (DO3) or 028=8 (DO4) or 029=8 (DO5).
- integration stage with electrical resistance: 004=3 and 025=9 (DO1) or 026=9 (DO2) or 027=9 (DO3) or 028=9 (DO4) or 029=9 (DO5).



Treg: control temperature
WHS: heating control setpoint
180*: proportional post-heating band*

If Treg < WHS -180 the heating integration stage is activated, the (or) icon is displayed if the integration is a valve (or electrical resistance).
If Treg >= WHS the heating integration stage is disabled. The (or) icon switches off if the integration is a valve (or electrical resistance) and if the heating stage is also disabled.

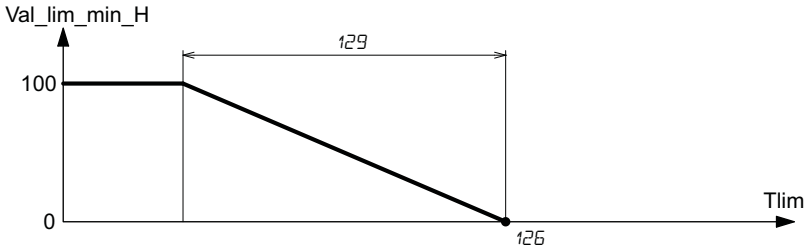
14. Supply limits function with fixed-point control

For fixed point control it is possible to take the supply limits into account to prevent the release of air into the supply duct which is too cold or too hot.
It is possible to enable the upper and lower limits separately in a given season based on the values of parameters 125 and 127 respectively.
The limit sensor is the supply sensor. Pair it with a sensor input 019=2 (AI1) or 021=2 (AI2) or 023=2 (AI3).
If no supply sensor has been paired with an input sensor, the limit function is not taken into consideration.

• Minimum limit:

To enable the lower limits in cooling mode, set 125=1.
To enable the lower limits in heating mode, set 125=2.
To enable the lower limits in heating and cooling modes, set 125=3.
To disable this function, set 125=0.
Pair the supply with an input:019=1 for input AI1 or 021=1 for input AI2 or 023=1 for input AI3.

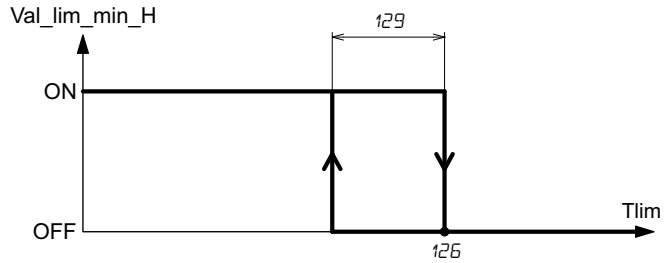
Low limit in heating mode with modulating control:



Val_lim_min_H: theoretical value of the low limit output in heating mode
Tlim: temperature of the supply sensor
126*: setpoint of low limit*
129*: proportional limit band*

When active, if the supply temperature falls below the minimum supply setpoint 126, the heating valve is controlled considering the highest value between the theoretical output of the heating control and the theoretical value of the Val_lim_min_H value.
Below 126 the ⚠ icon is displayed and on the alarms page, the message LI-L is displayed.

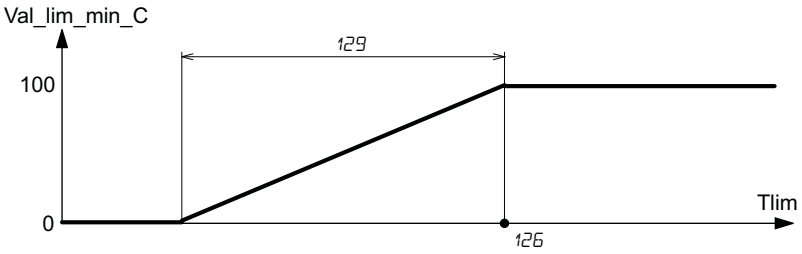
Low limit in heating mode with on-off control:



Val_lim_min_H: theoretical value of the low limit output in heating mode
Tlim: temperature of the supply sensor
126*: setpoint of low limit*
129*: proportional limit band*

When active, if the supply temperature falls below the minimum supply setpoint 126 - (proportional band 129), the on/off output in heating mode is controlled considering the highest value between the theoretical on/off output of the heating control and the theoretical value of the Val_lim_min_H limit.
Below 126 - 129 the ⚠ icon is displayed and on the alarms page, the message LI-L is displayed.

Low limit in cooling mode with modulating control:

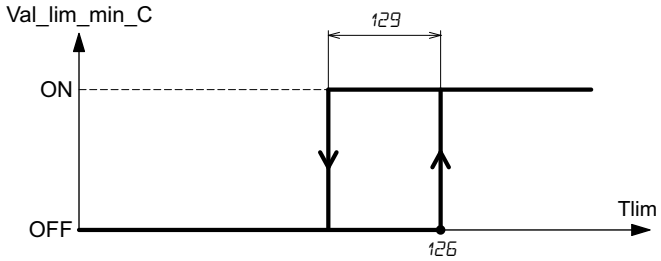


Val_lim_min_C: theoretical value of the low limit output in cooling mode
Tlim: temperature of the supply sensor
126*: setpoint of low limit*
129*: proportional limit band*

Control without dehumidification (139**=0):**
When active, if the supply temperature falls below the minimum supply setpoint 126, the cooling valve is controlled considering the lowest value between the theoretical output of the cooling control and the theoretical value of the Val_lim_min_C limit.
Below 126 the ⚠ icon is displayed and on the alarms page, the message L I - L is displayed.

Control with dehumidification using the cooling battery (007**=0 and** 139**≠0):**
In the event that the request for dehumidification has priority over the temperature (212=1), the limit function does not operate on the cooling battery.

Low limit in cooling mode with on-off control:



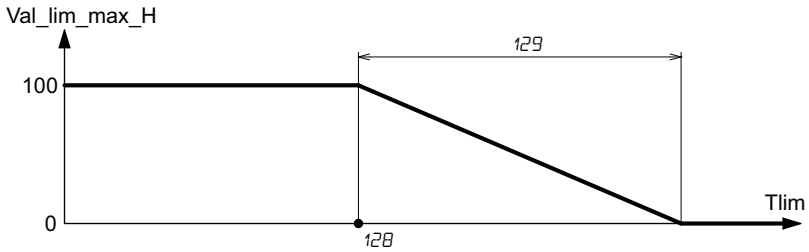
Val_lim_min_C: theoretical value of the low limit output in cooling mode
Tlim: temperature of the supply sensor
126*: setpoint of low limit*
129*: proportional limit band*

When active, if the supply temperature falls below the minimum supply setpoint 126 - (proportional band 129), the on/off output in cooling mode is controlled considering the lowest value between the theoretical on/off output of the cooling control and the theoretical value of the Val_lim_min_C limit.
Below 126 - 129 the ⚠ icon is displayed and on the alarms page, the message L I - L is displayed.

• Maximum limit:

To enable the high limit in cooling mode, set 127=1.
To enable the high limit in heating mode, set 127=2.
To enable the high limit in heating and cooling mode, set 127=3.
To disable this function, set 127=0.

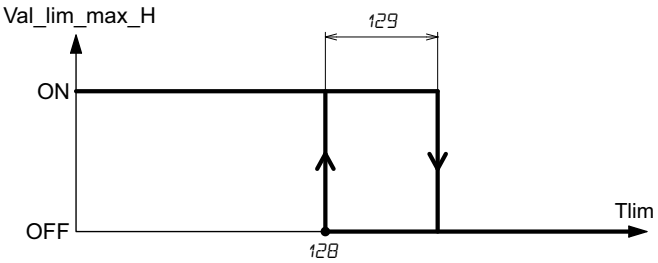
High limit in heating mode with modulating control:



Val_lim_max_H: theoretical value of the high limit output in heating mode
Tlim: temperature of the supply sensor
128*: setpoint of high limit*
129*: proportional limit band*

When active, if the supply temperature goes above the maximum supply setpoint 128, the heating valve is controlled considering the lowest value between the theoretical output of the heating control and the theoretical value of the Val_lim_max_H limit.
Above 128 the ⚠ icon is displayed and on the alarms page, the message LI-H is displayed.

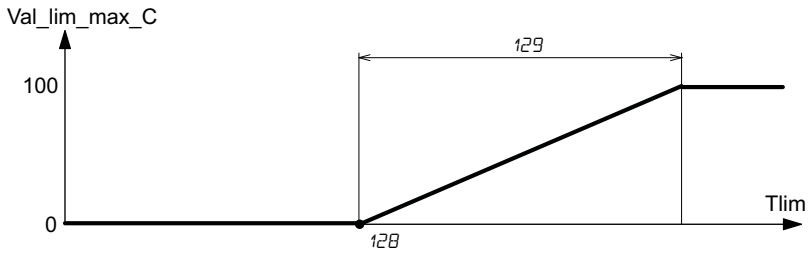
High limit in heating mode with on-off control:



Val_lim_max_H: theoretical value of the high limit output in heating mode
Tlim: temperature of the supply sensor
128*: setpoint of high limit*
129*: proportional limit band*

When active, if the supply temperature goes above the maximum supply setpoint 128 + (proportional band 129), the on/off output in heating mode is controlled considering the lowest value between the theoretical on/off output of the heating control and the theoretical value of the Val_lim_min_H limit.
Above 128 + 129 the ⚠ icon is displayed and on the alarms page, the message LI-H is displayed.

High limit in cooling mode with modulating control:

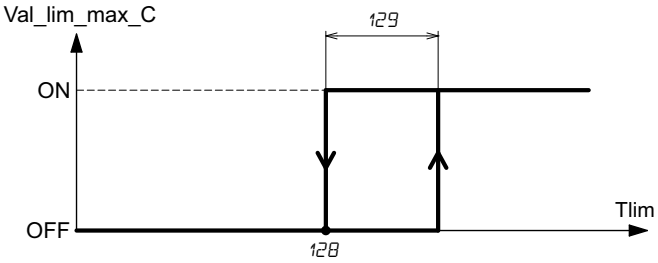


Val_lim_max_C: theoretical value of the high limit output in cooling mode
Tlim: temperature of the supply sensor
128*: setpoint of high limit*
129*: proportional limit band*

When active, if the supply temperature goes above the maximum supply setpoint 128, the cooling valve is controlled considering the maximum value between the theoretical output of the cooling control and the theoretical value of the Val_lim_max_C limit.

Above 128 the ⚠ icon is displayed and on the alarms page, the message LI-H is displayed.

High limit in cooling mode with on-off control:



Val_lim_max_C: theoretical value of the high limit output in cooling mode
Tlim: temperature of the supply sensor
128*: setpoint of high limit*
129*: proportional limit band*

When active, if the supply temperature goes above the maximum supply setpoint 128 + (proportional band 129), the on/off output in cooling mode is controlled considering the maximum value between the theoretical on/off output of the cooling control and the theoretical value of the Val_lim_min_C limit.

Above 128 + 129 the ⚠ icon is displayed and on the alarms page, the message LI-H is displayed.

Note: Control with limits can be used for all functions other than cascade mode 014=0, 1, 3 or 4 (2-pipe fixed point control or with compensation, 4-pipe fixed point control or with compensation).

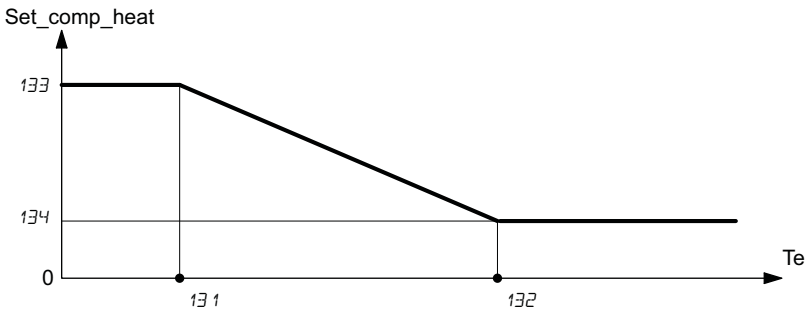
15. Control with setpoint compensation

The compensated setpoint allows an operating setpoint to be dynamically calculated according to the external temperature. In winter, it is normally used to raise the supply setpoint, when the external temperature falls.
In summer, it can calculate a room setpoint based on the external temperature to avoid having a large temperature difference between the cooled internal environment and the external one.
To use the setpoint compensation, select:
- the operating mode 014=1 (2-pipe control with external compensation) or 014=4 (4-pipe control with external compensation),
- type of compensation:
  - 030=1 for compensation in cooling mode,
  - 030=2 for compensation in heating mode,
  - 030=3 for compensation in heating and cooling modes,
- a sensor input to connect the external sensor: 019=3 for input AI1 or 021=3 for input AI2 or 023=3 for input AI3.

• Compensation in 2-pipe heating mode or 4-pipe mode:

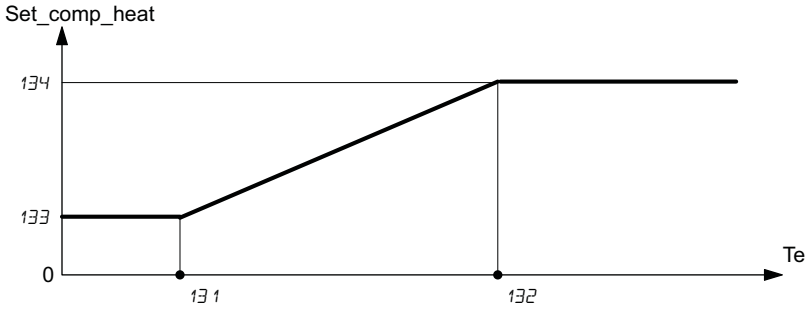
Two separate points are defined, as indicated in the charts below

Example of compensation curve with 133 > 134.



Set_comp_heat: winter compensated setpoint
Te: external temperature
131: *minimum external temperature for winter compensation*
132: *maximum external temperature for winter compensation*
133: *compensated setpoint corresponding to the minimum external temperature for winter compensation* 131
134: *compensated setpoint corresponding to the maximum external temperature for winter compensation* 132

Example of compensation curve with 133 < 134.



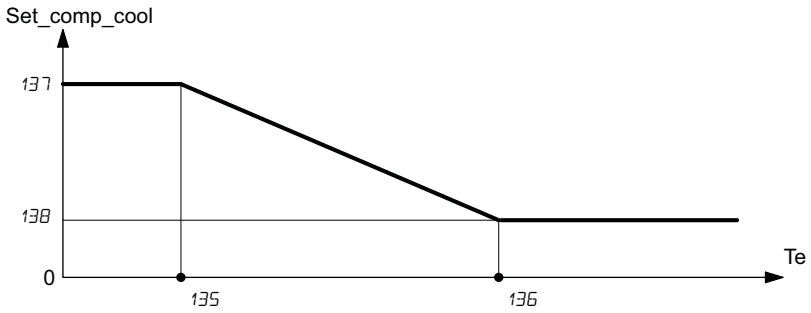
Set_comp_heat: winter compensated setpoint
Te: external temperature
131: *minimum external temperature for winter compensation*
132: *maximum external temperature for winter compensation*
133: *compensated setpoint corresponding to the minimum external temperature for winter compensation* 131
134: *compensated setpoint corresponding to the maximum external temperature for winter compensation* 132

Note: If the external sensor breaks, the compensated setpoint is still calculated.
If the external sensor is open, the compensated setpoint corresponds to I33.
If the external sensor is short-circuited, the compensated setpoint corresponds to I34.

• Compensation in the 2-pipe cooling mode:

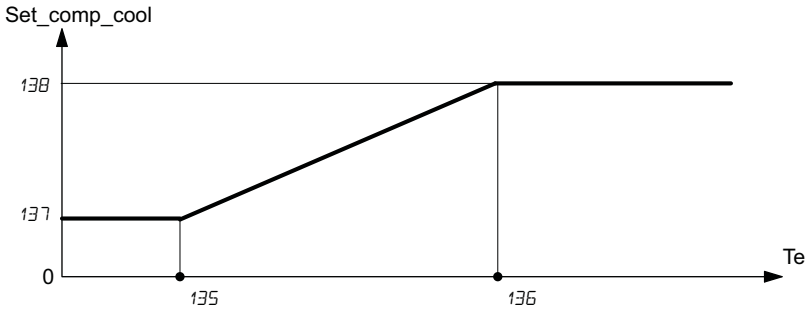
Two separate points are defined, as indicated in the charts below

Example of compensation with 137 > 138.



Set_comp_cool: summer compensated setpoint
Te: external temperature
135:*minimum external temperature for summer compensation*
136:*external maximum temperature for summer compensation*
137:*compensated setpoint corresponding to the minimum external temperature for summer compensation* 135
138:*compensated setpoint corresponding to the maximum external temperature for summer compensation* 136

Example of compensation curve with 137 < 138.



Set_comp_cool: summer compensated setpoint
Te: external temperature
135:*minimum external temperature for summer compensation*
136:*external maximum temperature for summer compensation*
137:*compensated setpoint corresponding to the minimum external temperature for summer compensation* 135
138:*compensated setpoint corresponding to the maximum external temperature for summer compensation* 136

Note: If the external sensor breaks, the summer compensated setpoint is still calculated.
If the external sensor is open, the compensated summer setpoint corresponds to I37.
If the external sensor is short-circuited, the compensated summer setpoint corresponds to I38.

16. Dehumidification

Dehumidification can be carried out in 3 modes:
- using the same battery that is normally used for cooling,
- using an on/off dehumidifier,
- using a modulating dehumidifier,
- using an external damper redulated on dehumidification
- using modulating fans regulated on dehumidification

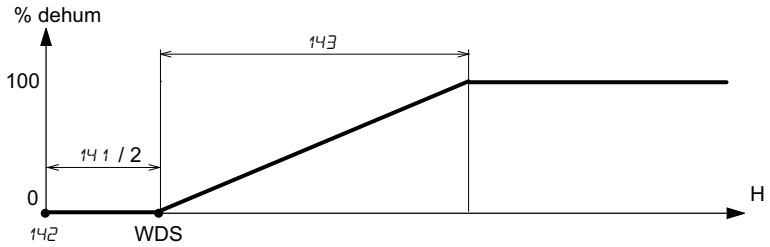
Humidity can be controlled using the humidity sensor inside the controller (AHU-xxxxH1 models only) or using a remote humidity transmitter with output 0..10 V connected to input AI3 (023=6).

• Use of the cooling battery for dehumidification:

In case the cooling battery is used, it received two theoretical signals:
- from the cooling controller
- from dehumidification.

The greater of these two signals is applied to the cooling battery.

The dehumidification signal is calculated based on the curve indicated below:



H: value of the humidity detected by the internal or remote humidity sensor
WDS: dehumidification mode setpoint
% dehum.: theoretical value percentage of dehumidification
142*: humidity setpoint*
141*: humidity neutral zone*
143*: humidity proportional band*

Settings for dehumidification with cooling battery:
- select the type of dehumidification with cooling battery 007=0,
- define the type of cooling battery 003=1 and
  - a modulating output for the cooling battery 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3)
  - or a modulating output for a mixed-use battery 030=5 (AO1) or 031=45 (AO2) or 032=5 (AO3),
- turn on dehumidification
  - with an internal humidity sensor 139=1 or 139=3 only in cooling (AHU-xxxxH1 models only)
  - or with a remote humidity sensor 139=2 or 139=4 only in cooling, 023=6 (0..10 V humidity input) and put the JP1 jumper in the “3-2” position,
- humidity neutral zone 141,
- humidity setpoint 142,
- humidity proportional band 143,
- humidity integral time 144.

Control is carried out on the dehumidification operating setpoint WDS = 142 + (141/2) and is proportional if 144=0 or proportional integral if 144≠0.

If the dehumidification request has priority, the icon is displayed.

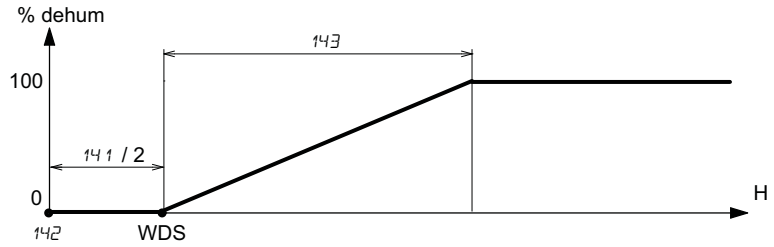
If the cooling request has priority, the icon is switched off.

In both cases, the icon is displayed.

Note: If the frost protection (with 188=1), condensation alarm or steady ventilation are activated, dehumidification is shut down.

• Using a modulating dehumidifier:

The dehumidification signal is calculated based on the curve indicated below:



H: value of the humidity detected by the internal or remote humidity sensor
WDS: dehumidification mode setpoint
% dehum.: theoretical value percentage of dehumidification
142*: humidity setpoint*
141*: humidity neutral zone*
143*: humidity proportional band*

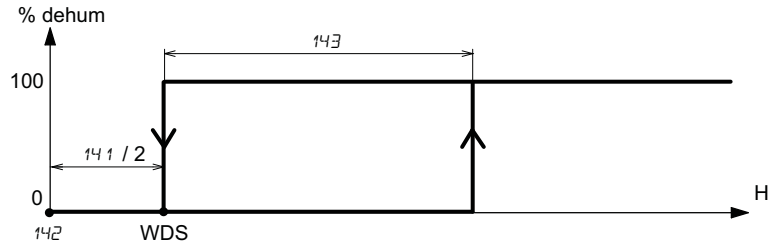
Settings for dehumidification with modulating dehumidifier:
- select the type of dehumidification with modulating dehumidifier 007=1,
- define the modulating dehumidifier output 030=11 (AO1) or 031=11 (AO2) or 032=11 (AO3) ,
- turn on dehumidification
  - with an internal humidity sensor 139=1 or 139=3 only in cooling (AHU-xxxxH1 models only)
  - or with a remote humidity sensor 139=2 or 139=4 only in cooling, 023=6 (0..10 V humidity input) and put the JP1 jumper in the “3-2” position,
- humidity neutral zone 141,
- humidity setpoint 142,
- humidity proportional band 143,
- humidity integral time 144.

Control is carried out on the dehumidification operating setpoint WDS = 142 + (141/2) and is proportional if 144=0 or proportional integral if 144≠0.
If the signal applied to the dehumidifier is not equal to 0, the icon is displayed.

Note: If the frost protection (with 188=1), condensation alarm or steady ventilation are activated, dehumidification is shut down.

• Using an on/off dehumidifier:

The dehumidification signal is calculated based on the curve indicated below:



H: value of the humidity detected by the internal or remote humidity sensor
WDS: dehumidification mode setpoint
% dehum.: theoretical value percentage of dehumidification
142*: humidity setpoint*
141*: humidity neutral zone*
143*: humidity proportional band*

Settings for dehumidification with on/off dehumidifier:
- select the type of dehumidification with the on/off dehumidifier 007=2,
- define the on/off dehumidifier output 025=17 (DO1) or 026=17 (DO2) or 027=17 (DO3) or 028=17 (DO4) or 029=17 (DO5),
- turn on dehumidification
  - with an internal humidity sensor 139=1 or 139=3 only in cooling (AHU-xxxxH1 models only)
  - or with a remote humidity sensor 139=2 or 139=4 only in cooling, 023=6 (0..10 V humidity input) and put the JP1 jumper in the “3-2” position,
- humidity neutral zone 141,
- humidity setpoint 142,
- humidity proportional band 143.

Control is carried out on the dehumidification operating setpoint WDS = 142 + (141/2).
If the humidity detected > WDS + 143 the dehumidifier is activated, and the icon is displayed.
If the humidity detected <= WDS the dehumidifier is disabled and the icon switches off.

Note: If the frost protection (with 188=1), condensation alarm or steady ventilation are activated, dehumidification is shut down.

• Using an external damper regulated on dehumidification:

See chapter *“Regulation of modulating damper based on dehumidification” page 83*

• Using a modulating fan regulated on dehumidification:

See chapter*”22. Operating mode of the fans” page 68* paragraph “Regulation of speed based on dehumidification (009=7)”.

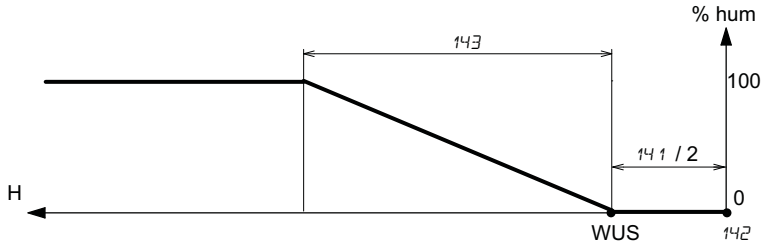
17. Humidification

Humidification can be carried out by using:
- an on/off humidifier,
- a modulating humidifier.

Humidity can be controlled using the humidity sensor inside the controller (AHU-xxxxH1 models only) or using a remote humidity transmitter with output 0..10 V connected to input AI3 (023=6). The presence of a one or more speeds on/off fan or a modulating supply fan is mandatory, otherwise humidification is not authorized.

• Using a modulating humidifier:

The humidification signal is calculated based on the curve indicated below:



H: value of the humidity detected by the internal or remote humidity sensor
WUS: humidifying operation setpoint
% hum: theoretical value percentage of humidification
142*: humidity setpoint*
141*: humidity neutral zone*
143*: humidity proportional band*

Settings for humidification with modulating humidifier:
- select the type of modulating humidifier 006=1,
- define the modulating humidifier output 030=10 or 031=10 or 032=10,
- turn on humidification
  - with an internal humidity sensor 140=1 (AHU-xxxxH1 models only)
  - or with a remote humidity sensor 140=2, 023=6 (0..10 V humidity input) and put the JP1 jumper in the “3-2” position,
- humidity neutral zone 141,
- humidity setpoint 142,
- humidity proportional band 143,
- humidity integral time 144.

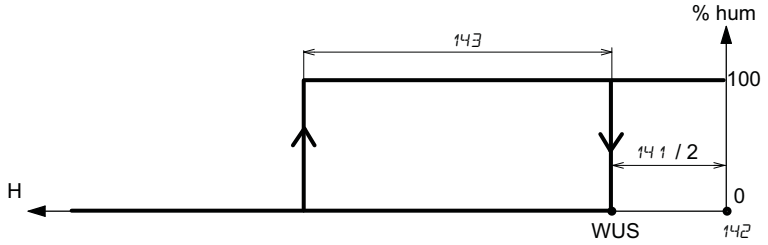
Control is carried out on the humidification operating setpoint WUS = 142 - (141/2) and is proportional if 144=0 or proportional integral if 144≠0.

When the signal applied to the humidifier is not equal to 0, the icon is displayed.

Note: If the frost protection (with 188=1), condensation alarm or steady ventilation are activated, humidification is shut down.

• Using an on/off humidifier:

The humidification signal is calculated based on the curve indicated below:



H: value of the humidity detected by the internal or remote humidity sensor
WUS: humidifying operation setpoint
% hum: theoretical value percentage of humidification
142*: humidity setpoint*
141*: humidity neutral zone*
143*: humidity proportional band*

Settings for humidification with on/off humidifier:
- select the type of on/off humidifier 006=2,
- define the on/off humidifier output 025=16 (DO1) or 026=16 (DO2) or 027=16 (DO3) or 028=16 (DO4) or 029=16 (DO5),
- turn on humidification
  - with an internal humidity sensor 140=1 (AHU-xxxxH1 models only)
  - or with a remote humidity sensor 140=2, 023=6 (0..10 V humidity input) and put the JP1 jumper in the “3-2” position,
- humidity neutral zone 141,
- humidity setpoint 142,
- humidity proportional band 143

Control is carried out on the humidification operating setpoint WUS = 142 - (141/2).

If the humidity detected < WUS - 143 the humidifier is activated, and the icon is displayed.

If the humidity detected >= WUS, the dehumidifier is disabled and the icon switches off.

Note: If the frost protection (with 188=1), condensation alarm or steady ventilation are activated, dehumidification is shut down.

• humidification authorization for humidifier not managed by the controller:

It is possible to provide winter humidification authorization for humidifier not managed by the controller through the use of a digital output. The authorization can take place through the presence of ventilation and the winter season.
To use this function, configure a digital output as the “humidification authorization”: 025=10 (DO1) or 026=10 (DO2) or 027=10 (DO3) or 028=10 (DO4) or 029=10 (DO5),

The digital output is activated if the fan is active and the season is set to heating.
Otherwise (summer season or no ventilation), the digital output is disabled.

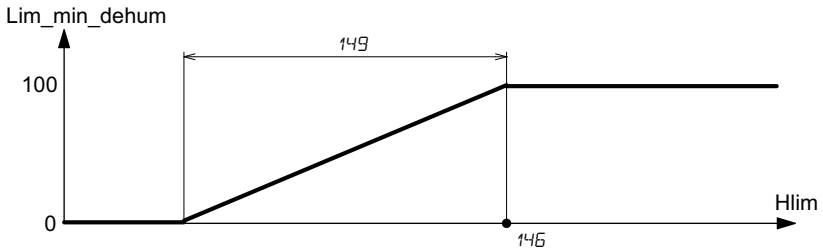
18. Humidity supply limits function

It is possible to take the humidity limits into account for the supply to avoid air that is too humid or too dry to enter into the room. The low and high limits for humidity may be enabled separately, based on the value of the parameters 145 and 147 respectively. The limit sensor is the humidity supply sensor. Pair it with the sensor input AI3 (023=6).
If no humidity supply sensor has been paired with an AI3 input sensor, the limit function is not taken into consideration.

• Low dehumidification limit:

To enable the low limit of dehumidification set the following parameters:
- set the low limit control of humidity145=1,
- pair the supply sensor with the AI3 input: 023=6 and put the JP1 jumper in the “3-2” position
- define the minimum limit setpoint 146 and the humidity limit proportional band 149.

Low limit in dehumidification mode with modulating control:

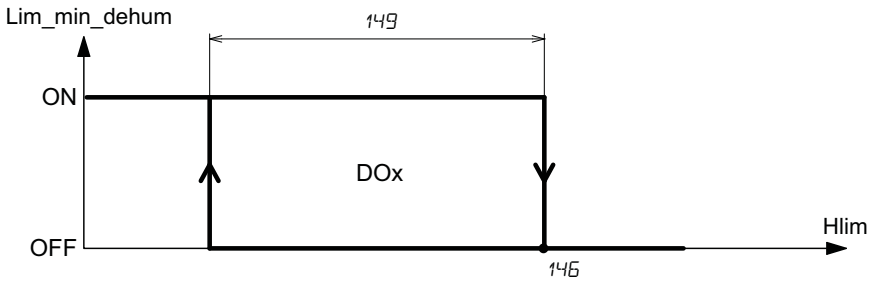


Hlim: Limit supply humidity sensor
Lim_min_dehum.: theoretical value of the low limit output in dehumidification
146*: low limit humidity setpoint*
149*: proportional band for humidity limit*

If the supply humidity falls below the low limit humidity setpoint 146, the modulating dehumidifier is controlled considering the lowest value between the theoretical output of the dehumidification control and the theoretical value of the Lim_min_dehum limit.

Below 146 the ⚠ icon is displayed and on the alarms page, the message LILH is displayed.

Low limit in dehumidification mode with on/off control:



Hlim: Limit supply humidity sensor
Lim_min_dehum.: theoretical value of the lower limit output in dehumidification
146*: low limit humidity setpoint*
149*: proportional band for humidity limit*

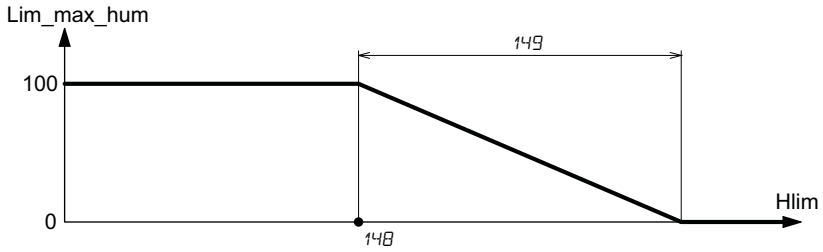
If the supply humidity falls below the low limit humidity setpoint 146 - (proportional band for humidity limit 149), the on/off output in dehumidification mode is controlled considering the lowest value between the theoretical on/off value of the dehumidification control and the theoretical value of the Lim_min_dehum limit.

Below 146 - 149 the ⚠ icon is displayed and on the alarms page, the message LILH is displayed.

• Upper humidification limit:

To enable the high limit of humidification set the following parameters:
- set high limit control of humidity147=1,
- pair the supply humidity sensor with the AI3 input: 023=6 and put the JP1 jumper in the “3-2” position
- define the maximum limit setpoint 148 and the humidity limit proportional band 149.

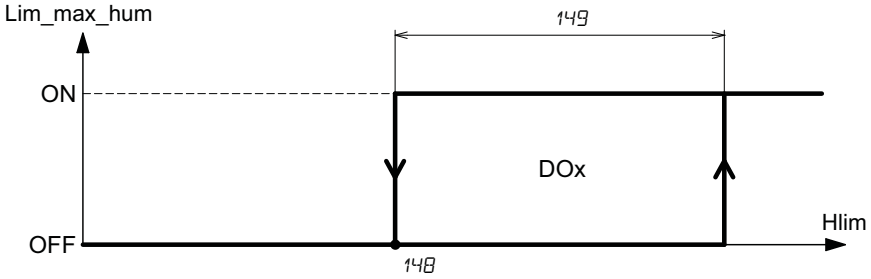
High limit in humidification mode with modulating control:



Hlim: Limit supply humidity sensor
Lim_max_hum: theoretical value of the high limit output in humidification
148*: high limit humidity setpoint*
149*: proportional band for humidity limit*

If the supply humidity goes above the high limit humidity setpoint 148, the modulating humidifier is controlled considering the lowest value between the theoretical output of the humidification control and the theoretical value of the Lim_max_hum limit.
Above 148 the ⚠ icon is displayed and on the alarms page, the message LIHH is displayed.

High limit in humidification mode with on/off control:



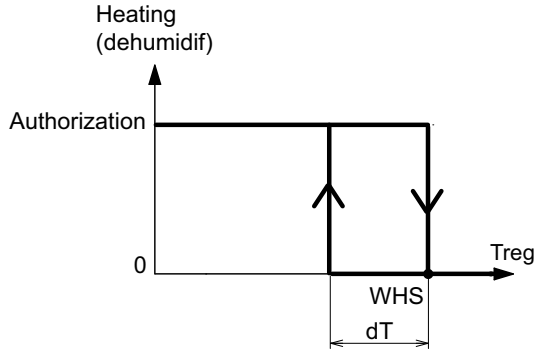
Hlim: Limit supply humidity sensor
Lim_max_hum: theoretical value of the high limit output in humidification
148*: high limit humidity setpoint*
149*: proportional band for humidity limit*

If the humidity supply control goes above the maximum humidity supply setpoint I48 + (humidity limit proportional band I49), the on/off humidification output is controlled considering the lowest value between the theoretical on/off setpoint of the humidification control and the theoretical value of the Lim_max_hum limit.
Above 148 the ⚠ icon is displayed and on the alarms page, the message LIHH is displayed.

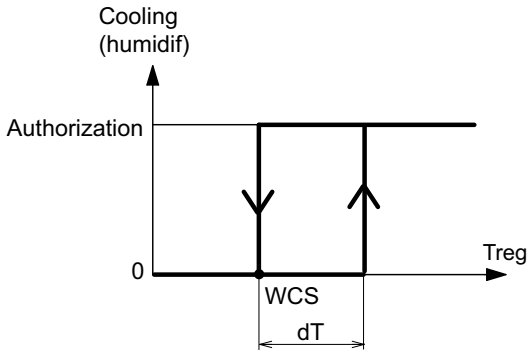
19. Temperature/humidity control priority

Simultaneous requests for:
- heating and humidification or
- cooling and dehumidification,
are not contradictory and can be controlled together.

However, simultaneous requests for:
- heating and dehumidification
- cooling and humidification
are contradictory and cannot be carried out simultaneously A control priority needs to be assigned between the temperature and the humidity, using the parameter 212:
- 212= 0 means the temperature control is prioritized. The control of the temperature is carried out first; when the temperature setpoint is reached then humidity control is started.
To do again temperature regulation, temperature must vary as indicated below:

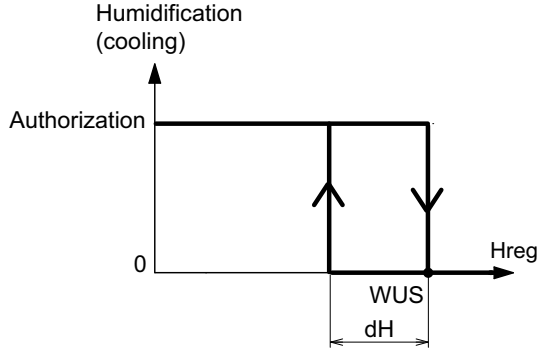


Treg: regulation temperature
WHS: heating operation setpoint
dT: 0.2°C
During dehumidification if Treg < WHS - dT, heating regulation is started and dehumidification regulation stopped till WHS is reached again
.

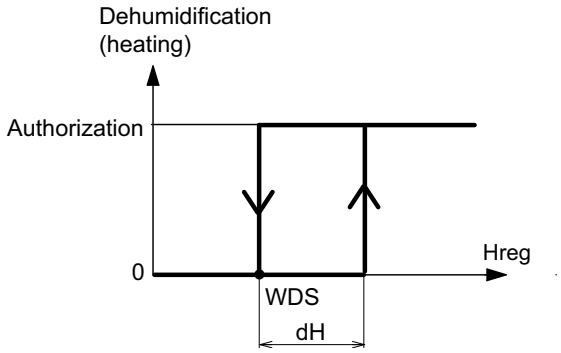


Treg: regulation temperature
WCS: cooling operation setpoint
dT: 0.2°C
During humidification if Treg > WCS + dT, cooling regulation is started and humidity regulation stopped till WCS is reached again.

- 212= 1 means the humidity control is prioritized. The control of the humidity is carried out first; when the humidity setpoint is reached then the temperature control is started.
To do again humidity regulation, humidity must vary as indicated below:



Hreg: regulation humidity
WUS: humidification operation setpoint
dH: 0.2%r.h
During cooling if Hreg < WUS - dH, humidification regulation is started and cooling regulation stopped till WUS is reached.



Hreg: regulation humidity
WDS: dehumidification operation setpoint
dH: 0.2%r.h.
During heating if Hreg > WDS + dH, dehumidification regulation is started and heating regulation stopped till WDS is reached.

The table below shows all the cases that may occur during temperature and/or humidity control.

• Temperature priority, 212=0:

Temperature setpoint not reached:

Temperature request	Humidity request	Heating battery	Cooling/ dehumidification battery	Post-heating battery (*)	Humidifier
Heating	Humidification	ON	OFF	005=0 (post only): OFF	ON
				005=1 (post+integ) ON (controlled in integration through the control sensor and the WHS operating setpoint)	
Heating	Dehumidification	ON	OFF	005=0 (post only): OFF	OFF
				005=1 (post+integ) ON (controlled in integration through the control sensor and the WHS operating setpoint)	
Cooling	Humidification	OFF	ON	OFF	OFF
Cooling	Dehumidification	OFF	007=0: ON (controlled with the max between the cooling request and dehumidification request)	OFF (if cooling request is higher than dehumidification request)	OFF
			007=1 or 2: ON (dehumidification using the modulating or on/off dehumidifier)	ON (if cooling request is higher than dehumidification request, post heating is controlled by the supply sensor and the post-heating setpoint 179)	

(*) if 005=2, the post-heating battery has the function of additional heating battery. It is controlled based on the supply sensor

and the post-heating setpoint 179 independently of the priority.

Temperature setpoint reached, control of humidity:

Temperature request	Humidity request	Heating battery	Cooling/ dehumidification battery	Post-heating battery	Humidifier
Heating achieved	Humidification	OFF	OFF	OFF	ON
Heating achieved	Dehumidification	OFF	007=0: ON (controlled by the dehumidification signal)	ON (controlled by the supply sensor and post-heating sensor179)	OFF
			007=1 or 2: ON (dehumidification using the modulating or on/off dehumidifier)		
Cooling achieved	Humidification	OFF	OFF	OFF	ON
Cooling achieved	Dehumidification	OFF	007=0: ON (controlled by the dehumidification signal)	ON (controlled by the supply sensor and the post setpoint 179)	OFF
			007=1 or 2: ON (dehumidification using the modulating or on/off dehumidifier)		

(*) if 005=2, the post-heating battery has the function of additional heating battery. It is controlled based on the supply sensor and the post-heating setpoint 179 independently of the priority.

• Priority humidity, 212=1:

Humidity setpoint not reached:

Temperature request	Humidity request	Heating battery	Cooling/ dehumidification battery	Post-heating battery	Humidifier
Heating	Humidification	OFF	OFF	OFF	ON
Heating	Dehumidification	OFF	007=0: ON (controlled by the dehumidification signal)	ON (controlled by the supply sensor and the post-heating setpoint 179)	OFF
			007=1: ON (dehumidification using the modulating or on/off dehumidifier)		
Cooling	Humidification	OFF	OFF	OFF	ON
Cooling	Dehumidification	OFF	007=0: ON (controlled with the max between the cooling request and dehumidification request)	OFF (if cooling request is higher than dehumidification request)	OFF
			007=1: ON (dehumidification using the modulating or on/off dehumidifier).	ON (if cooling request is higher than dehumidification request, post heating is controlled by the supply sensor and the post-heating setpoint 179)	

Humidity setpoint reached, temperature control:

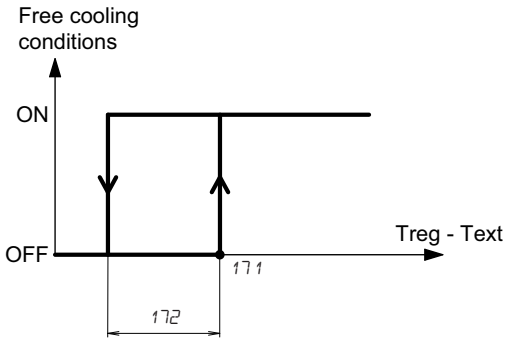
Temperature request	Humidity request	Heating battery	Cooling/ dehumidification battery	Post-heating battery	Humidifier
Heating	Humidification achieved	ON	OFF	005=0 (post only): OFF	OFF
				005=1 (post+integ) ON (controlled in integration through the control sensor and the WHS operating setpoint)	
Heating	Dehumidification achieved	ON	OFF	005=0 (post only): OFF	OFF
				005=1 (post+integ) ON (controlled in integration through the control sensor and the WHS operating setpoint)	
Cooling	Humidification achieved	OFF	007=0: ON (temperature-controlled)	OFF	OFF
			007=1 or 2: OFF (dehumidification using the modulating or on/off dehumidifier)		
Cooling	Dehumidification achieved	OFF	ON (controlled by temperature).	OFF	OFF
			007=1 or 2: OFF (dehumidification using the modulating or on/off dehumidifier)		

20. Free cooling/heating conditions

Free cooling and/or heating operation allows you to cool or heat while saving energy, by means of a damper, when environmental conditions are favourable in case of cooling or heating request.

• Free cooling conditions:

Set the following parameters:
-170=1 or 3 (enabling of free cooling operation indipendently of working season) or 170=4 or 6 (enabling of free cooling operation only in cooling mode).
- do regulation based on the room sensor (internal or remote) 001=0;
if a remote room sensor is used, set an analogue input as a remote sensor 019=1 (AI1) or 021=1 (AI2) 023=1 (AI3),
- configure an analogue input as an external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- select a controlled damper 010≠0,
- control the selected damper on free cooling 011=1 or 2,



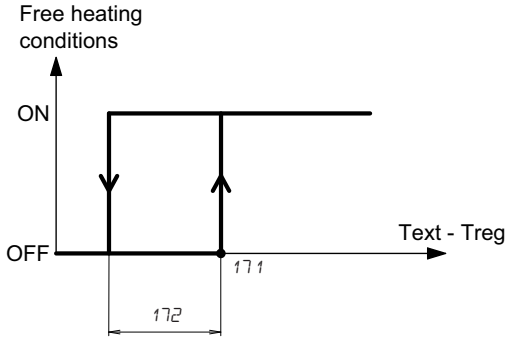
Treg: room control or return temperature
Text: external temperature
171*: setpoint differential for free cooling/heating*
172*: proportional band for free cooling/heating*

In order to be able to have the free cooling conditions, the following 4 conditions must be checked
Text >= 174
Treg >= 175
(Treg - Text) < 173
(Treg - Text) > 171

If (Treg - Text) <= 171 -172 now the free cooling conditions are OFF.

• Free heating conditions:

In order to have the free heating conditions, the following parameters must be set:
- 170=2 or 3 (enabling of free heating operation indipendently of working season) or 170=5 or 6 (enabling of free heating operation only in heating mode)
- do regulation based on the room sensor (internal or remote) 001=0;
in the case of a remote room sensor, set an analogue input as a remote sensor 019=1 (AI1) or 021=1 (AI2) 023=1 (AI3),
- configure an analogue input as an external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- select a controlled damper 010≠0,
- control the selected damper on free heating 011=1 or 2.



Treg: room control or return temperature
Text: external temperature
171*: setpoint differential for free cooling/heating*

172*: proportional band for free cooling/heating*

In order to have the free heating conditions ON, the following 4 conditions must be checked
Text <= 176
Treg <= 177
(Text - Treg) < 173
(Text - Treg) > 171

If (Text - Treg) <= 171 -172 now the free heating conditions are OFF.

If damper used is on/off regulated type (010=1) or modulated type(010=3), when conditions of free cooling/heating are present and there is a cooling/heating request, the request is divided on 2 bands. The first band regulates the dampers by free cooling/heating, the second band the cooling/heating battery(ies)
The presence of cooling battery during free cooling or the presence of heating battery during free heating is mandatory, otherwise damper remains on minimum opening position and is not regulated.

If damper used is on/off bypass for heat exchanger type (010=2) or modulated bypass for heat exchanger type(010=4), when conditions of free cooling/heating are present and there is a cooling/heating request, the request is divided on 2 bands. The first band regulates the dampers by free cooling/heating, the second band the cooling/heating battery(ies).
If cooling battery is not present during free cooling or if heating battery is not present during free heating, the damper is regulated in any case during cooling/heating request.

if the damper used is bypass for heat exchanger (based only on free heating/cooling, 010=5), the damper is regulated based on free cooling/heating regardless of cooling/heating request and of the presence of heating/cooling battery(ies).

During regulation of damper on free heating icon is switched on and icon flashes.

During regulation of damper on free cooling icon is switched on and icon flashes.

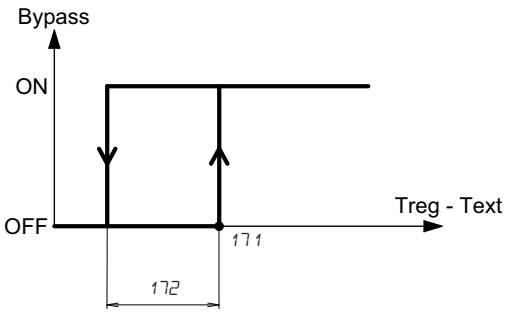
Note: If the frost protection alarm occurs, if the appliance is switched off, if the room sensor or external sensor is broken, free cooling/heating is disabled.
In case of regulation on supply sensor without considering room sensor, free cooling/heating is disabled. A 1-speed on/off fan or a fan with several on/off speeds or a supply modulating fan must be present.

21. Regulation with free cooling, free heating

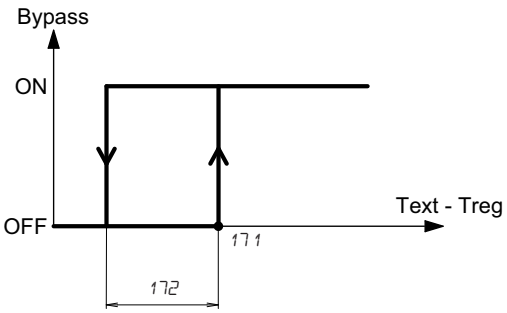
• Operation with on/off bypass damper for cross-flow heat exchanger

if the damper used is bypass for heat exchanger (based only on free heating/cooling, 010=5), the damper is regulated directly with free cooling and/or heating conditions defined in the previous paragraph, regardless request of cooling and/or heating.
The following settings must be done:
-170=1 or 3 (authorization of free cooling regardless the working season), or 170=4 or 6 (authorization of free cooling in cooling mode only), or 170=2 or 3 (authorization of free heating regardless the working season), or 170=5 or 6 (authorization of free heating in heating mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- set a digital output as on/off bypass for heat exchanger (based only on free c/h): 025=20 (DO1) or 026=20 (DO2) or 027=20 (DO3) or 028=20 (DO4) or 029=20 (DO5), action on damper 011=1,
- set the type of heat exchanger to cross-flow heat exchanger 012=1.

Free cooling:



Free heating



Treg: room control or return temperature
Text: external temperature
171*: differential setpoint for free cooling/heating*
172*: proportional band for free cooling/heating*

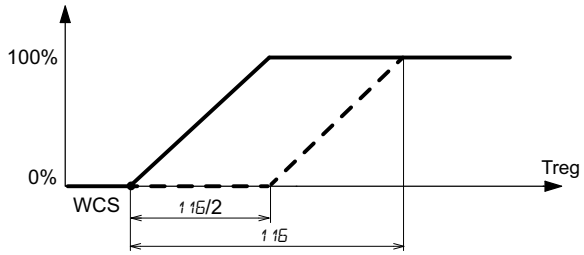
Using the free cooling conditions:
Text >= 174
Treg >= 175
(Treg - Text) < 173
If (Treg - Text) > 171 -> the bypass damper is activated (open).
If (Treg - Text) <= 172 the bypass damper is disabled (closed).

Using the free heating conditions:
Text <= 176
Treg <= 177
(Text - Treg) < 173
If (Text - Treg) > 171 the bypass damper is activated (open).
If (Text - Treg) <= 172 the bypass damper is disabled (closed).

• Cooling operation using free cooling:

Operation with modulating damper and modulating cooling valve:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the working season), or 170=4 or 6 (authorization of free cooling in cooling mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external modulating damper regulated on free c/h: 010=3, 011=1 or 2 and 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3),
or modulating bypass for heat exchanger 010=4, 011=1 and 012=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).
- modulating cooling valve 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3)
or modulating mixed-use cooling valve 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).

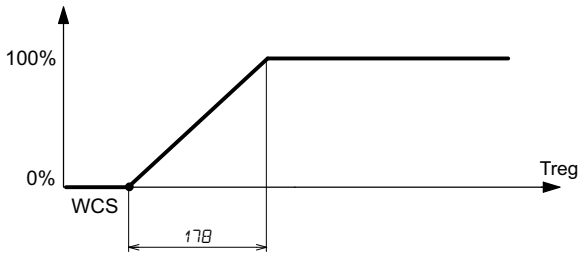


Treg: control temperature
WCS: cooling operation setpoint
116*: cooling proportional band*
solid curve: modulating damper output
dashed curve: modulating cooling valve output

If the control temperature rises above WCS, the modulating damper in the presence of free cooling conditions goes from the minimum opening position (parameter164) to the maximum opening position (parameter 165) in the band defined by the parameter 116/2.
The valve changes position from closed to open when Treg change from (WCS + 116/2) to (WCS + 116).

Operation with bypass modulating damper without cooling valve:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the working season), or 170=4 or 6 (authorization of free cooling in cooling mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- modulating bypass for heat exchanger 010=4, 011=1 and 012=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).

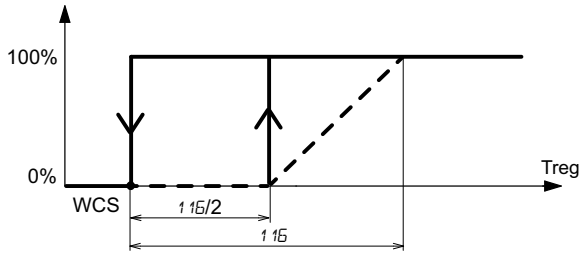


Treg: control temperature
WCS: cooling operation setpoint
178 *Hysteresis regulation free heating/cooling*

If temperature of regulation sensor rises above WCS, the modulating damper in the presence of free cooling conditions goes from the minimum opening position (parameter164) to the maximum opening position (parameter 165) in the band defined by the parameter 178.

Operation with on/off damper and cooling modulating valve:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the working season), or 170=4 or 6 (authorization of free cooling in cooling mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external on/off damper controlled by free cooling/heating: 010=1 and 011=1 or 2, 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5),
- modulating cooling valve 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3) or modulating mixed-use valve in cooling 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).

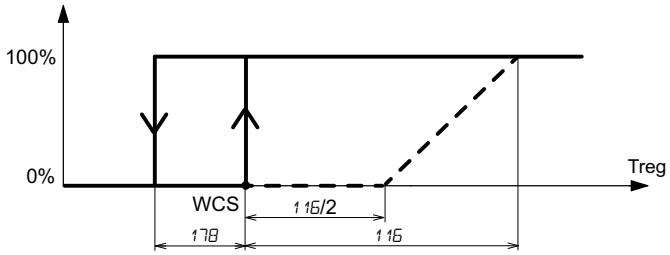


Treg: control temperature
WCS: cooling operation setpoint
116*: cooling proportional band*
solid curve: on/off damper output
dashed curve: modulating cooling valve output

In the presence of free cooling conditions:
If Treg > (WCS + 116/2) the on/off damper controlled by the free cooling is activated.
If Treg <= WCS the on/off damper controlled by the cooling is disabled.
The valve changes position from closed to open when Treg change from (WCS + 116/2) to (WCS + 116).

Operation with on/off bypass damper and cooling modulating valve:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the working season), or 170=4 or 6 (authorization of free cooling in cooling mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- on/off bypass damper for heat exchanger 010=2, 011=1 and 012=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- modulating cooling valve 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3) or modulating mixed-use valve in cooling 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).



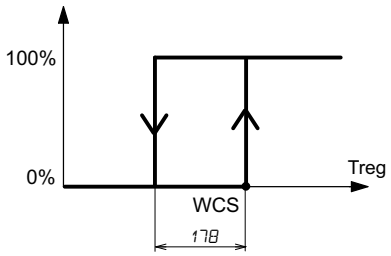
Treg: control temperature
WCS: cooling operation setpoint
116*: cooling proportional band*
178 *Hysteresis regulation free heating/cooling*
solid curve: on/off damper output
dashed curve: modulating cooling valve output

With free cooling conditions:
If Treg > WCS the on/off bypass damper regulated on free cooling is activated.
If Treg <= (WCS - 178) the on/off bypass damper regulated on free cooling is deactivated.

The valve changes position from closed to open when Treg change from (WCS + 116/2) to (WCS + 116).

Operation with on/off bypass damper without cooling valve:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the working season), or 170=4 or 6 (authorization of free cooling in cooling mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- on/off bypass damper for heat exchanger 010=2, 011=1 and 012=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),

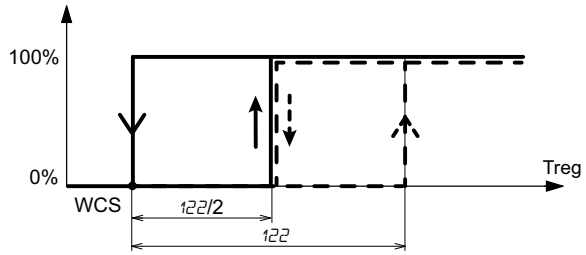


Treg: control temperature
WCS: cooling operation setpoint
178 *Hysteresis regulation free heating/cooling*

With free cooling conditions:
If Treg > WCS the on/off bypass damper regulated on free cooling is activated.
If Treg <= (WCS - 178) the on/off bypass damper regulated on free cooling is deactivated.

Operation with on/off damper and on/off cooling valve:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the working season), or 170=4 or 6 (authorization of free cooling in cooling mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external on/off damper controlled by free cooling/heating: 010=1 and 011=1 or 2, 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5),
- on/off cooling valve 003=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5),
or on/off mixed-use valve in cooling 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5).

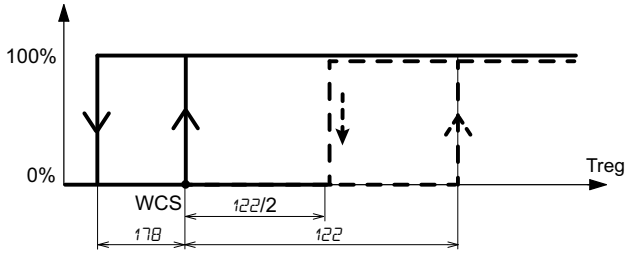


Treg: control temperature
WCS: cooling operation setpoint
122*: hysteresis for on/off output*
solid curve: on/off damper output
dashed curve: on/off cooling valve output

In the presence of free cooling conditions:
if Treg > (WCS + 122/2) the on/off damper is activated.
if Treg <= WCS the damper is deactivated.
if Treg > (WCS + 122) the cooling valve is activated.
if Treg <= (WCS + 122/2) the cooling valve is deactivated.

Operation with on/off bypass damper and on/off cooling valve:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the working season), or 170=4 or 6 (authorization of free cooling in cooling mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- on/off bypass damper for heat exchanger 010=2, 011=1 and 012=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- on/off cooling valve 003=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5),
or on/off mixed-use valve in cooling 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5).

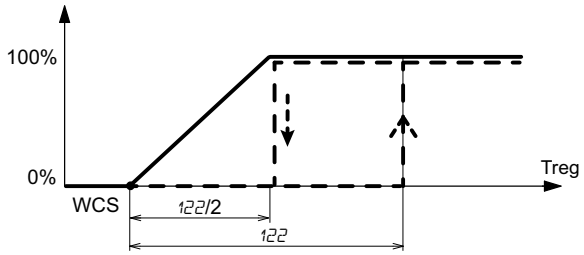


Treg: control temperature
WCS: cooling operation setpoint
122*: hysteresis for on/off output*
178 *hysteresis regulation free heating/cooling*
solid curve: on/off damper output
dashed curve: modulating cooling valve output

In the presence of free cooling conditions:
if Treg > WCS the on/off damper is activated.
if Treg <= (WCS - 178) the damper is deactivated.
if Treg > (WCS + 122) the cooling valve is activated.
if Treg <= (WCS + 122/2) the cooling valve is deactivated.

Operation with modulating damper and on/off cooling valve:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the working season), or 170=4 or 6 (authorization of free cooling in cooling mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external modulating damper regulated on free c/h: 010=3, 011=1 or 2 and 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3),
or modulating bypass for heat exchanger 010=4, 011=1 and 012=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).
- on/off cooling valve 003=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5),
or on/off mixed-use valve in cooling 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5).



Treg: control temperature
WCS: cooling operation setpoint
122*: hysteresis for on/off output*
solid curve: modulating damper output
dashed curve: on/off cooling valve output

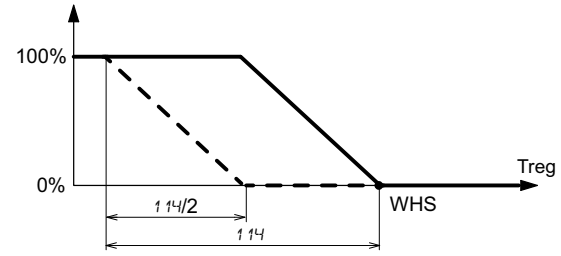
If temperature of regulation sensor rises above WCS, the modulating damper in the presence of free cooling conditions goes from the minimum opening position (parameter164) to the maximum opening position (parameter 165) in the band defined by

the parameter 122/2.
if Treg > (WCS + 122) the cooling valve is activated.
if Treg <= (WCS + 122/2) the cooling valve is deactivated.

• Heating operation using free heating:

Operation with modulating damper and modulating heating valve:

Do following settings:
-170=2 or 3 (authorization of free heating regardless the working season), or 170=5 or 6 (authorization of free heating in heating mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external modulating damper regulated on free c/h: 010=3, 011=1 or 2 and 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3),
or modulating bypass for heat exchanger 010=4, 011=1 and 012=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).
- modulating heating valve 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3)
or modulating mixed-use valve in heating 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3)
or modulating electrical resistance 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3)

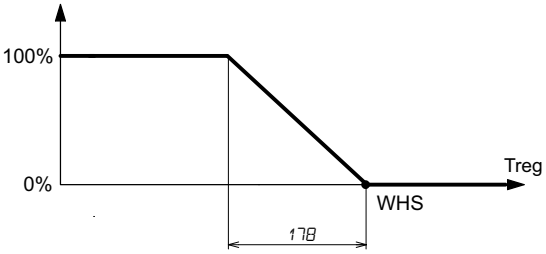


Treg: control temperature
WHS: heating operation setpoint
114*: heating proportional band*
solid curve: modulating damper output
dashed curve: modulating heating valve output

If the control temperature drops below WHS, the modulating damper in the presence of free heating conditions goes from the minimum opening position (parameter164) to the maximum opening position (parameter 165) in the band defined by the parameter 114/2.
The valve changes position from closed to open when Treg change from (WHS - 114/2) to (WHS - 114).

Operation with modulating bypass damper without heating valve

Do following settings:
-170=2 or 3 (authorization of free heating regardless the working season), or 170=5 or 6 (authorization of free heating in heating mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- serranda modulante bypass per recuperatore 010=4, 011=1 and 012=1 and 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).

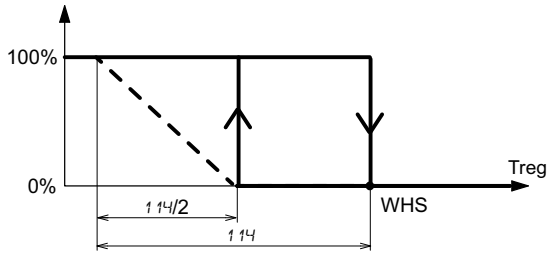


Treg: control temperature
WHS: heating operation setpoint
178 *hysteresis regulation free heating/cooling*

If the control temperature drops below WHS, the modulating bypass damper in the presence of free heating conditions goes from the minimum opening position (parameter164) to the maximum opening position (parameter 165) in the band defined by the parameter 178.

Operation with on/off damper and modulating heating valve:

Do following settings:
-170=2 or 3 (authorization of free heating regardless the working season), or 170=5 or 6 (authorization of free heating in heating mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external on/off damper controlled by free cooling/heating: 010=1 and 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5),
- modulating heating valve 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3)
or modulating mixed-use valve in heating 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3)
or modulating electrical resistance 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3)

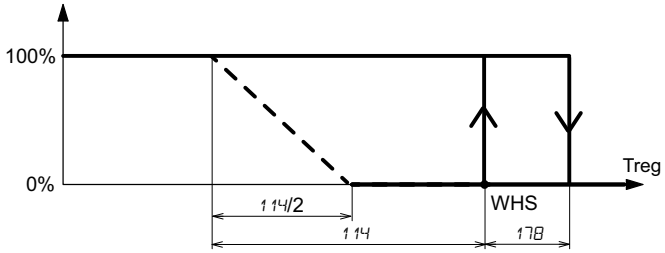


Treg: control temperature
WHS: heating operation setpoint
114*: heating proportional band*
solid curve: on/off damper output
dashed curve: modulating heating valve output

In the presence of free heating conditions:
If Treg < (WHS - 114/2) the on/off damper is activated.
If Treg >= WHS the damper is disabled.
The valve changes position from closed to open when Treg change from (WHS - 114/2) to (WHS - 114).

Operation with on/off bypass damper and modulating heating valve:

Do following settings:
-170=2 or 3 (authorization of free heating regardless the working season), or 170=5 or 6 (authorization of free heating in heating mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- on/off bypass damper for heat exchanger 010=2, 011=1 and 012=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- modulating heating valve 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3)
or modulating mixed-use valve in heating 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3)
or modulating electrical resistance 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3)

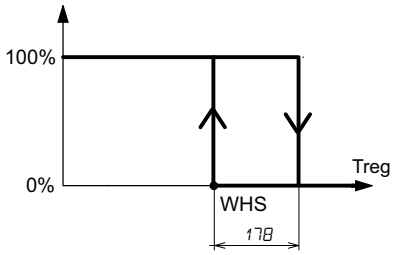


Treg: control temperature
WHS: heating operation setpoint
114*: heating proportional band*
178 *Hysteresis regulation free heating/cooling*
solid curve: on/off damper output
dashed curve: modulating heating valve output

In the presence of free heating conditions:
If Treg < WHS the on/off damper is activated.
If Treg >= (WHS + 178) the damper is disabled.
The valve changes position from closed to open when Treg change from (WHS - 114/2) to (WHS - 114).

Operation with on/off bypass damper without heating valve:

Do following settings:
-170=2 or 3 (authorization of free heating regardless the working season), or 170=5 or 6 (authorization of free heating in heating mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- on/off bypass damper for heat exchanger 010=2, 011=1 and 012=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),

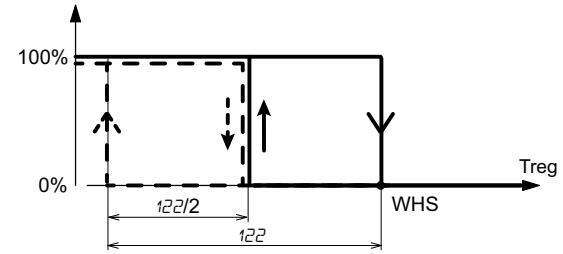


Treg: control temperature
WHS: heating operation setpoint
178 *Hysteresis regulation free heating/cooling*

In the presence of free heating conditions:
If Treg < WHS the on/off damper is activated.
If Treg >= (WHS + 178) the damper is disabled.

Operation with on/off damper and on/off heating valve:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the working season), or 170=4 or 6 (authorization of free cooling in cooling mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external on/off damper controlled by free cooling/heating: 010=1 and 011=1 or 2, 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5),
- heating valve on/off 002=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5)
or electrical resistance on/off 002=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)
or on/off mixed-use valve in heating 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5)

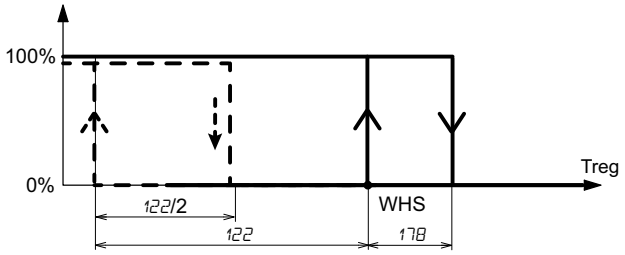


Treg: control temperature
WHS: heating operation setpoint
122*: hysteresis for on/off output*
solid curve: on/off damper output
dashed curve: on/off heating valve output

In the presence of free heating conditions:
If Treg < (WHS - 122/2) the on/off damper is activated.
If Treg >= WHS the damper is disabled.
If Treg < (WHS - 122) the on/off valve is activated.
If Treg >= (WHS -122/2) the on/off valve is disabled.

Operation with on/off bypass damper and on/off heating valve:

Do following settings:
-170=2 or 3 (authorization of free heating regardless the working season), or 170=5 or 6 (authorization of free heating in heating mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- on/off bypass damper for heat exchanger 010=2, 011=1 and 012=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- heating valve on/off 002=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5)
or electrical resistance on/off 002=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)
or on/off mixed-use valve in heating 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5)

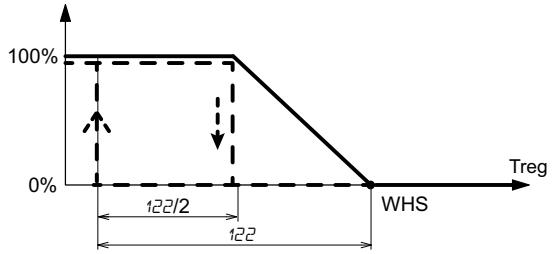


Treg: control temperature
WHS: heating operation setpoint
122*: hysteresis for on/off output*
178 *Hysteresis regulation free heating/cooling*
solid curve: on/off damper output
dashed curve: on/off heating valve output

In the presence of free heating conditions:
If Treg < WHS the on/off damper is activated.
If Treg >= (WHS + 178) the damper is disabled.
If Treg < (WHS - 122) the valve is activated.
If Treg >= (WHS - 122/2) the valve is deactivated.

Operation with modulating damper and on/off heating valve:

Do following settings:
170=2 or 3 (authorization of free heating regardless the working season), or 170=5 or 6 (authorization of free heating in heating mode only),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external modulating damper regulated on free c/h: 010=3, 011=1 or 2 and 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3),
or modulating bypass for heat exchanger 010=4, 011=1 and 012=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).
- heating valve on/off 002=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5)
or electrical resistance on/off 002=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)
or on/off mixed-use valve in heating 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5)



Treg: control temperature
WCS: heating operation setpoint
122*: hysteresis for on/off output*
solid curve: modulating damper output
dashed curve: on/off heating valve output

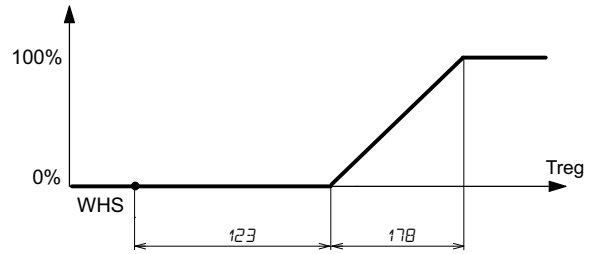
If the control temperature drops below WHS, the modulating damper in the presence of free heating conditions goes from the minimum opening position (parameter 164) to the maximum opening position (parameter 165) in the band defined by the parameter 122/2.
If Treg < (WHS - 122) the on/off valve is activated.
If Treg >= (WHS -122/2) the on/off valve is disabled.

• Free cooling in winter:

In some cases, it may be necessary to cool a room even in the heating season when, for example, a place is very crowded and the temperature rises too high.

Operation with modulating damper:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the season),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external modulating damper regulated on free c/h: 010=3, 011=1 or 2 and 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3),
or modulating bypass for heat exchanger 010=4, 011=1 and 012=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).



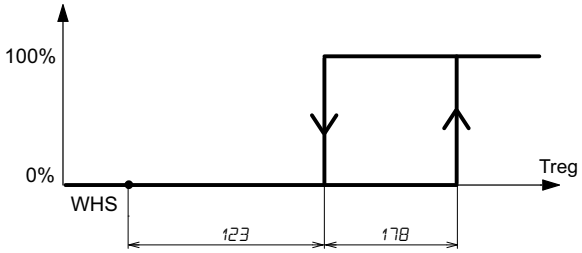
Treg: control temperature
WHS: heating operation setpoint
123*: neutral zone*
178*: hysteresis for control of free heating/cooling*

If the control temperature rises above WHS + 123, the modulating damper in the presence of free cooling goes from the minimum opening position (parameter164) to the maximum opening position (parameter 165) in the band defined by the parameter 178.

Note: if external modulating damper is used, the presence of the heating battery is mandatory:
heating valve on/off 002=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5),
or electrical resistance on/off 002=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5),
or on/off mixed-use valve in heating 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5),
or modulating heating valve 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3),
or modulating mixed-use valve in heating 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3),
or modulating electrical resistance 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3).
If modulating bypass damper for heat exchanger is used, the presence of the heating battery is not mandatory.

Operation with on/off damper:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the season),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external on/off damper controlled by free cooling/heating: 010=1 and 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5),



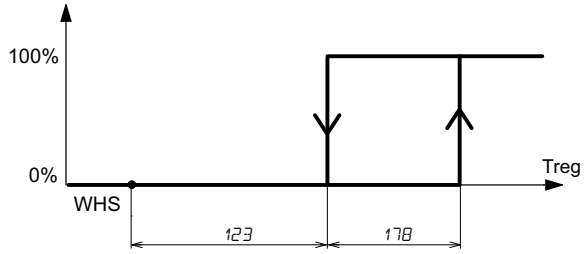
Treg: control temperature
WHS: heating operation setpoint
123*: neutral zone*
178*: hysteresis for control of free heating/cooling*

In the presence of free cooling conditions:
If Treg > (WHS + 123 + 178) the on/off damper is activated.
If Treg <= (WHS + 123) the damper is disabled.

Note: the presence of the heating battery is mandatory:
heating valve on/off 002=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5),
or electrical resistance on/off 002=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5),
or on/off mixed-use valve in heating 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5),
or modulating heating valve 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3),
or modulating mixed-use valve in heating 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3),
or modulating electrical resistance 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3).

Operation with on/off bypass damper:

Do following settings:
-170=1 or 3 (authorization of free cooling regardless the season),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- on/off bypass damper for heat exchanger 010=2, 011=1 and 012=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),



Treg: control temperature
WHS: heating operation setpoint
122*: neutral zone*
178 *hysteresis regulation free heating/cooling*

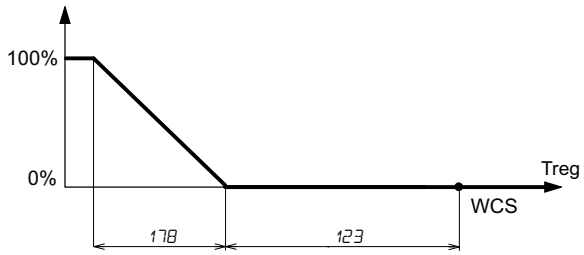
In the presence of free cooling conditions:
If Treg > (WHS + 123 + 178) the on/off bypass damper is activated.
If Treg <= (WHS + 123) the damper is disabled.

Note: the presence of the heating battery is not mandatory.

• Free heating in the summer:

Operation with modulating damper:

Do following settings:
-170=2 or 3 (authorization of free heating regardless the season),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external modulating damper regulated on free c/h: 010=3, 011=1 or 2 and 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3),
or modulating bypass for heat exchanger 010=4, 011=1 and 012=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).



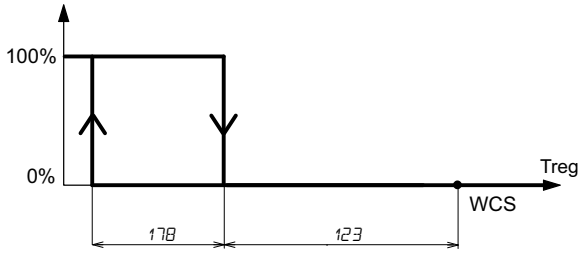
Treg: control temperature
WCS: cooling operation setpoint
123*: neutral zone*
178*: hysteresis for control of free heating/cooling*

If the control temperature drops below WCS - 123, the modulating damper in the presence of free heating goes from the minimum opening position (parameter164) to the maximum opening position (parameter 165) in the band defined by the parameter 178.

Note: if external modulating damper is used, the presence of the cooling battery is mandatory:
on/off cooling valve 003=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5),
or on/off mixed-use valve in cooling 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5),
or modulating cooling valve 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3),
or modulating mixed-use cooling valve 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).
if modulating bypass damper is used, the presence of the cooling battery is not mandatory

Operation with on/off damper:

Do following settings:
-170=2 or 3 (authorization of free heating regardless the season),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- external on/off damper controlled by free cooling/heating: 010=1 and 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5),



Treg: control temperature
WCS: cooling operation setpoint
123*: neutral zone*
178*: hysteresis for control of free heating/cooling*

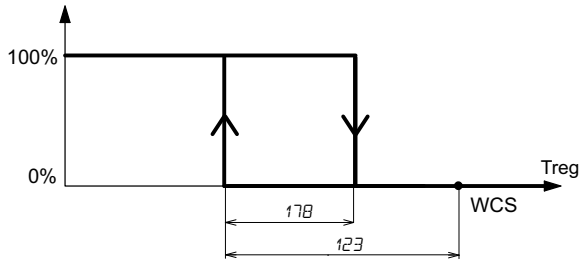
In the presence of free heating conditions:
If Treg < (WCS - 123 - 178) the on/off damper is activated.
If Treg >= (WHS - 123) the damper is disabled.

Note: the presence of the cooling battery is mandatory:

on/off cooling valve 003=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5),
or on/off mixed-use valve in cooling 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5),
or modulating cooling valve 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3),
or modulating mixed-use cooling valve 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).

Operation with on/off bypass:

Do following settings:
-170=2 or 3 (authorization of free heating regardless the season),
- do the regulation on room sensor (internal or remote sensor) 001=0;
in case the remote sensor is used set an analogue input as remote sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)),
- set an analogue input as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3),
- on/off bypass damper for heat exchanger 010=2, 011=1 and 012=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),



Treg: control temperature
WCS: cooling operation setpoint
122*: neutral zone*
178 *hysteresis regulation free heating/cooling*

In the presence of free heating conditions:
If Treg < (WCS - 123) the on/off bypass damper is activated.
If Treg >= (WCS - 123 + 178) the damper is disabled.

Note: the presence of the cooling battery is not mandatory.

22. Operating mode of the fans

The controller can control up to 2 modulating 0..10 V fans (supply and extract) or an on/off type fan with one, two or three speeds. If ventilation is not controlled by the regulator but is present on the plant, set parameter 008 to 5. By this way functions that require the presence of ventilation will be authorized to work

• On/off type fans with one, two or three speeds:

To select the operation with a single-speed on/off fan, set the parameter 008=1 and one of the digital outputs 025=1 (DO1) or 026=1 (DO2) or 027=1 (DO3) or 028=1 (DO4) or 029=1 (DO5) for speed 1.

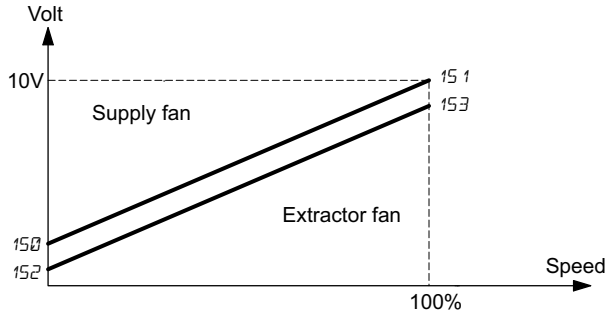
To select the operation with two-speed on/off fan, set the parameter 008=2, and two digital outputs corresponding to the first and second speed:
025=1 (DO1) or 026=1 (DO2) or 027=1 (DO3) or 028=1 (DO4) or 029=1 (DO5) for speed 1,
025=2 (DO1) or 026=2 (DO2) or 027=2 (DO3) or 028=2 (DO4) or 029=2 (DO5) for speed 2.

To select the operation with three-speed on/off fan, set the parameter 008=3, and three digital outputs corresponding to the first, second and third speed:
025=1 (DO1) or 026=1 (DO2) or 027=1 (DO3) or 028=1 (DO4) or 029=1 (DO5) for speed 1,
025=2 (DO1) or 026=2 (DO2) or 027=2 (DO3) or 028=2 (DO4) or 029=2 (DO5) for speed 2,
025=3 (DO1) or 026=3 (DO2) or 027=3 (DO3) or 028=3 (DO4) or 029=3 (DO5) for speed 3.

• Modulating fans:

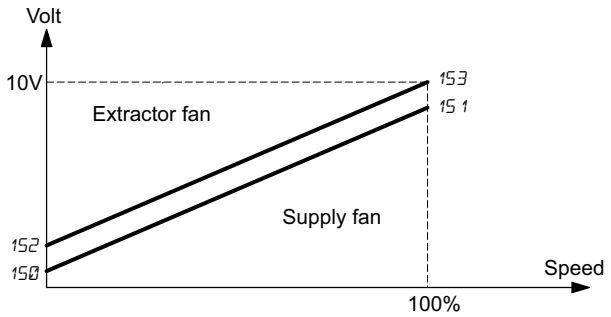
To select the operation with modulating fans, set the parameter 008=4:
a modulating output for the supply fan 030=1 (AO1) or 031=1 (AO2) or 032=1 (AO3) and/or
a modulating output for the extractor fan 030=2 (AO1) or 031=2 (AO2) or 032=2 (AO3).
If you need a digital output to enable the supply or extractor fan, set 025=19 (DO1) or 026=19 (DO2) or 027=19 (DO3) or 028=19 (DO4) or 029=19 (DO5).
In case of the presence of the supply fan, set the minimum and maximum voltage applicable with the parameters 150 , 151.
In case of the presence of the extractor fan, set the minimum and maximum voltage applicable with the parameters 152, 153.
If the supply and extractor fans do not have the same minimum and maximum voltage, overpressure or negative pressure may be created in the room.

- application with overpressure in the room:



150*: minimum supply fan voltage*
151*: maximum supply fan voltage*
152*: minimum extractor fan voltage*
153*: maximum extractor fan voltage*

- application with underpressure in the room:



150*: minimum supply fan voltage*
151*: maximum supply fan voltage*
152*: minimum extractor fan voltage*
153*: maximum extractor fan voltage*

Based on the value of the parameter 009, the type of fan control can then be selected:
009 = 0 for manual control,
009 = 1 for control based on CO_2,
009 = 2 for control based on the temperature (between minimum and maximum speed),
009 = 3 for on/off control based on the temperature,
009 = 4 for control based on temperature and CO_2,
009 = 5 for control of the differential pressure (only for modulating fans).
When the device is switched on, the fan starts up after the start-up delay has elapsed 159, whilst when the device is switched off, it actually switches off after the ventilation switch-off delay has elapsed 160.

Manual control of speed (009=0):

The fans operate at a fixed speed that is selected manually. To select the speed, proceed as follows:

press the ESC button and the ✣ icon is displayed together with the indicator of the fan operating mode on display B.

Press the ESC button one or more times to select the speed of the fan in the case of on/off fans with multiple speeds or modulating fans (008=2 or 3 or 4):

M SPE1= control with speed 1,
M SPE2 = control with speed 2,
M SPE3=Control with speed 3.

The selection made is saved automatically.

To exit the menu, wait 4 seconds until display B stops flashing.

Note: In case of operation without a fan (008=0), pressing the ESC button has no effect.

If using modulating fans, speeds 1, 2 and 3 correspond to 3 percentage levels of the motor speed variation field. To configure these parameters, set the parameters 154, 155, 156 for the speeds 1, 2 or 3 respectively.
The parameters 150, 151 allow you to select the minimum and maximum voltage of the supply fan (supply fan speed variation field).
The parameters 152, 153 allow you to select the minimum and maximum voltage of the extractor fan (extractor fan speed variation field).

For the supply fan, the manual speeds are calculated as follows:
speed 1=[(154 / 100) x (151 - 150)] + 150
speed 2=[(155 / 100) x (151 - 150)] + 150
speed 3=[(156 / 100) x (151 - 150)] + 150

For the extractor fan, the manual speeds are calculated as follows:
speed 1=[(154 / 100) x (153 - 152)] + 152
speed 2=[(155 / 100) x (153 - 152)] + 152
speed 3=[(156 / 100) x (153 - 152)] + 152

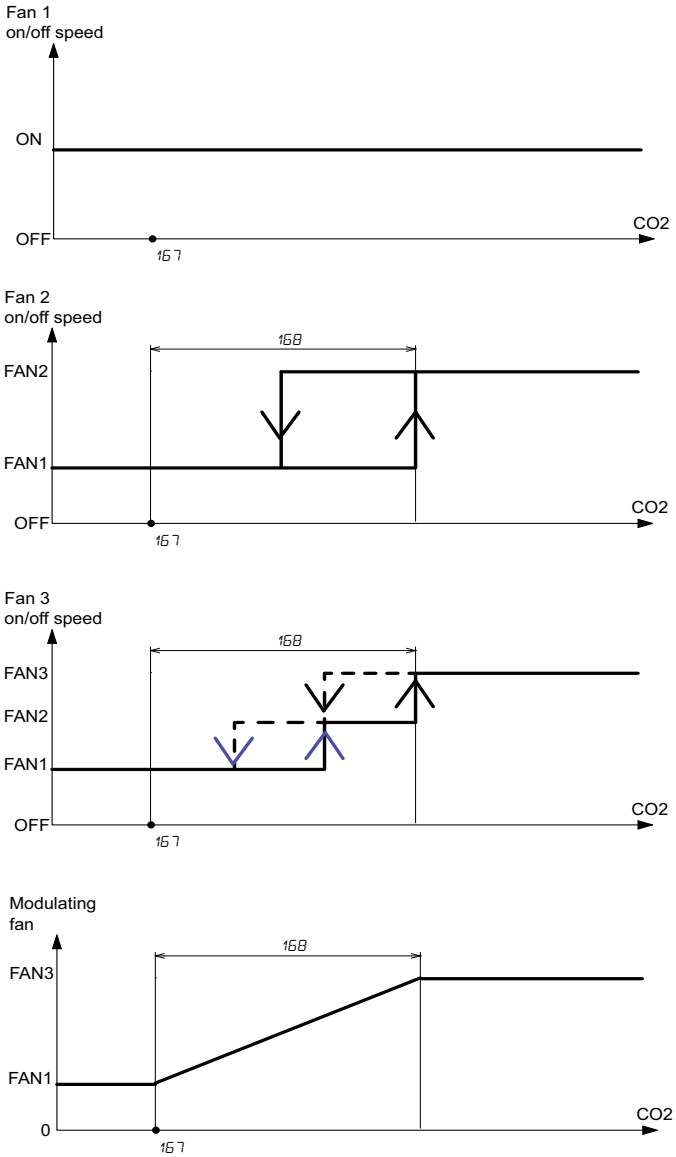
Control of speed based on CO_2 (009=1):

In some situations in which rooms are crowded, it is necessary to regulate the air quality to ensure the air is renewed when the CO_2 concentration exceeds a given threshold.

To control the speed of the fan based on the CO_2, set the parameter 009 to 1.
Configure 023=5 and position jumper JP1 in position “3-2”; the input sensor AI3 is automatically configured as input 0..10 V for air quality; the corresponding scale is set at 0..2000 ppm (206=0 and 207=2000) with the unit of measurement (208=0).

Then define the parameters of the PI controller for reduction of CO_2 (167: setpoint 168: proportional band and 169: integral time).

Depending on the type of fan, they will work according to the following chart:



167 *air exchange setpoint*
168 *air exchange proportional band*
*VEL1: speed 1= [(*154 */ 100) x (*151 - 150*)]* + 150 *for the supply and =[(*154 */ 100) x (*153 - 152*)]* + 152 *for the extraction.*
*VEL2: speed 2= [(*155 */ 100) x (*151 - 150*)]* + 150 *for the supply and =[(*155 */ 100) x (*153 - 152*)]* + 152 *for the extraction.*
*VEL3: speed 3= [(*156 */ 100) x (*151 - 150*)]* + 150 *for the supply and =[(*156 */ 100) x (*153 - 152*)]* + 152 *for the extraction.*

For the two-speed fan:
if CO_2 <= 167,speed 1 is ON, and if CO_2 increases when CO_2 > (167 + 168), speed 2 is ON,
if CO_2 decreases and CO_2 <= (167 + 168/2), speed 1 is ON,

For the three-speed fan:
if CO_2 <= 167,speed 1 is ON,
if CO_2 increases and CO_2 >= (167 + (168*(2/3))) and CO_2 < (167 + 168), speed 2 is ON,
if CO_2 > (167 + 168), speed 3 is ON,
if CO_2 decreases and CO_2 <= (167 + (168*(2/3))) and CO_2 > (167 + (168*(1/3))), speed 2 is ON,

if CO_2 <= (167 + (168*(1/3))), speed 1 is ON.

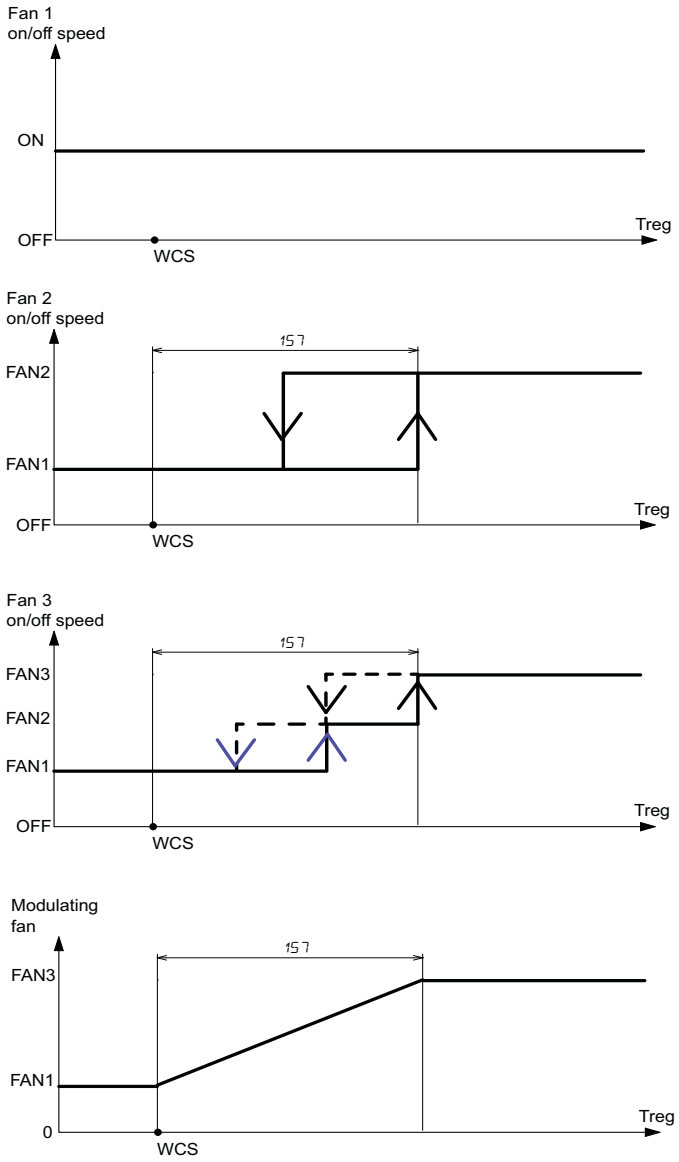
For the modulating fan:
If CO_2 > 167,the speed is modulated between speeds 1 and 3.

Control of speed based on temperature (009=2):

- Summer control:

Control of the fans is carried out based on the temperature of the control sensor, the cooling operating setpoint and the proportional band of the fan (parameter 157).

Depending on the type of fan and the operating season, they will work according to the following chart:



Treg: temperature of the control sensor
WCS: cooling operation setpoint
157 *proportional band of the fan*
VEL1: speed 1= [(154 / 100) x (151 - 150)] + 150 *for the supply and* =[(154 / 100) x (153 - 152)] + 152 *for the extraction.*
VEL2: speed 2= [(155 / 100) x (151 - 150)] + 150 *for the supply and* =[(155 / 100) x (153 - 152)] + 152 *for the extraction.*
VEL3: speed 3= [(156 / 100) x (151 - 150)] + 150 *for the supply and* =[(156 / 100) x (153 - 152)] + 152 *for the extraction.*

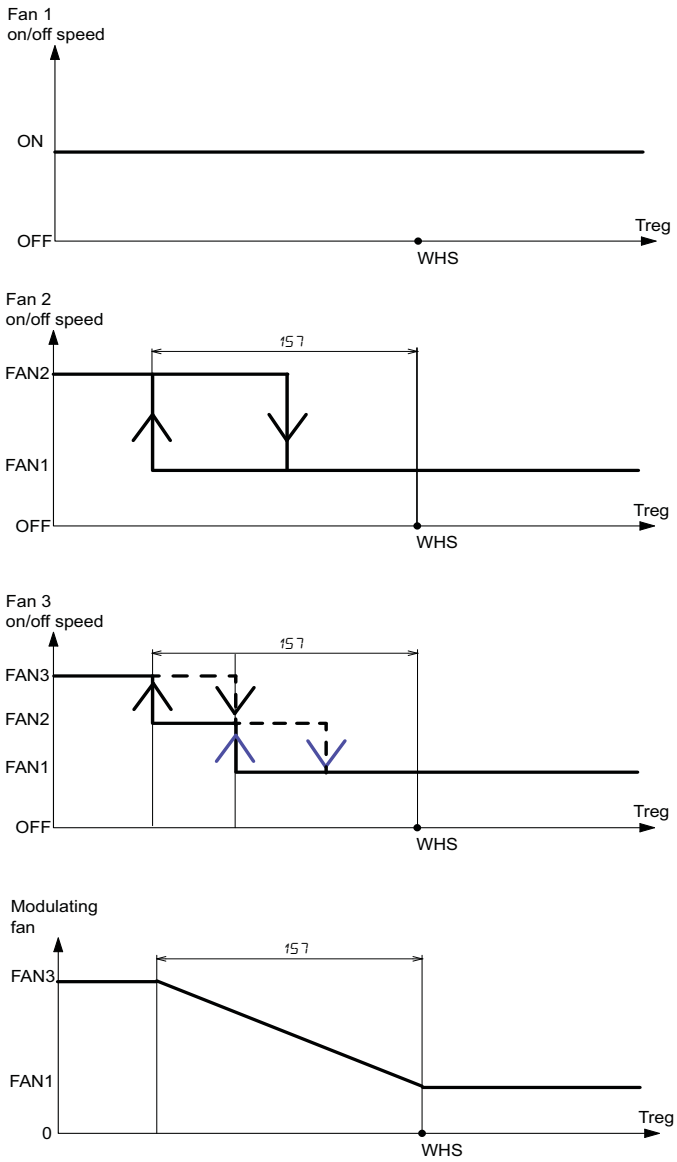
For the two-speed fan:
if Treg <= WCS, speed 1 is ON and if Treg increases when Treg > (WCS + 157), speed 2 is ON,
if Treg decreases and Treg <= (WCS + 157/2), speed 1 is ON,

For the three-speed fan:
if Treg <= WCS, speed 1 is ON,
if Treg increases and Treg >= (WCS + (157*(2/3))) and Treg < (WCS + 157), speed 2 is ON,
if Treg > (WCS + 157), speed 3 is ON,

if Treg decreases and Treg <= (WCS + (157*(2/3))) and Treg > (WCS + (157*(1/3))), speed 2 is ON,
if Treg <= (WCS + (157*(1/3))). speed 1 is ON.

For the modulating fan:
If Treg > WCS, the speed is modulated between 1 and 3.

- Winter control:



Treg: temperature of the control sensor
WCS: heating operation setpoint
157 *proportional band of the fan*
VEL1: speed 1= [(154 / 100) x (151 - 150)] + 150 *for the supply and* =[(154 / 100) x (153 - 152)] + 152 *for the extraction.*
VEL2: speed 2= [(155 / 100) x (151 - 150)] + 150 *for the supply and* =[(155 / 100) x (153 - 152)] + 152 *for the extraction.*
VEL3: speed 3= [(156 / 100) x (151 - 150)] + 150 *for the supply and* =[(156 / 100) x (153 - 152)] + 152 *for the extraction.*

For the two-speed fan:
if Treg >= WHS, speed 1 is ON and if Treg decreases when Treg < (WHS - 157), speed 2 is ON,
if Treg increases and Treg >= (WHS - 157/2), speed 1 is ON,

For the three-speed fan:
if Treg >= WHS, speed 1 is ON,
if Treg decreases and Treg <= (WHS - (157*(2/3))) and Treg > (WHS - 157), speed 2 is ON,
if Treg < (WHS - 157), speed 3 is ON,
if Treg increases and Treg >= (WHS - (157*(2/3))) and Treg < (WHS - (157*(1/3))), speed 2 is ON,
if Treg >= (WHS - (157*(1/3))), speed 1 is ON.

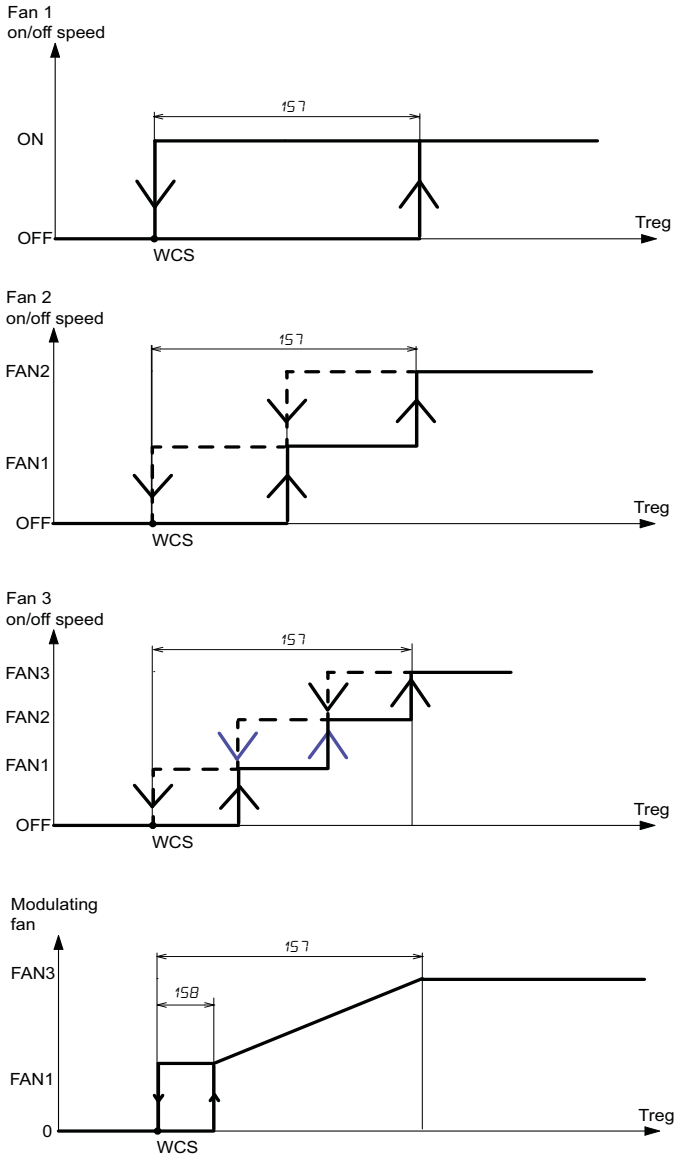
For the modulating fan:
If Treg < WHS, the speed is modulated between 1 and 3.

Control of speed based on temperature ON/OFF (009=3):

Control of the fans is carried out based on the temperature of the control sensor, the operating setpoint and the proportional band of the fan defined by the parameter 157. When the temperature reaches the operating setpoint, the fan is switched off after the switch-off delay for the fan 160 has elapsed.

Depending on the type of fan, they will work according to the following chart:

- Summer control:



Treg: temperature of the control sensor
WCS: cooling operation setpoint
157*: proportional band of the fan*
158*: step enabling for supply fan*
*VEL1: speed 1= [(*154 */ 100) x (*151 - 150*)]* + 150 *for the supply and =[(*154 */ 100) x (*153 - 152*)]* + 152 *for the extraction.*
*VEL2: speed 2= [(*155 */ 100) x (*151 - 150*)]* + 150 *for the supply and =[(*155 */ 100) x (*153 - 152*)]* + 152 *for the extraction.*
*VEL3: speed 3= [(*156 */ 100) x (*151 - 150*)]* + 150 *for the supply and =[(*156 */ 100) x (*153 - 152*)]* + 152 *for the extraction.*

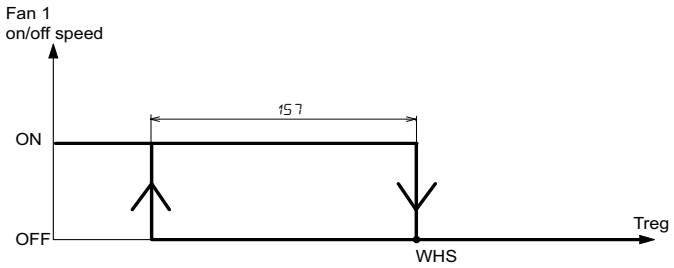
For the two-speed fan:
if Treg < WCS, the fan is off
if Treg increases and Treg > (WCS + (157/2)) and Treg < (WCS + 157), speed 1 is ON,
If Treg > (WCS + 157), speed 2 is ON,
if Treg decreases and Treg <= (WCS + (157/2)) and Treg > WCS, speed 1 is ON,
if Treg < WCS, the fan is off

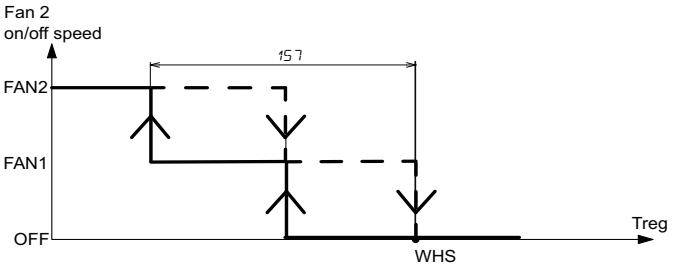
For the three-speed fan:
if Treg < WCS, the fan is off,
if Treg increases and Treg > (WCS + (157*(1/3))) and Treg < (WCS + (157*(2/3))), speed 1 is ON,

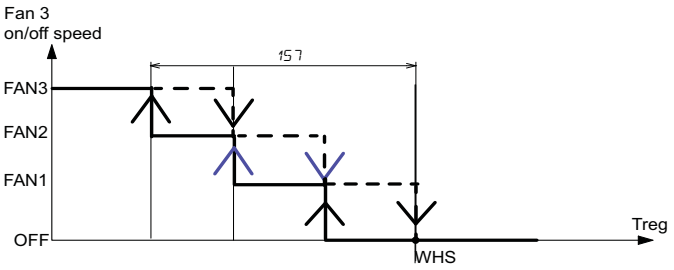
if Treg increases and Treg > (WCS + (157*(2/3))) and Treg < (WCS + 157), speed 2 is ON,
If Treg > (WCS + 157), speed 3 is ON,
if Treg decreases and Treg < (WCS + (157*(2/3))) and Treg > (WCS + (157*(1/3))), speed 2 is ON,
if Treg decreases and Treg < (WCS + (157*(1/3))) and Treg > WCS, speed 1 is ON,
if Treg < WCS, the fan is off

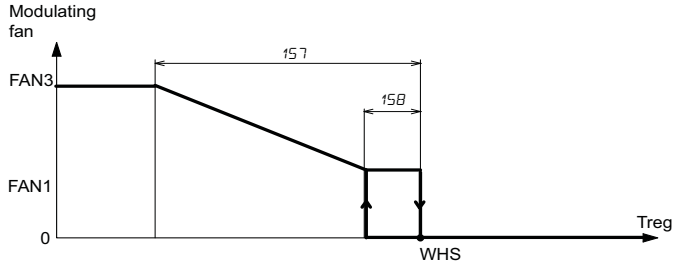
For the modulating fan:
if Treg < WCS, the fan is off,
If Treg > (WCS +158), the speed starts at a speed between speeds 1 and 3.
The speed is modulated up to speed 3 if Treg continues to increase.
If Treg decreases and Treg < WCS, the fan is off.

- Winter control:









Treg: temperature of the control sensor
WHS: heating operation setpoint
157*: proportional band of the fan*
158*: step enabling for supply fan*
*VEL1: speed 1= [(*154 */ 100) x (*151 - 150*)]* + 150 *for the supply and =[(*154 */ 100) x (*153 - 152*)]* + 152 *for the extraction.*
*VEL2: speed 2= [(*155 */ 100) x (*151 - 150*)]* + 150 *for the supply and =[(*155 */ 100) x (*153 - 152*)]* + 152 *for the extraction*.
*VEL3: speed 3= [(*156 */ 100) x (*151 - 150*)]* + 150 *for the supply and =[(*156 */ 100) x (*153 - 152*)]* + 152 *for the extraction*.

For the two-speed fan:
if Treg > WHS, the fan is off
if Treg decreases and Treg < (WHS - (157/2)) and Treg > (WHS - 157), speed 1 is ON,
If Treg < (WHS - 157), speed 2 is ON,
if Treg increases and Treg >= (WHS - (157/2)) and Treg < WHS, speed 1 is ON,
if Treg > WHS, the fan is off

For the three-speed fan:
if Treg > WHS, the fan is off,
if Treg decreases and Treg < (WHS - (157*(1/3))) and Treg > (WHS - (157*(2/3))), speed 1 is ON,
if Treg decreases and Treg < (WHS - (157*(2/3))) and Treg > (WHS - 157), speed 2 is ON,
If Treg < (WHS - 157) speed 3 is ON,
if Treg increases and Treg > (WHS - (157*(2/3))) and Treg < (WHS - (157*(1/3))), speed 2 is ON,
if Treg increases and Treg > (WHS - (157*(1/3))) and Treg < WHS, speed 1 is ON,
if Treg > WHS, the fan is off

For the modulating fan:
if Treg < WHS, the fan is off,
If Treg < (WHS -158), the speed starts at a speed between 1 and 3.
The speed is modulated up to speed 3 if Treg continues to decrease.
If Treg increases and Treg > WHS, the fan is off.

If a modulating electrical resistance is activated, the speed of the modulating fan follows the chart indicated above as long as the required heating power is lower than the parameter 211.
When the required heating power exceeds the parameter 211, the speed of the modulating fan is adjusted based on the power applied to the electrical resistance.
For example: if the parameter 211 = 80%, as long as the modulating fan speed is less than 80% of its control band defined by the parameter 157, the speed corresponds to the chart shown above. If the modulating fan speed is upper than 80% the speed of the fan will have a percentage value equal to the percentage value of power applied to the electrical resistance.
In case of an on/off fan, if the heating power required exceeds the parameter 211, the speed of the fan switches to maximum speed.

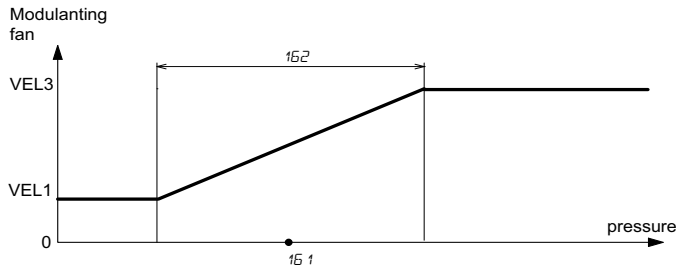
Control of speed based on temperature and CO_2 (009=4):

The fan is controlled considering the maximum value between the theoretical control speed based on the temperature only (see the paragraph "*"Control of speed based on temperature (009=2):" page 71*") and the theoretical control speed based on the CO_2 only (see the paragraph "*"Control of speed based on CO_2 (009=1):" page 70*").

Control of speed based on pressure/flow rate with direct action (009=5):

Based on parameter 213 regulation can be performed at constant pressure (213=0) or at constant flow rate (213≠0).
In case of constant flow rate regulation, flow rate is calculated based on formula $F = k \sqrt{dp}$ with
F=flow rate (m^3/hour)
k=parameter 213,
dp diffrential pressure (Pa) of differential pressure transducer connected to analogue input AI3.

To regulate with constant pressure set 213=0, for constant flow rate set 213 to the flow rate coefficient required.
Then do other settings:
008=4 (modulating fan);
If required on plant select output for supply fan 030=1 or 031=1 or 032=1;
If required on plant select output for return fan 030=2 or 031=2 or 032=2.
Set type of regulation on modulating fan 009=5 (regulation based on pressure with direct action).
A pressure transmitter 0..10 V must be connected to the input AI3 (023=7) and the JP1 jumper must be put in the "3-2" position.Set parameter 023 = 7, the pressure is automatically set to the default values 206=0 and 207=2000 and the pressure unit 208=2 (without a unit). After this, the scale can be modified according to the needs of the facility.
Define parameters of PI regulator (161: setpoint, 162: proportional band, 163: integral time).

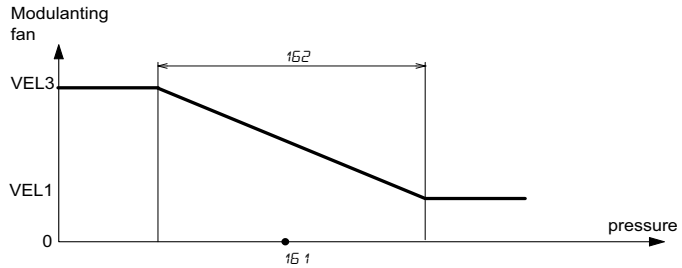


pressure: differential pressure detected by the transmitter
161*: setpoint*
162*: proportional band*

Control of speed based on pressure/flow rate with reverse action (009=6):

Based on parameter 213 regulation can be performed at constant pressure (213=0) or at constant flow rate (213≠0).
In case of constant flow rate regulation, flow rate is calculated based on formula F = k √ dp with
F=flow rate (m^3/hour)
k=parameter 213,
dp diffrential pressure (Pa) of differential pressure transducer connected to analogue input AI3.

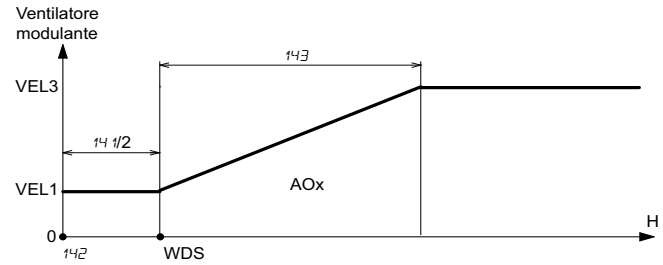
To regulate with constant pressure set 213=0, for constant flow rate set 213 to the flow rate coefficient required.
Then do other settings:
008=4 (modulating fan);
If required on plant select output for supply fan 030=1 or 031=1 or 032=1;
If required on plant select output for return fan 030=2 or 031=2 or 032=2.
Set type of regulation on modulating fan 009=6 (regulation based on pressure with reverse action).
A pressure transmitter 0..10 V must be connected to the input AI3 (023=7) and the JP1 jumper must be put in the “3-2” position. Set parameter 023=7, the pressure is automatically set to the default values 206=0 and 207=2000 and the pressure unit 208=2 (without a unit). After this, the scale can be modified according to the needs of the facility.
Define parameters of PI regulator (161: setpoint, 162: proportional band, 163: integral time).



pressure: differential pressure detected by the pressure transmitter
161*: setpoint*
162*: proportional band*

Control of speed based on dehumidification (009=7):

Modulating fan can be regulated based on dehumidification with built-in humidity sensor (139=1 or 3 only for models AH-xxxSH1) or based on remote 0..10V humidity transmitter (139=2 or 4).
Regulation can be done with PI regulator.
To use this function set the following parameters:
008=4 (modulating fan);
If required on plant select output for supply fan 030=1 or 031=1 or 032=1;
If required on plant select output for return fan 030=2 or 031=2 or 032=2.
Set type of regulation on modulating fan 009=7 (regulation based on dehumidifcation).
Set parameter 139 to select the type of humidity sensor used for dehumidification:
139=1 for built-in humidity sensor -> models AH-xxxSH1
139=2 for a remote 0..10V humidity transmitter (set 023=6 and position jumper JP1 on position “2-3“, then input sensor AI3 is set for 0..10V input transmitter, the corresponding range is set to 0..100 %r.H. (206=0 and 207=100) with unit set to %r,H. (208=1).
Set regulation parameters for dehumidification (141: neutral zone humidity, 142: set humidity, 143: proportional band humidity, 144: integral time humidity)
Speed of modulating fans is regulated between speed 1 and 3 as indicated on the figure below::



H: value of built-in humidity sensor or remote humidity transmitter
WDS: working deumidification setpoint
142*: humidity setpoint*
141*: neutral zone humidity*
143*: proportional band humidity*

Speeds 1 and 3 of supply fan are defined based on parameters150, 151, 154,155,156.

If return fan is also used set the following parameters to set speed 1 and 3: 152, 153, 154,155,156.

The percentage output of the PI controller is applied between the speed 1 and 3.

If the dehumidification request corresponds to a value greater than speed 1, the  icon is displayed. If the request corresponds to the speed 1, the  icon is switched off

Note: If the frost protection alarm is activated (and 188=1), the fans are immediately stopped.
If the appliance is switched off, the fans are stopped after the switch-off delay for the fans 160 has elapsed.

23. Damper control

The damper is either: on/off or modulating.

- **On/off damper:**

The on/off damper can be external, a bypass for heat exchanger or a bypass for cross-flow heat exchanger (based on free heating/cooling only).

On/off damper type	Regulation type and settings
External damper (not regulated) (*)	Damper is open when air handling unit is switched on and closed with delay 166 after ventilation is OFF. Select the output for damper 025=12 (DO1) or 026=12 (DO2) or 027=12 (DO3) or 028=12 (DO4) or 029=12 (DO5)
External damper regulated	It can be regulated based on CO_2, on free cooling and/or heating, on free cooling and/or heating + CO_2, or on humidity. 010 = 1 (on/off damper regulated). Select output for damper 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5)
	Regulation on CO_2: 011=0 (regulation on CO_2) 023=5 (input AI3 0..10V CO_2) and put jumper JP1 on position “3-2” Set regulation parameters from 167 to 169 (setpoint, proportional band and integral time CO_2)
	Regulation on free cooling/heating: 011=1 (regulation on free cooling/heating) Activate free cooling and/or heating with parameter170 Set parameters of free cooling and/or heating from 171 to 178 (see *“35. Configuration of installer parameters (level 2 password)” page 121*)
	Regulation on free cooling/heating and CO_2: 011=2 (regulation on free cooling/heating and CO_2) Activate free cooling and/or heating with parameter170 Set parameters of free cooling and/or heating from 171 to 178 (see *“35. Configuration of installer parameters (level 2 password)” page 121*) 023=5 (input AI3 0..10V CO_2) Set regulation parameters from 167 to 169 (setpoint, proportional band and integral time CO_2)
	Regulation on humidity (dehumidification): 011=3 (regulation based on humidty) Activate dehumidification: with internal humidity sensor 139=1 or 139=3 in cooling only (models AHU-xxxxH1 only) or with remote humidity sensor 139=2 or 139=4 in cooling only, 023=6 (input 0..10 V humidity) and put jumper JP1 on position “3-2”. Set following regulation parameters: - neutral zone humidity 141, - humidity setpoint 142, - proportional band humidity 143,
Bypass for heat exchanger	It is regulated based on free cooling and/or heating based on cooling and/or heating request 011=1 (regulation on free cooling/heating) Select heat exchanger type (012≠0) Select output for bypass of heat exchanger 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5)

Bypass for cross-flow heat exchanger (based on free cooling/heating only)	It is regulated based on free cooling and/or heating without considering cooling and/or heating request 011=1 (regulation on free cooling/heating) 012=1 (cross-flow heat exchanger) Select output for bypass of cross-flow heat exchanger (based on free cooling/heating only) 025=20 (DO1) or 026=20 (DO2) or 027=20 (DO3) or 028=20 (DO4) or 029=20 (DO5)

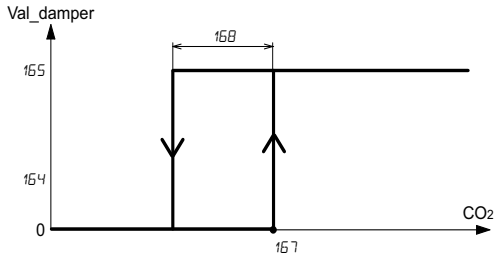
(*) external damper not regulated can be used together with other type of damper defined by parameter 010 (010 =1 or 2 or 3 or 4).

Regulation of on/off damper based on free cooling/heating

External on/off damper can be used as external regulated damper 010=1, or as bypass damper for heat exchanger 010=2, or as bypass damper for cross-flow heat exchanger (based on free cooling/heating only) 010=5.
Set type of regulation on damper 011=1 (regulation based on free cooling/heating with cooling/heating request).
Define which output is the external regulated damper: 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5). or the bypass for heat exchanger 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or the bypass for cross-flow heat exchanger (based on free cooling/heating only) 025=20 (DO1) or 026=20 (DO2) or 027=20 (DO3) or 028=20 (DO4) or 029=20 (DO5).
Activate free cooling and/or free heating setting parameter 170.
The damper is regulated based on graphs depicted on paragraph *"21. Regulation with free cooling, free heating" page 53* when conditions of free cooling/heating are present and there is a cooling or heating request (this request is not considered if a bypass damper for cross-flow heat exchanger, based only on free cooling/heating, is used).

Regulation of on/off damper based on air quality

In rooms where a lot of people are present, it is necessary to regulate the air quality to ensure fresh air when the CO_2 concentration exceeds a given threshold. A on/off damper can be used.
In order to carry out this operation, set 023=5 (AI3 input for 0..10 V CO_2 input) and position the JP1 jumper in the "3-2" position. The input sensor AI3 is automatically configured as input 0..10 V for air quality, and the corresponding scale is set at 0..2000 ppm (206=0 and 207=2000) with the unit of measurement ppm (208=0)
Select type of damper 010=1 (external damper regulated).
Select type of regulation on damper 011=0 (regulation on CO_2).
Defines which output is the external damper regulated: 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) Set.
Define the parameters for reduction of the CO_2 concentration (167: setpoint, 168: proportional band).
The damper is regulated as following graph:



Val_damper: theoretical value of the damper control
167*: air exchange setpoint*
168*: air exchange proportional band*

If the concentration value of CO_2> (air exchange setpoint 167) corresponding digital output is activated, icon .is switched on.
If the concentration value of CO_2 <= (air exchange setpoint 167 - proportional band 168), corresponding digital output is deactivated and icon is switched off;

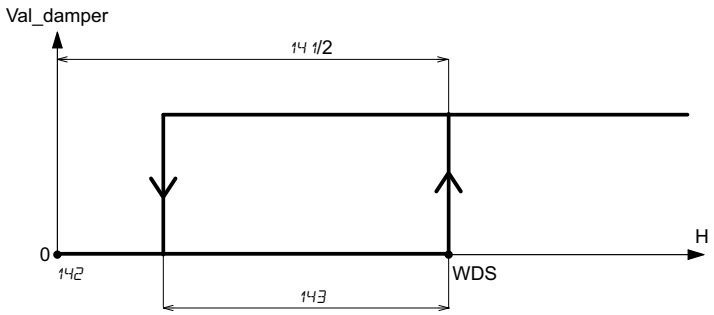
Note: If the frost protection alarm is activated (and 188=1) or if the appliance is switched off or if ventilation is absent, the on/off damper is deactivated.

Regulation of on/off damper based on free cooling/heating and CO_2

The regulation corresponds to paragraph *"Regulation of on/off damper based on air quality" page 79* for CO_2 part and to paragraph *"Regulation of on/off damper based on free cooling/heating" page 79* for free cooling/heating part.
The external on/off regulated damper is activated if one of the previous paragraphs would activate the output.
The external on/off regulated damper is deactivated if none of the previous two paragraphs would activates the output.

Regulation of on/off damper based on dehumidification

It can be used in rooms with humidity that is ALWAYS higher than external humidity (overcrowded places, health farms, sauna, swimming pools, ...) or in winter when external humidity is ALWAYS lower than internal humidity. An external on/off damper can be used for such a situation.
To use this function set following parameters:
set parameter 139 to activate dehumidification:
139=1 or 139=3 (in cooling only) with built-in humidity sensor (models AH-xxxSH1 only),
139=2 or 139=4 (in cooling only) with a remote 0..10V humidity transmitter. Set 023=6 (input 0..10V humidity) and position jumper JP1 on position "2-3", then input sensor AI3 is set for 0..10V input transmitter, the corresponding range is set to 0..100 %r.H. (206=0 and 207=100) with unit set to %r,H. (208=1),
select the type of regulated damper 010=1 (external regulated on/off damper),
select the type of regulation applied to damper 011=3 (dehumidification),
define which digital output is the external regulated on/off damper 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5),
define regulation parameters for dehumidification (141: neutral zone humidity, 142: humidity setpoint, 143: proportional band humidity).
The external regulated on/off damper as indicated below.



Val_damper: theoretical value of the damper control
WDS: dehumidification working setpoint
142*: setpoint of humidity*
141*: neutral zone humidity*
143*: proportional band humidity*

If value of humidity > WDS, the external regulated damper is activated and icon is activated.

If value of humidity <= (WDS - banda proporzionale 143), the external regulated damper is deactivated and icon is deactivated.

Note: If the frost protection alarm is activated (and 188=1) or if the appliance is switched off or if ventilation is absent, the on/off damper is deactivated.

• Modulating damper:

The modulating damper can be external or a bypass for heat exchanger.

Modulanting type damper	Regulation type and settings
External regulated damper	It can be regulated based on CO_2, free cooling and/or heating, free cooling and/or heating + CO_2, or humidity 010 = 3 (external modulating damper). Select output for modulating damper 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3).
	Regulation on CO_2: 011=0 (regulation based on CO_2) 023=5 (input AI3 0..10V CO_2) Set regulation parameters from 167 to 169 (setpoint, proportional band and integral time CO_2)
	Regulation on free cooling/heating: 011=1 (regulation based on free cooling/heating) Activate free cooling and/or heating with parameter170 Set parameters of free cooling and/or heating from 171 to 178 (see *"35. Configuration of installer parameters (level 2 password)" page 121*)
	Regulation on free cooling/heating and CO_2: 011=2 (azione basato sul free cooling/heating e CO_2) Attivare il free cooling e/o heating con il parametro170 Set parameters of free cooling and/or heating from 171 to 178 (see *"35. Configuration of installer parameters (level 2 password)" page 121*) 023=5 (input AI3 0..10V CO_2) Set regulationparameters from167 to 169 (setpoint, proportional band and integral time CO_2)
	Regulation on humidity (dehumidification): 011=3 (regulation based on humidity) Activate dehumidification: with internal humidity sensor 139=1 or 139=3 in cooling only (models AHU-xxxxH1 only) or with remote humidity sensor 139=2 or 139=4 in cooling only, 023=6 (input 0..10 V humidity) and put jumper JP1 on position "3-2". Set following regulation parameters: - neutral zone humidity 141, - humidity setpoint 142, - proportional band humidity 143, - integral time humidity 144.
Bypass for heat exchanger	it is regulated based on free cooling and/or free heating and on cooling/heating request 011=1 (regulation based on free cooling/heating) Select type of heat exchanger (012≠0) Select output for modulating bypass damper of heat exchanger 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).

(*) external damper not regulated can be used together with other type of damper defined by parameter 010 (010 =1 or 2 or 3 or 4).

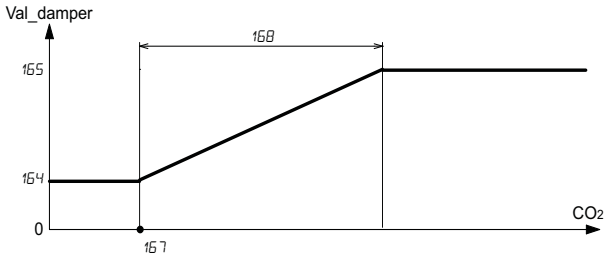
Regulation of modulating damper based on free cooling/heating

The modulating damper can be used as an external damper or as bypass damper for heat exchanger.
Select the type of modulating damper 010=3 (modulating damper) or 010=4 (modulating bypass damper for heat exchanger)
Select the minimum opening position (parameter164) and the maximum opening position (parameter165) of the damper.
Select the regulation type of damper 011=1 (control based on the cooling/heating request with free cooling/heating conditions).
Define which analogue output is the modulating damper: 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3).
Activate the free cooling and/or free heating by setting the parameter 170.
The damper will be controlled based on the charts indicated in the paragraph *"21. Regulation with free cooling, free heating" page 53* when the free cooling/heating conditions and cooling/heating requests are present.

Regulation of modulating damper based on CO_2

In rooms where a lot of people are present, it is necessary to regulate the air quality to ensure fresh air when the CO_2 concentration exceeds a given threshold.
An external modulating damper is used with a PI-type control for this purpose.
In order to carry out this operation, set 023=5 (AI3 input for 0..10 V CO_2 input) and position the JP1 jumper in the "3-2" position.
The input sensor AI3 is automatically configured as input 0..10 V for CO_2, and the corresponding scale is set at 0..2000 ppm (206=0 and 207=2000) with the unit of measurement ppm (208=0).
Select the type of modulating damper 010=3 (modulating damper).
Select the minimum opening position (parameter164) and the maximum opening position (parameter165) of the damper.
Select the type of damper regulation 011=0 (regulation based on CO_2).
Define which analogue output is the modulating damper: 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3).
Define the parameters of the PI controller for the reduction of the CO_2 concentration (167: setpoint, 168: proportional band, 169: integral time).

The modulating damper is regulated between minimum and maximum opening positions as indicated on the following figure:



Val_damper: theoretical value of the damper control
164*: minimum modulating damper opening*
165*: maximum modulating damper opening*
167*: air exchange setpoint*
168*: air exchange proportional band*

The percentage output of the PI controller is applied between the minimum and maximum opening positions of the damper 164 and 165.

If the air change request corresponds to a value greater than the minimum damper position, the icon is displayed. If the request corresponds to the minimum position, the icon is switched off.

Note: If the frost protection alarm is activated (and 188=1) or if the appliance is switched off or if ventilation is absent, the modulating damper is completely closed.

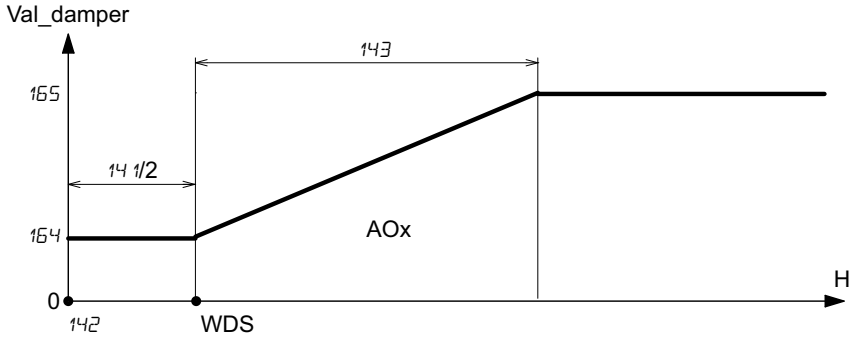
Regulation of modulating damper based on free cooling/heating and CO_2

The regulation corresponds to paragraph *"Regulation of modulating damper based on CO_2" page 82* for CO_2 part and to paragraph *"Regulation of modulating damper based on free cooling/heating" page 82* for free cooling/heating part.
The modulating damper is regulated considering the maximum theoretical value from the paragraphs indicated.
In order to carry out this operation, set 023=5 (AI3 input for 0..10 V CO_2 input) and position the JP1 jumper in the "3-2" position.
The input sensor AI3 is automatically configured as input 0..10 V for CO_2, and the corresponding scale is set at 0..2000 ppm (206=0 and 207=2000) with the unit of measurement ppm (208=0).
Select the type of modulating damper 010=3 (modulating damper).
Select the minimum opening position (parameter164) and the maximum opening position (parameter165) of the damper.
Select the type of damper regulation 011=2 (regulation based on free cooling/heating and CO_2).
Define which analogue output is the modulating damper: 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3).
Define the parameters of the PI controller for the reduction of the CO_2 concentration (167: setpoint, 168: proportional band, 169: integral time).

Activate the free cooling and/or free heating by setting the parameter 170.
Set parameters from 171 to 178.

Regulation of modulating damper based on dehumidification

It can be used in rooms with humidity that is ALWAYS higher than external humidity (overcrowded places, health farms, sauna, swimming pools, ...) or in winter when external humidity is ALWAYS lower than internal humidity. An external modulating damper is used with a PI regulation for such a situation.
To use this function set following parameters:
set parameter 139 to activate dehumidification,
-139=1 or 139=3 (in cooling only) with built-in humidity sensor -> models AH-xxxSH1
-139=2 or 139=4 (in cooling only) with a remote 0..10V humidity transmitter, set 023=6 and position jumper JP1 on position “2-3“, then input sensor AI3 is set for 0..10V input transmitter, the corresponding range is set to 0..100 %r.H. (206=0 and 207=100) with unit set to %r,H. (208=1)).
select the type of regulated damper 010=3 (modulating damper),
select the type of regulation applied to damper 011=3 (dehumidification),
select the minimum opening position (parameter164) and the maximum opening position (parameter165) of the damper,
select the type of damper control 011=3 (control based on dehumidication),
define which analogue output is the modulating damper: 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3),
define PI regulation parameters for dehumidification (141: neutral zone humidity, 142: humidity setpoint, 143: proportional band humidity, 144: integral time humidity)
The modulating damper is regulated between minimum and maximum opening positions as indicated on the following figure:



Val_damper: theoretical value of the damper control
WDS: working dehumidification setpoint
164*: minimum modulating damper opening*
165*: maximum modulating damper opening*
142*: humidity setpoint*
141*: humidity neutral zonet*
143*: humidity proportional band*

The percentage output of the PI controller is applied between the minimum and maximum opening positions of the damper 164 and 165.

If the dehumidification request corresponds to a value greater than the minimum damper position, the icon is displayed. If the request corresponds to the minimum position, the icon is switched off.

Note: If the frost protection alarm is activated (and 188=1) or if the appliance is switched off or if ventilation is absent,, the modulating damper is completely closed.

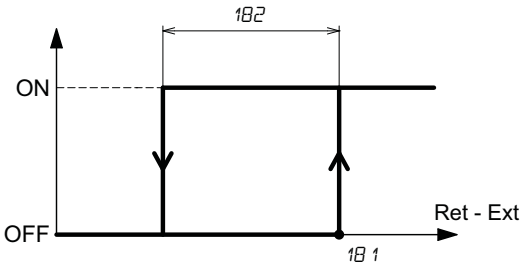
24. Heat exchanger

If a significant quantity of fresh air is needed, the air handling units are equipped with heat exchangers to enable energy saving. The heat extracted from return air is transmitted to supply air in order to pre-heat or pre-cool it and save energy.
If there is a cooling or a heating request and conditions for recovery are present regulation is first done using the heat exchanger and then on the cooling or heating battery, if present.

The regulator can control most types of heat exchanger and by parameter 012,the selection can be done:
For cross-flow heat exchanger set 012=1.
For double battery heat exchanger set 012=2.
For on/off rotary heat exchanger set 012=3.
For modulating rotary heat exchanger set 012=4.
For no heat exchanger set 012=0.

• Conditions for recovery:

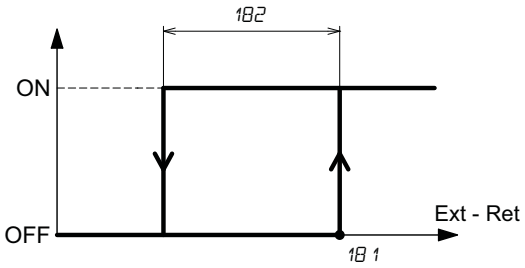
The heat exchanger (excluded cross-flow heat exchanger) is not always active, it is activated in heating if there is a heating request and if the following condition of activation in heating is verified:



Ret = return temperature
Ext = external temperature
181: *setpoint of heat exchanger*
182: *differential of heat exchanger*

If Ret - Ext > heat exchanger setpoint 181, the heat exchanger is authorized to run if necessary.
If Ret - Ext <= (heat exchanger setpoint 181 - heat exchanger differential 182) the heat exchanger is not authorized to run.

it is activated in cooling if there is a cooling request and if the following condition of activation in cooling is verified:



Ret = Temperatura di ripresa
Ext = Temperatura esterna
181: *setpoint del recuperatore*
182: *differenziale del recuperatore*

If Ext - Ret > heat exchanger setpoint 181, the heat exchanger is authorized to run if necessary.
If Ext - Ret <= (heat exchanger setpoint 181 - heat exchanger differential 182) the heat exchanger is not authorized to run.

• Cross-flow heat exchanger:

The cross-flow heat exchanger does not need an output.
It is equipped with a bypass damper (on/off or modulating) that is used to stop the passage of air through the heat exchanger channels based on following schedule indications (column Activation). When bypass is not activated, cross-flow heat exchanger is always in recovery.

Bypass type of heat exchanger	Activation and parameters setting and operating
On/off	Activation: - during cooling and/or heating request when conditions of free cooling and/or free heating are present. - during exchanger frost protection alarm if 186=1 or 3 (*)
	Parameter setting and operating: 010 = 2 (bypass on/off). 011 = 1 (damper regulated on free cooling/heating) 012 = 1 (cross-flow heat exchanger). Select output for bypass damper 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) Activate free cooling and/or heating with parameter170. Set an analogue output as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3) Set parameters of free cooling and/or heating from 171 to 178 (see *"35. Configuration of installer parameters (level 2 password)" page 121*) For operating mode of Bypass damper see paragraph *"21. Regulation with free cooling, free heating" page 53*
On/off (based on free cooling/heating only)	Activation: - during conditions of free cooling and/or heating **without considering** cooling and/or heating request. - during exchanger frost protection alarm if 186=1 or 3 (*)
	Parameter setting and operating: 010 = 5 (bypass on/off based on free cooling/heating only). 011 = 1 (damper regulated on free cooling/heating) 012 = 1 (cross-flow heat exchanger). Select output for bypass damper 025=20 (DO1) or 026=20 (DO2) or 027=20 (DO3) or 028=20 (DO4) or 029=20 (DO5) Activate free cooling and/or heating with parameter170. Set an analogue output as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3) Set parameters of free cooling and/or heating from 171 to 178 (see *"35. Configuration of installer parameters (level 2 password)" page 121*) For operating of bypass see paragraph *"Operation with on/off bypass damper for cross-flow heat exchanger" page 53*
Modulating	Activation: - during cooling and/or heating request when conditions of free cooling and/or free heating are present, the damper is modulated. - during exchanger frost protection alarm if 186=1 or 3 (*)
	Parameter setting and operating: 010 = 4 (modulating bypass) 011 = 1 (damper regulated on free cooling/heating) 012 = 1 (cross-flow heat exchanger). Select output for damper 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3). Activate free cooling and/or heating with parameter170. Set an analogue output as external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3) Set parameters of free cooling and/or heating from 171 to 178 (see *"35. Configuration of installer parameters (level 2 password)" page 121*) For operating mode of Bypass damper see paragraph *"21. Regulation with free cooling, free heating" page 53*

(*) return air (warm) can defrost fins of heat exchanger as they are not mixed with fresh air.

During operation, the ON or OFF icons indicate the status of the heat exchanger:

Icon status	Indication
ON icon is on	Heat recovery in progress (bypass damper closed)
OFF icon is displayed	Heat exchanger in frost protection mode
(ON icon is on; OFF icon is off) alternating with (ON icon is off, OFF icon is on). (The icon is flashing to indicate free heating or cooling in progress).	Partial heat recovery because the modulating bypass damper is regulated based on the current cooling/heating request during free cooling or free heating conditions (bypass damper partially open)
OFF icon is on	No heat recovery because of free cooling and/or heating (bypass damper completely open) or in case of frost protection alarm of the heat exchanger (if 186=1)

By Modbus, it is also possible to see the status of the heat exchanger (see the Modbus variables table *"42. Modbus (for AHU-xMxSx1 models)" page 138*).

• Double battery heat exchanger:

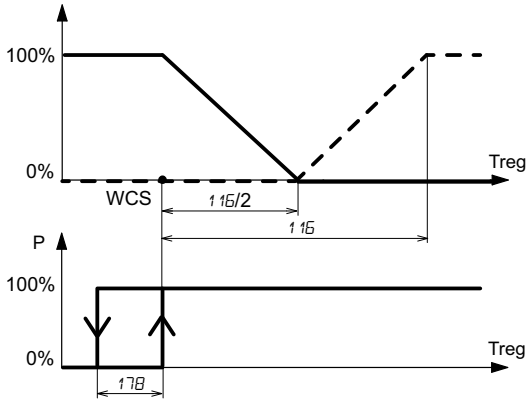
The double battery heat exchanger is activated by a fluid circulation pump placed between the two batteries.
If a cooling/heating request is present and conditions of recovery are satisfied, the pump is activated.
If a bypass damper is present it operates opposed to the pump.
If a modulating bypass damper is present, the damper modulates the recovery based on cooling / heating request.

Operation with modulating bypass heat exchanger and modulating cooling valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).
- modulating cooling valve 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3)

or modulating mixed-use cooling valve 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).



Treg: control temperature
WCS: cooling operation setpoint
116*: cooling proportional band*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating bypass damper output
dashed curve: modulating cooling valve output
P: pump of double coil heat exchanger output

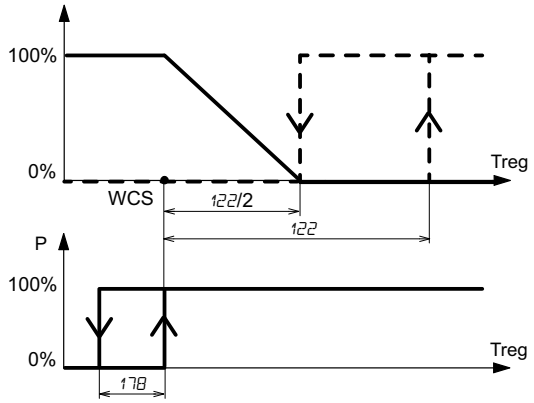
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the pump is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening position (parameter 164) in the band defined by 116/2. The cooling valve goes from closed position to open position when Treg changes from (WCS + 116/2) to (WCS + 116).
The pump is deactivated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with modulating bypass heat exchanger and on/off cooling valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).
- on/off cooling valve 003=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5),

or on/off mixed-use valve in cooling 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5).



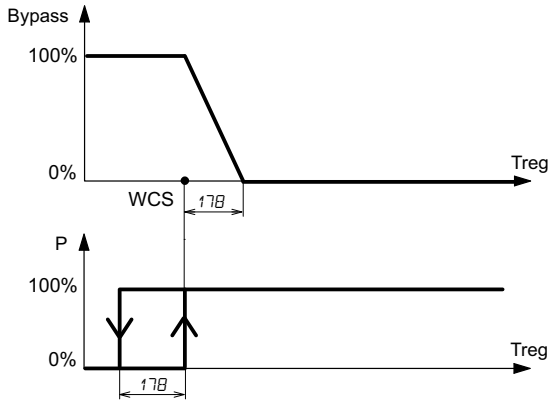
Treg: control temperature
WCS: cooling operation setpoint
122*: hysteresis for on/off output*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating bypass damper output
dashed curve: on/off cooling valve output
P: pump of double coil heat exchanger output

With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the pump is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening position (parameter 164) in the band defined by 122/2. The cooling valve is activated if Treg > (WCS + 122) and deactivated if Treg <= (WCS + 122/2).
The pump is deactivated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with modulating bypass heat exchanger without cooling valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).



Treg: control temperature
WCS: cooling operation setpoint
178: *hysteresis regulation free heating/cooling*
Bypass: modulating bypass damper output
P: pump of double coil heat exchanger output

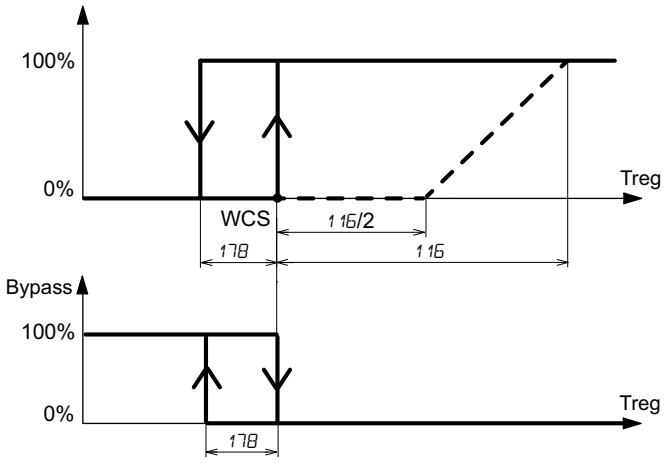
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the pump is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening position (parameter 164) in the band defined by 178.
The pump is deactivated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with on/off bypass heat exchanger and cooling modulating valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- modulating cooling valve 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3)

or modulating mixed-use cooling valve 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).



Treg: control temperature
WCS: cooling operation setpoint
116*: cooling proportional band*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: pump of double coil heat exchanger output
dashed curve: modulating cooling valve output
Bypass: on/off bypass damper output

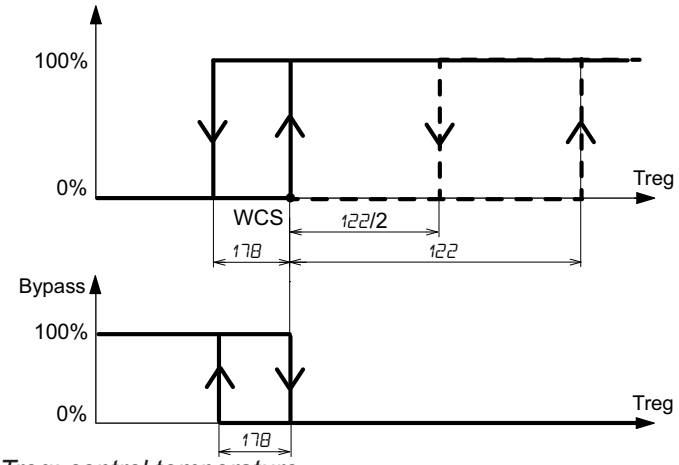
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the pump is activated and the on/off bypass is deactivated.
The cooling valve goes from closed position to open position when Treg changes from (WCS + 116/2) to (WCS + 116).
The pump is deactivated and the bypass damper activated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with on/off bypass heat exchanger and on/off cooling valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- on/off cooling valve 003=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5),

or on/off mixed-use valve in cooling 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5).



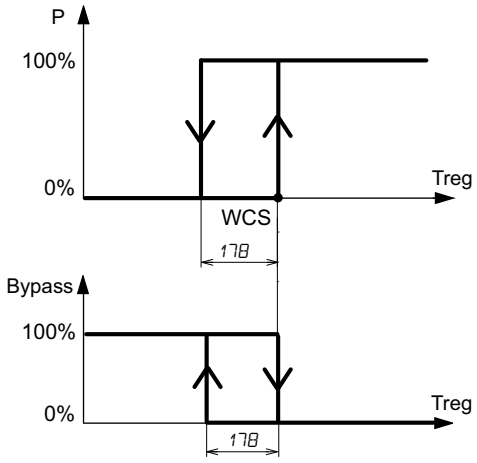
Treg: control temperature
WCS: cooling operation setpoint
122*: hysteresis for on/off output*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: pump of double coil heat exchanger output
dashed curve: on/off cooling valve output
Bypass: bypass damper for heat exchanger output

With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the pump is activated and the on/off bypass is deactivated. The cooling valve is activated if Treg > (WCS + 122) and deactivated if Treg <= (WCS + 122/2)
The pump is deactivated and the bypass damper activated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with on/off bypass heat exchanger without cooling valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5).



Treg: control temperature
WCS: cooling operation setpoint
178: *hysteresis regulation free heating/cooling*
P: pump of double coil heat exchanger output
Bypass: on/off bypass damper output

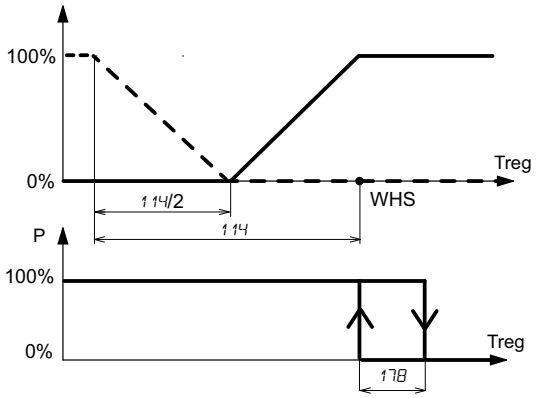
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the pump is activated and the on/off bypass is deactivated. The pump is deactivated and the bypass damper activated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with modulating bypass heat exchanger and modulating heating valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3),
- modulating heating valve 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3)

or modulating mixed-use valve in heating 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3)
or modulating electrical resistance 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3)



Treg: control temperature
WHS: heating operation setpoint
114*: heating proportional band*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating bypass damper output
dashed curve: modulating heating valve output
P: pump of double coil heat exchanger output

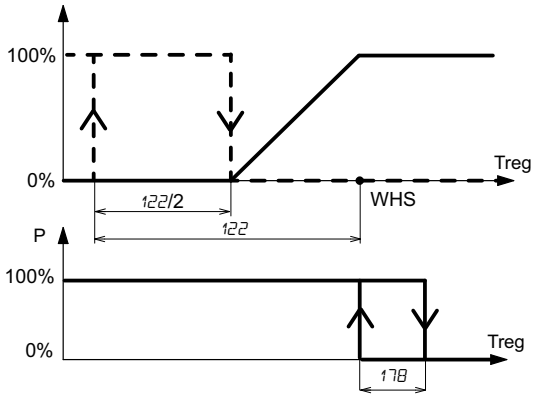
With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon is switched on, the pump is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening position (parameter 164) in the band defined by 114/2. The heating valve goes from closed position to open position when Treg changes from (WHS - 114/2) to (WHS - 114).
The pump is deactivated if Treg >= (WHS + 178). The icon is switched off.

Operation with modulating bypass heat exchanger and on/off heating valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3),
- heating valve on/off 002=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5)

or electrical resistance on/off 002=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)
or on/off mixed-use valve in heating 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5)



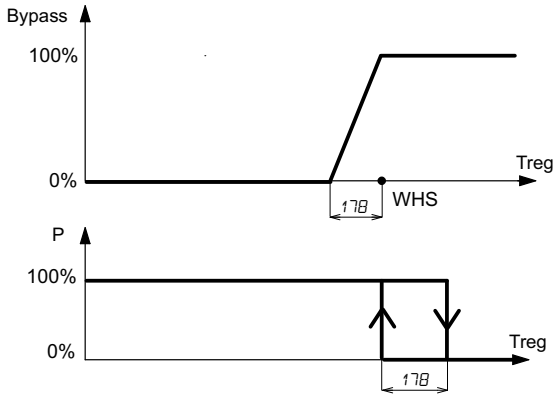
Treg: control temperature
WHS: heating operation setpoint
122*: hysteresis for on/off output*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating bypass damper for heat exchanger output
dashed curve: on/off heating valve output
P: pump of double coil heat exchanger output

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon is switched on, the pump is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening position (parameter 164) in the band defined by 122/2. The heating valve is activated when Treg < (WHS - 122) and deactivated when Treg >= (WHS - 122/2). The pump is deactivated if Treg >= (WHS + 178). The icon is switched off.

Operation with modulating bypass heat exchanger without heating valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3),



Treg: control temperature
WHS: heating operation setpoint
178: *hysteresis regulation free heating/cooling*
Bypass: modulating bypass damper for heat exchanger output
P: pump of double coil heat exchanger output

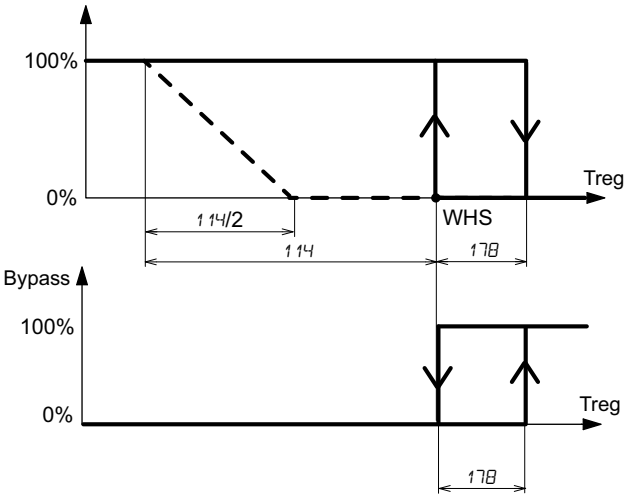
With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon is switched on, the pump is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening position (parameter 164) in the band defined by 178.
The pump is deactivated if Treg >= (WHS + 178). The icon is switched off.

Operation with on/off bypass heat exchanger and heating modulating valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- modulating heating valve 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3)

or modulating mixed-use valve in heating 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3)
or modulating electrical resistance 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3)



Treg: control temperature
WHS: heating operation setpoint
114*: heating proportional band*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: pump of double coil heat exchanger output
dashed curve: modulating heating valve output
Bypass: on/off bypass damper output

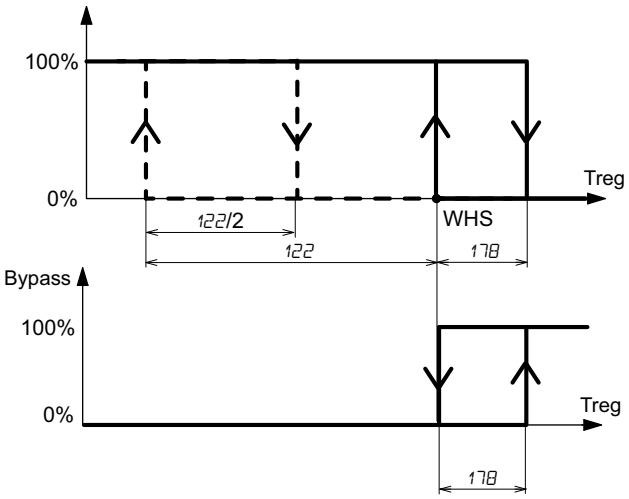
With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon ♨ is switched on, the pump is activated and the on/off bypass damper is deactivated.
The heating valve goes from closed position to open position when Treg changes from (WHS - 114/2) to (WHS - 114).
The pump is deactivated and bypass activated if Treg >= (WHS + 178). The icon ♨ is switched off.

Operation with on/off bypass heat exchanger and heating on/off valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- heating valve on/off 002=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5)

or electrical resistance on/off 002=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)
or on/off mixed-use valve in heating 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5)



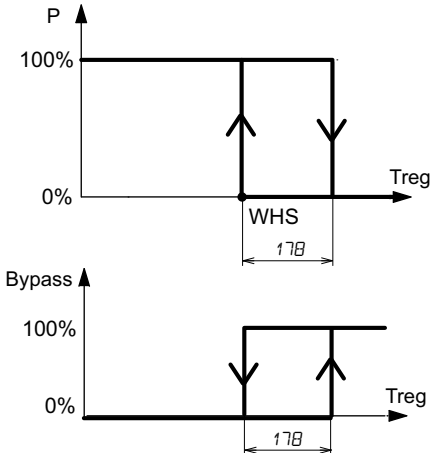
Treg: control temperature
WHS: heating operation setpoint
122*: hysteresis for on/off output*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: pump of double coil heat exchanger output
dashed curve: on/off heating valve output
Bypass: bypass damper for heat exchanger output

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon ♨ is switched on, the pump is activated and the on/off bypass damper is deactivated.
The heating valve is activated if Treg < (WHS - 122) and deactivated if Treg >= (WHS - 122/2).
The pump is deactivated and bypass activated if Treg >= (WHS + 178). The icon ♨ is switched off.

Operation with on/off bypass heat exchanger without heating valve:

Do following settings:
- set type of heat exchanger 012=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5)



Treg: control temperature
WHS: heating operation setpoint
178: *hysteresis regulation free heating/cooling*
P: pump of double coil heat exchanger output
Bypass: bypass damper for heat exchanger output

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon ♨ is switched on, the pump is activated and the on/off bypass damper is deactivated. The pump is deactivated and bypass activated if Treg >= (WHS + 178). The icon ♨ is switched off.

During operation, the ON or OFF icons indicates the status of the heat exchanger:

Icon status	Indication
ON icon is on	pump activated, heat recovery in progress
OFF icon is flashing	Pump closed for free heating or free cooling
OFF icon is on	Pump closed, heat exchanger off

By Modbus, it is also possible to see the status of the heat exchanger (see *"42. Modbus (for AHU-xMxSx1 models)" page 138*).

Note: Frost protection of heat exchanger is not considered on double battery heat exchanger as there is never frost on batteries. If a frost protection heat exchanger alarm occurs, a message of alarm appears on alarm pages only.

• Rotary on/off heat exchanger:

To be able to operate, ventilation must be activated; otherwise, it is always disabled.

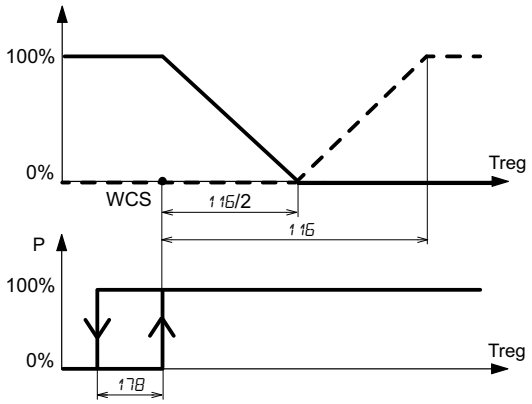
if a request of cooling/heating is present with cooling recovery/heating recovery conditions, the rotary on/off heat exchanger is activated.
If a on/off bypass damper is present, it operates opposite to heat exchanger.
If a modulating bypass damper is present, the modulating damper modulates the recovery based on cooling/heating request.

Operation with modulating bypass heat exchanger and modulating cooling valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).
- modulating cooling valve 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3)

or modulating mixed-use cooling valve 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).



Treg: control temperature
WCS: cooling operation setpoint
116*: cooling proportional band*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating bypass damper output
dashed curve: modulating cooling valve output
P: rotary on/off heat exchanger output

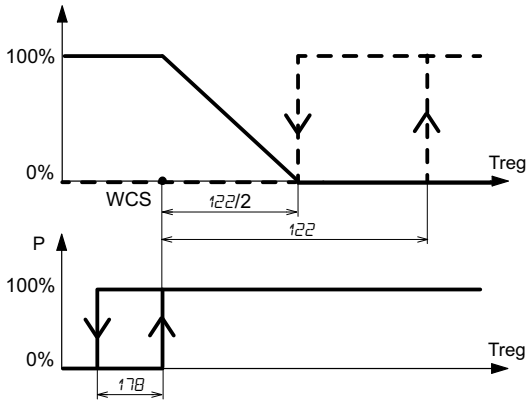
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the rotary on/off heat exchanger is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening position (parameter 164) in the band defined by 116/2. The cooling valve goes from closed position to open position when Treg changes from (WCS + 116/2) to (WCS + 116).
The rotary on/off heat exchanger is deactivated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with modulating bypass heat exchanger and on/off cooling valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).
- on/off cooling valve 003=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5),

or on/off mixed-use valve in cooling 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5).



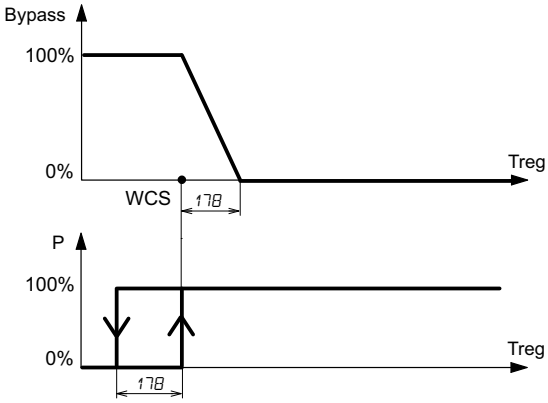
Treg: control temperature
WCS: cooling operation setpoint
122*: hysteresis for on/off output*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating bypass damper output
dashed curve: on/off cooling valve output
P: rotary on/off heat exchanger output

With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the rotary on/off heat exchanger is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening position (parameter 164) in the band defined by 122/2. The cooling valve is activated if Treg > (WCS + 122) and deactivated if Treg <= (WCS + 122/2).
The rotary on/off heat exchanger is deactivated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with modulating bypass heat exchanger without cooling valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3).



Treg: control temperature
WCS: cooling operation setpoint
178: *hysteresis regulation free heating/cooling*
Bypass: modulating bypass damper output
P: rotary on/off heat exchanger output

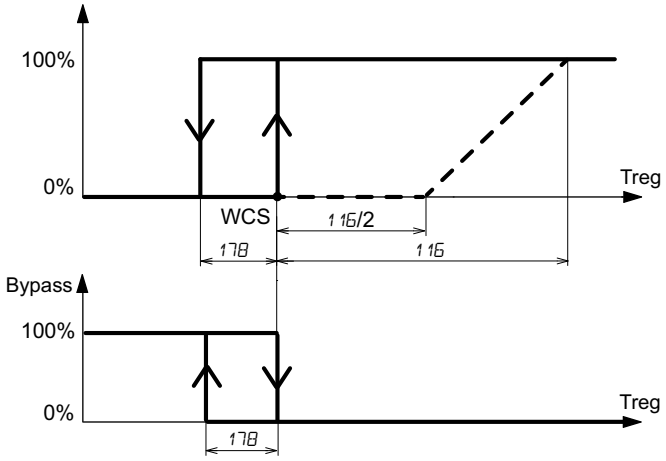
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the rotary on/off heat exchanger is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening position (parameter 164) in the band defined by 178.
The rotary on/off heat exchanger is deactivated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with on/off bypass heat exchanger and cooling modulating valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- modulating cooling valve 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3)

or modulating mixed-use cooling valve 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).



Treg: control temperature
WCS: cooling operation setpoint
116*: cooling proportional band*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: rotary on/off heat exchanger output
dashed curve: modulating cooling valve output
Bypass: on/off bypass damper output

With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the rotary on/off heat exchanger is activated

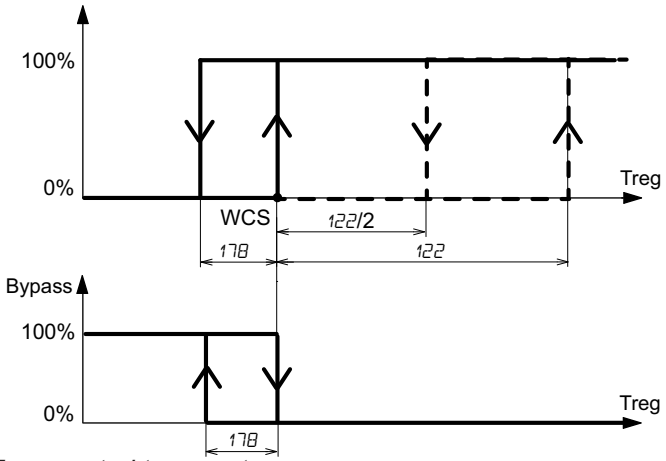
and the on/off bypass is deactivated.
The cooling valve goes from closed position to open position when Treg changes from (WCS + 116/2) to (WCS + 116).
The rotary on/off heat exchanger is deactivated and the bypass damper activated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with on/off bypass heat exchanger and on/off cooling valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- on/off cooling valve 003=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5),

or on/off mixed-use valve in cooling 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5).



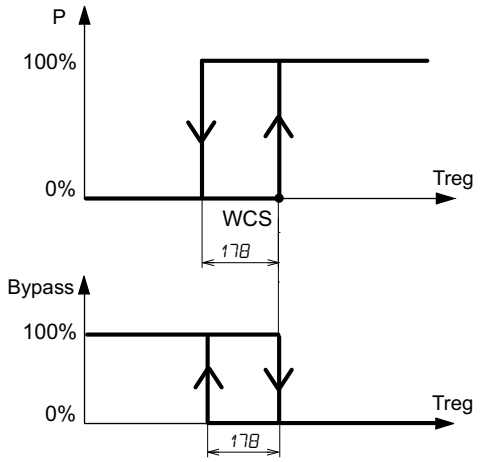
Treg: control temperature
WCS: cooling operation setpoint
122*: hysteresis for on/off output*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: rotary on/off heat exchanger output
dashed curve: on/off cooling valve output
Bypass: bypass damper for heat exchanger output

With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the rotary on/off heat exchanger is activated and the on/off bypass is deactivated. The cooling valve is activated if Treg > (WCS + 122) and deactivated if Treg <= (WCS + 122/2)
The rotary on/off heat exchanger is deactivated and the bypass damper activated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with on/off bypass heat exchanger without cooling valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5).



Treg: control temperature
WCS: cooling operation setpoint
178: *hysteresis regulation free heating/cooling*
P: rotary on/off heat exchanger output
Bypass: on/off bypass damper output

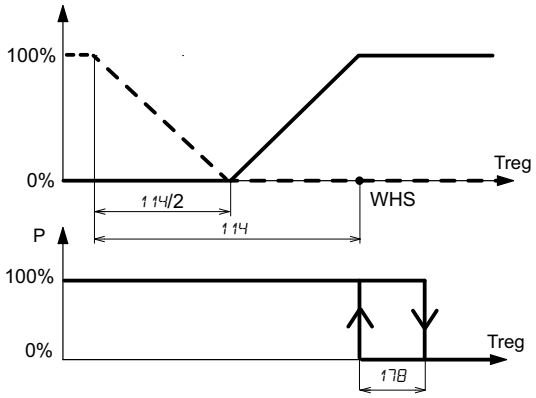
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the rotary on/off heat exchanger is activated and the on/off bypass is deactivated. The rotary on/off heat exchanger is deactivated and the bypass damper activated if Treg <= (WCS - 178). The icon ❄ is switched off.

Operation with modulating bypass heat exchanger and modulating heating valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3),
- modulating heating valve 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3)

or modulating mixed-use valve in heating 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3)
or modulating electrical resistance 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3)



Treg: control temperature
WHS: heating operation setpoint
114*: heating proportional band*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating bypass damper output
dashed curve: modulating heating valve output
P: rotary on/off heat exchanger output

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon ♨ is switched on, the rotary on/off heat exchanger is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening posi-

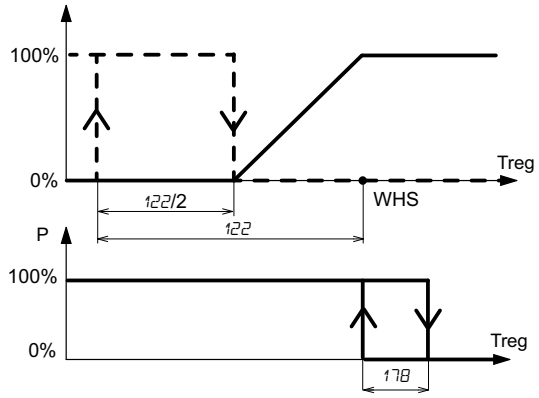
tion (parameter 164) in the band defined by 114/2. The heating valve goes from closed position to open position when Treg changes from (WHS - 114/2) to (WHS - 114).
The rotary on/off heat exchanger is deactivated if Treg >= (WHS + 178). The icon is switched off.

Operation with modulating bypass heat exchanger and on/off heating valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3),
- heating valve on/off 002=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5)

or electrical resistance on/off 002=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)
or on/off mixed-use valve in heating 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5)



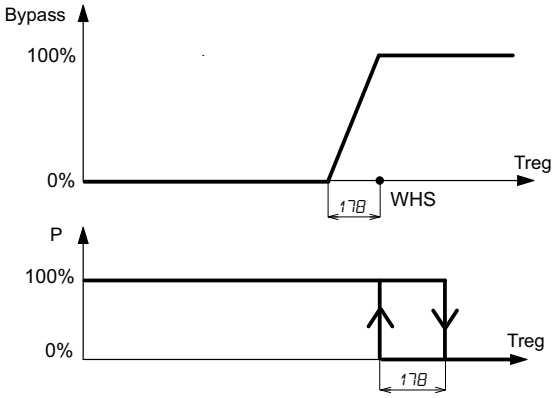
Treg: control temperature
WHS: heating operation setpoint
122*: hysteresis for on/off output*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating bypass damper for heat exchanger output
dashed curve: on/off heating valve output
P: rotary on/off heat exchanger output

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon is switched on, the rotary on/off heat exchanger is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening position (parameter 164) in the band defined by 122/2. The heating valve is activated when Treg < (WHS - 122) and deactivated when Treg >= (WHS - 122/2).
The rotary on/off heat exchanger is deactivated if Treg >= (WHS + 178). The icon is switched off.

Operation with modulating bypass heat exchanger without heating valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 010=4, 011=1, 030=13 (AO1) or 031=13 (AO2) or 032=13 (AO3),



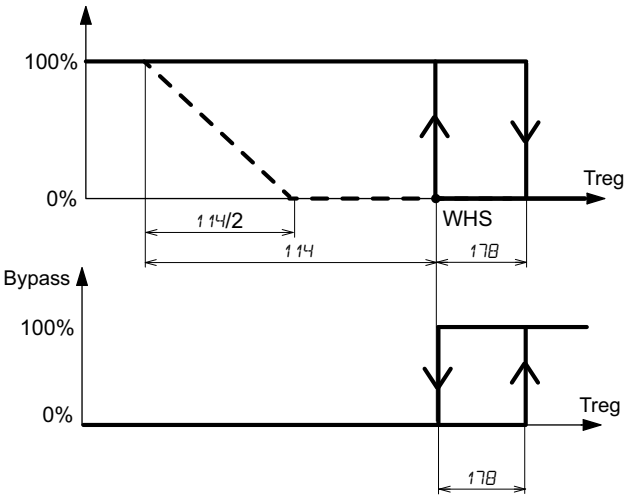
Treg: control temperature
WHS: heating operation setpoint
178: *hysteresis regulation free heating/cooling*
Bypass: modulating bypass damper for heat exchanger output
P: rotary on/off heat exchanger output

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon ♨ is switched on, the rotary on/off heat exchanger is activated and the modulating bypass damper goes from the maximum opening position (parameter165) to the minimum opening position (parameter 164) in the band defined by 178.
The rotary on/off heat exchanger is deactivated if Treg >= (WHS + 178). The icon ♨ is switched off.

Operation with on/off bypass heat exchanger and heating modulating valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- modulating heating valve 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3)
or modulating mixed-use valve in heating 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3)
or modulating electrical resistance 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3)



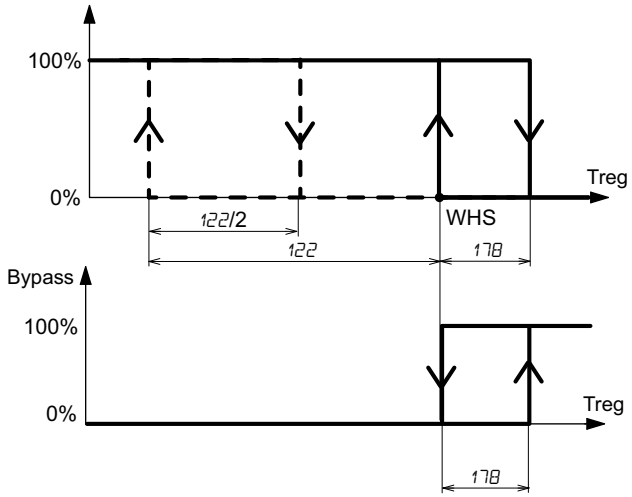
Treg: control temperature
WHS: heating operation setpoint
114*: heating proportional band*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: rotary on/off heat exchanger output
dashed curve: modulating heating valve output
Bypass: on/off bypass damper output

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon is switched on, the rotary on/off heat exchanger is activated and the on/off bypass damper is deactivated.
The heating valve goes from closed position to open position when Treg changes from (WHS - 114/2) to (WHS - 114).
The rotary on/off heat exchanger is deactivated and bypass activated if Treg >= (WHS + 178). The icon is switched off.

Operation with on/off bypass heat exchanger and heating on/off valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- heating valve on/off 002=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5)
or electrical resistance on/off 002=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)
or on/off mixed-use valve in heating 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5)



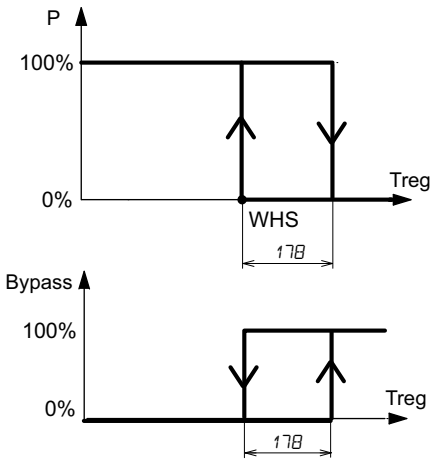
Treg: control temperature
WHS: heating operation setpoint
122*: hysteresis for on/off output*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: rotary on/off heat exchanger output
dashed curve: on/off heating valve output
Bypass: bypass damper for heat exchanger output

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon is switched on, the rotary on/off heat exchanger is activated and the on/off bypass damper is deactivated.
The heating valve is activated if Treg < (WHS - 122) and deactivated if Treg >= (WHS - 122/2).
The rotary on/off heat exchanger is deactivated and bypass activated if Treg >= (WHS + 178). The icon is switched off.

Operation with on/off bypass heat exchanger without heating valve:

Do following settings:
- set type of heat exchanger 012=3,
- select a digital output for the rotary on/off heat exchanger 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5)



Treg: control temperature
WHS: heating operation setpoint
178: *hysteresis regulation free heating/cooling*
P: rotary on/off heat exchanger output
Bypass: bypass damper for heat exchanger output

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon is switched on, the rotary on/off heat exchanger is activated and the on/off bypass damper is deactivated.
The rotary on/off heat exchanger is deactivated and bypass activated if Treg >= (WHS + 178). The icon is switched off.

During operation, the ON or OFF icons indicate the status of the heat exchanger:

Icon status	Indication
ON icon is on	Rotary on/off heat exchanger running, heat recovery in progress
OFF icon is flashing	Rotary on/off heat exchanger stopped for free heating or free cooling
OFF icon is on	Rotary on/off heat exchanger stopped, heat exchanger off

By Modbus, it is also possible to see the status of the heat exchanger (see *"42. Modbus (for AHU-xMxSx1 models)" page 138*).

Note: Frost protection of heat exchanger is considered for rotary on/off heat exchanger. If a frost protection of heat exchanger occurs, the rotary on/off heat exchanger is forced to run;
If parameter 186 ≠ 1 and 3, on/off bypass is forced to OFF, modulating bypass is forced to minimum opening position defined by parameter164.
If parameter 186=1 or 3, on/off bypass is forced to ON, modulating bypass is forced to maximum opening position defined by parameter165.

• Modulating rotary heat exchanger:

To be able to operate, ventilation must be activated; otherwise, it is always disabled.

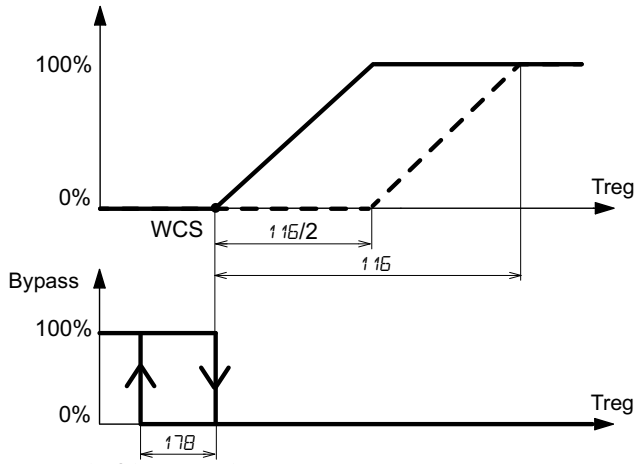
if a request of cooling/heating is present with cooling recovery/heating recovery conditions, the modulating rotary heat exchanger modulates his speed from the minimum defined by parameter 183 to the maximum defined by parameter 184
If a on/off bypass damper is present, it is activated only if speed of rotary heat exchanger is 0.
The modulating bypass damper can't be used for modulating rotary heat exchanger.

Operation with on/off bypass heat exchanger and cooling modulating valve:

Do following settings:
- set type of heat exchanger 012=4,
- select an analogue output for the modulating rotary heat exchanger 030=12 (AO1) o 031=12 (AO2) o 032=12 (AO3),
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- modulating cooling valve 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3),

or modulating mixed-use cooling valve 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3).



Treg: control temperature
WCS: cooling operation setpoint
116*: cooling proportional band*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating rotary heat exchanger output
dashed curve: modulating cooling valve output
Bypass: on/off bypass damper output with 183=*0 (with* 183≠0*, the bypass is always OFF)*

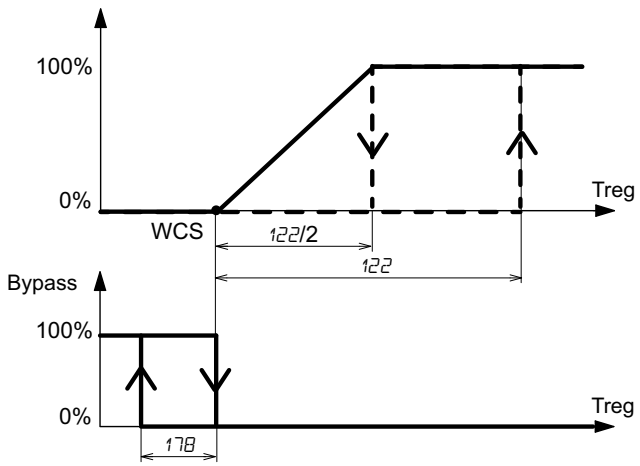
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, the on/off bypass damper is deactivated (with 183=0), icon ❄ is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WCS to (WCS + 116/2). The cooling valve goes from closed position to open position when Treg changes from (WCS + 116/2) to (WCS + 116).
The modulating rotary heat exchanger reaches its minimum speed if Treg <= WCS:
if minimum speed is different from 0 (183≠0), icon ❄ is switched off and the bypass remains OFF.
if minimum speed is equal to 0 (183=*0*), and if Treg <= (WCS - 178) the on/off bypass damper is activated and icon ❄ is switched off.

Operation with on/off bypass heat exchanger and cooling on/off valve:

Do following settings:
- set type of heat exchanger 012=4,
- select an analogue output for the modulating rotary heat exchanger 030=12 (AO1) o 031=12 (AO2) o 032=12 (AO3),
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- on/off cooling valve 003=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5),

or on/off mixed-use valve in cooling 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5).



Treg: control temperature
WCS: cooling operation setpoint
122*: hysteresis for on/off output*

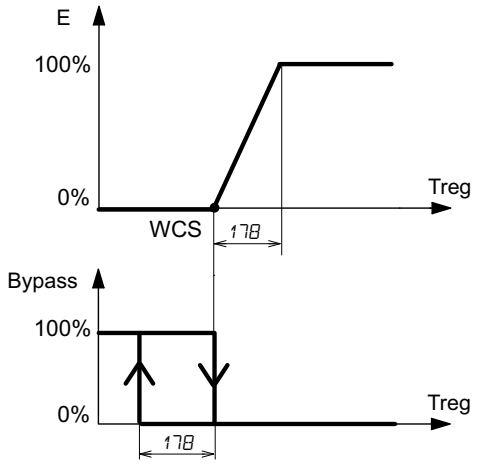
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating rotary heat exchanger output
dashed curve: on/off cooling valve output
Bypass: on/off bypass damper output with 183=*0 (with* 183≠0*, the bypass is always OFF)*

With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, the on/off bypass damper is deactivated (with 183=0), icon ❄ is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WCS to (WCS + 122/2).
The on/off cooling valve is activated if Treg > (WCS + 122) and is deactivated if Treg <= (WCS + 122/2).
The modulating rotary heat exchanger reaches its minimum speed if Treg <= WCS:
if minimum speed is different from 0 (183≠0), icon ❄ is switched off and the bypass remains OFF.
if minimum speed is equal to 0 (183=*0*), and if Treg <= (WCS - 178) the on/off bypass damper is activated and icon ❄ is switched off.

Operation with on/off bypass heat exchanger without cooling valve:

Do following settings:
- set type of heat exchanger 012=4,
- select an analogue output for the modulating rotary heat exchanger 030=12 (AO1) o 031=12 (AO2) o 032=12 (AO3),
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5).



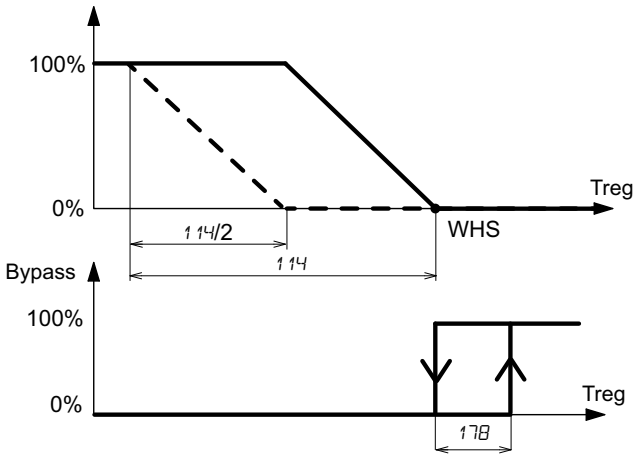
Treg: control temperature
WCS: cooling operation setpoint
178: *hysteresis regulation free heating/cooling*
E: modulating rotary heat exchanger output
Bypass: on/off bypass damper output with 183=*0 (with* 183≠0*, the bypass is always OFF)*

With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, the on/off bypass damper is deactivated (with 183=0), icon ❄ is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WCS to (WCS + 178).
The modulating rotary heat exchanger reaches its minimum speed if Treg <= WCS:
- with 183=0 minimum speed of modulating rotary heat exchanger is equal to 0. The bypass is activated if Treg <= (WCS - 178), icon ❄ is switched off,
- with 183≠0 minimum speed of modulating rotary heat exchanger is not equal to 0, icon ❄ is switched off and the bypass remains OFF.

Operation with on/off bypass heat exchanger and heating modulating valve:

Do following settings:
- set type of heat exchanger 012=4,
- select an analogue output for the modulating rotary heat exchanger 030=12 (AO1) o 031=12 (AO2) o 032=12 (AO3),
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)

- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- modulating heating valve 002=2 and 030=3 (AO1) or 031=3 (AO2) or 032=3 (AO3)
or modulating mixed-use valve in heating 002=2 003=1 and 030=5 (AO1) or 031=5 (AO2) or 032=5 (AO3)
or modulating electrical resistance 002=1 and 030=6 (AO1) or 031=6 (AO2) or 032=6 (AO3)

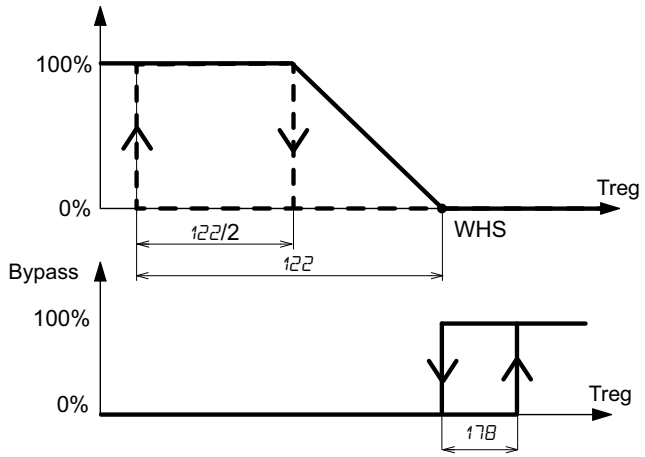


Treg: control temperature
WHS: heating operation setpoint
114*: heating proportional band*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating rotary heat exchanger output
dashed curve: modulating heating valve output
Bypass: on/off bypass damper output with 183=*0 (with* 183≠0*, the bypass is always OFF)*

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, the on/off bypass damper is deactivated (with 183=0), icon ♨ is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WHS to (WHS - 114/2). The heating valve goes from closed position to open position when Treg changes from (WHS - 114/2) to (WHS - 114).
The modulating rotary heat exchanger reaches its minimum speed if Treg >= WHS:
if minimum speed is different from 0 (183≠0), icon ♨ is switched off and the bypass remains OFF.
if minimum speed is equal to 0 (183=*0*), and if Treg <= (WHS + 178) the on/off bypass damper is activated and icon ♨ is switched off.

Operation with on/off bypass heat exchanger and heating on/off valve:

Do following settings:
- set type of heat exchanger 012=4,
- select an analogue output for the modulating rotary heat exchanger 030=12 (AO1) o 031=12 (AO2) o 032=12 (AO3),
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- heating valve on/off 002=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5)
or electrical resistance on/off 002=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5)
or on/off mixed-use valve in heating 002=4, 003=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5)



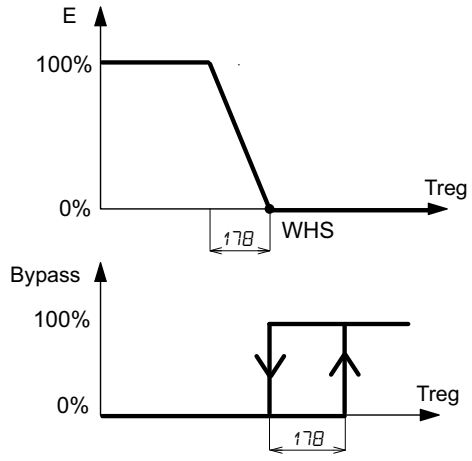
Treg: control temperature
WHS: heating operation setpoint
122*: hysteresis for on/off output*
178: *hysteresis regulation free heating/cooling*
solid curve upper part: modulating rotary heat exchanger output
dashed curve: on/off heating valve output
Bypass: on/off bypass damper output with 183=*0 (with* 183≠0*, the bypass is always OFF)*

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, the on/off bypass damper is deactivated (with 183=0), icon ♨ is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WHS to (WHS - 122/2).
The on/off heating valve is activated if Treg < (WHS - 122) and is deactivated if Treg >= (WHS - 122/2).
The modulating rotary heat exchanger reaches its minimum speed if Treg >= WHS:
if minimum speed is different from 0 (183≠0), icon ♨ is switched off and the bypass remains OFF.
if minimum speed is equal to 0 (183=*0*), and if Treg >= (WHS + 178) the on/off bypass damper is activated and icon ♨ is switched off.

Operation with on/off bypass heat exchanger without heating valve:

Do following settings:
- set type of heat exchanger 012=4,
- select an analogue output for the modulating rotary heat exchanger 030=12 (AO1) o 031=12 (AO2) o 032=12 (AO3),
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define external sensor 019=3 (AI1) or 021=3 (AI2) or 023=3 (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 010=2, 011=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5).



Treg: control temperature
WHS: heating operation setpoint
178: *hysteresis regulation free heating/cooling*
E: modulating rotary heat exchanger output
Bypass: on/off bypass damper output with 183=*0 (with* 183≠0*, the bypass is always OFF)*

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, the on/off bypass damper is deactivated (with 183=0), icon is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WHS to (WHS - 178).
The modulating rotary heat exchanger reaches its minimum speed if Treg >= WHS:
- with 183=0 minimum speed of modulating rotary heat exchanger is equal to 0. The bypass is activated if Treg >= (WCS + 178), icon is switched off,
- with 183≠0 minimum speed of modulating rotary heat exchanger is not equal to 0, icon is switched off and the bypass remains OFF.

During operation, the ON or OFF icons indicate the status of the heat exchanger:

Icon status	Indication
ON icon is on	Rotary heat exchanger running, heat recovery in progress
OFF icon is flashing	Rotary heat exchanger stopped for free heating or free cooling
OFF icon is on	Rotary heat exchanger stopped, heat exchanger off

By Modbus, it is also possible to see the status of the heat exchanger (see *"42. Modbus (for AHU-xMxSx1 models)" page 138*).

Note: Frost protection of heat exchanger is considered for rotary modulating heat exchanger. If a frost protection of heat exchanger occurs, the rotary modulating heat exchanger is forced to run at maximum speed;
If parameter 186 ≠ 1 and 3, on/off bypass is forced to OFF.
If parameter 186=1 or 3, on/off bypass is forced to ON.

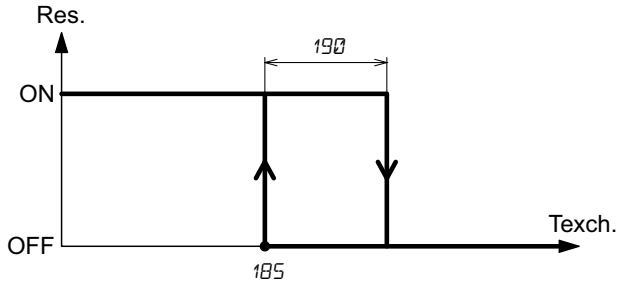
25. Frost protection operation of the heat exchanger

On cross-flow heat exchanger frost can be present during the winter season.
The detection of the risk of frost formation can be done either by a contact coming from a frost protection thermostat or by a frost protection sensor placed on the heat exchanger.
To activate the detection using a contact, set 015=14 (DI1) or 017=14 (DI2) or an analogue input configured as a “frost protection heat exchanger contact” 019=21 (AI1) or 021=21 (AI2) or 023=21 (AI3).
To activate the detection using a frost protection sensor on the heat exchanger, set 019=4 (AI1) or 021=4 (AI2) or 023=4 (AI3).

In case of a frost protection on heat exchanger, it is possible to select, by parameter 186, which action to do for defrosting.
If 186=0 the speed of the supply fan is reduced relative to the extract fan. The parameter 187 allows you to select the percentage of the speed reduction.
If 186=1 the bypass is open, allowing the heat recovery air to heat the heat exchange device plates.
If 186=2 a pre-heating electrical resistance placed on the heat exchanger is activated. In this case, carry out the following settings:
If 186=3 the speed of the supply fan is reduced relative to the extract fan and the bypass is open. The parameter 187 allows you to select the percentage of the speed reduction. The bypass is open, allowing the heat recovery air to heat the heat exchange device plates
Se 186=4 the speed of the supply fan is reduced relative to the extract fan and a pre-heating electric heater placed on the heat exchanger is activated. The parameter 187 allows you to select the percentage of the speed reduction.

If a pre-heating electrical resistance, placed on the heat exchanger, is used, do the following settings:
- select which digital output will control the pre-heating electrical resistance 025=15 (DO1) or 026=15 (DO2) or 027=15 (DO3) or 028=15 (DO4) or 029=15 (DO5)
- select a sensor with frost protection function for the heat exchanger 019=4 (AI1) or 021=4 (AI2) or 023=4 (AI3).

The pre-heating resistance is controlled based on the following logic:



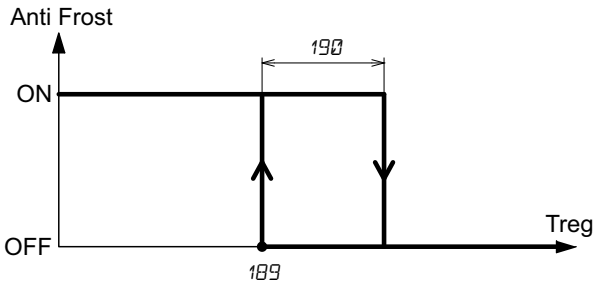
Res.: pre-heating electrical resistance
Texch.: frost protection temperature sensor of the heat exchanger
185*: heat exchanger frost protection setpoint*
If Texch < 185 is activated, the pre-heating resistance is activated and the icon is displayed, the and icons flash and the message ALC is displayed on the alarms page.

If Texch >= (185 + 190), the pre-heating resistance is disabled, the , and icons switch off.

If the frost protection sensor in the heat exchanger has an error, the frost protection operation of the heat exchanger is disabled.

26. Frost protection operation of the heating battery

The frost protection operation on the heating battery can be activated by an external contact, by an antifreeze heating battery sensor or by the control sensor.
To enable the frost protection operation, set 188=1.
To use a frost protection contact, select 015=6 (DI1) or 017=6 (DI2).
To use an analogue input configured for “frost protection” select 019=13 (AI1) or 021=13 (AI2) or 023=13 (AI3).
To use a sensor as antifreeze heating battery sensor select 019=22 (AI1) or 021=22 (AI2) or 023=22 (AI3)
If no digital contact is configured for frost protection 015≠6 (DI1) and 017≠6 (DI2), no analogue input is configured for “frost protection” 019≠13 (AI1) and 021≠13 (AI2) and 023≠13 (AI3) or as antifreeze heating battery sensor 019≠22 (AI1) or 021≠22 (AI2) or 023≠22 (AI3) then the control sensor is used for this operation.



Anti Frost.: frost protection alarm
Treg.: control sensor considered for antifreeze heating battery function
189*: frost protection heating battery setpoint*
190*: frost protection heating battery hysteresis*

If Treg < 189 frost protection alarm is activated, the and icons flash and the message ALF is displayed on the alarms page. The heating battery is activated to 100% and all other outputs are disabled. In case of the presence of a modulating cooling valve, it takes the position defined by the parameter 191. If a digital output is set as antifreeze heating coil alarm relay 025=21 (DO1) or 026=21 (DO1) or 027=21 (DO1) or 028=21 (DO1) or 029=21 (DO1), the corresponding relay is activated.

If Treg >= (189 + 190), the frost protection alarm is disabled and the and icons turn off. If a digital output is set as antifreeze heating coil alarm relay 025=21 (DO1) or 026=21 (DO1) or 027=21 (DO1) or 028=21 (DO1) or 029=21 (DO1), the corresponding relay is deactivated.

In case the control sensor has an error, the frost protection operation is disabled.

27. Anti-condensation function

If one of the digital inputs is configured as a condensation alarm contact 015=8 (DI1) or 017=8 (DI2) or an analogue input is configured as a “condensation contact” 019=15 (AI1) or 021=15 (AI2) or 023=15 (AI3), and condensation alarm is activated, the cooling valve is closed while the other functions remain active and the and icons flash.

28. Timer extension or forced presence modes

If timer periods are used for the “economy/boost” function (199=0) in the event that the “economy/boost” or “non-occupied holiday” functions are used, the operating setpoints are calculated considering parameters 120 (economy/boost offset) and 121 (“non-occupied/holiday” operating mode offset).
It is possible to bypass these functions and continue regulation with the base setpoints for a certain period of time (parameter 198).
To bypass these functions, set the timer extension manually using the MODE button (see *“4. Quick access parameter setting” page 8* or use an external contact 015=5 (DI1) or 017=5 (DI2) or use an analogue input configured as a “forcing presence contact” 019=12 (AI1) or 021=12 (AI2) or 023=12 (AI3).

If the timer periods are used to switch on/off the appliance199=1, and the timer extension function is activated by the MODE button, the unit does not consider the timer periods and keeps the appliance switched on for the time corresponding to the parameter 198.

To activate the timer extension function manually, set the parameter MOC to OC (see *“MODE button functionality” page 10*). Once activated, a delay equal to the value of the parameter198 must expire before normal operation resumes.

Once the timer extension function is activated by the external contact, the bypass of the functions continues as long as the contact is in active position.

29. Dirty filter

The dirty filter function counts the fan's hours of operation and displays a flashing warning message with the icon when it exceeds the maximum number of hours defined by parameter 192.
In this case, the fan filter is considered to be dirty and must be changed.

To activate the dirty filter function, set the maximum number of hours with the parameter 192 (not equal to zero).
To deactivate this function, set the maximum number of hours to count to 0.

With the function activated, the counter of the fan's hours of operation is saved to the memory every 2 hours. To reset the counter, set the parameter 203 to 1. The counter is reset and parameter 203 changes to 0 automatically and the icon stops flashing until the counter again exceeds the value of parameter 192.

Note: With the function deactivated the fan's operating hours are not counted.

30. Summertime changeover

The device is configured to change to summertime automatically in some areas of the world.
To be able to use this function:
- set the parameter 197 to 1 if the controller is used in Europe,
- set the parameter 197 to 2 if the controller is used in the USA. In the latter case, also set the unit of measurement to °F by setting the parameter 196 to 1. All temperature parameters will then be expressed in °F and the controller will use this scale automatically.

For all regions different from Europe and the USA, set the parameter 197 to 0. In this case, the summertime change cannot be updated automatically. Update the time appropriately for the country concerned.

31. AI3 sensor used as 0...10 V input

In **AI3** sensor with input 0...10 V is used, position the JP1 jumper in the "3-2" position and set the parameter 023 to 5 or 6 or 7.
If 023 = 5, the appliance is configured to read the air quality sensor with 0..10 V output. The scale is automatically set to:
206 = 0 (scale lower end) and 207 = 2000 (scale upper end), and the unit of measurement 208 to 0 (ppm).
If 023 = 6, the appliance is configured to read the humidity sensor with 0..10 V output. The scale is automatically set to:
206 = 0 and 207 = 100, and the unit of measurement 208 to 1 (%r.h).
If 023 = 7, the appliance is configured to read a pressure transmitter with 0..10 V output. Set the lower end scale 206 and the upper end scale at 207. Set the unit of measurement 208 to 2.

To display the corresponding value on display B, set the parameter 194 to 14.
It is possible, using parameter 209,to correct the displayed value.
Depending on the size of the scale, the value is displayed on the display with or without the decimal point.

32. Forced outputs via Modbus

It is possible to force any output via Modbus independently of the appliance's regulation. To force this output, write the forced key to the FORCED_OUTPUTS_KEY register (10083) and then write the appropriate value to the address corresponding to the output to be forced.

Definition of the forced key
The forced key is a 16-bit variable comprising 2 parts: the upper weighting has a fixed value (01100110) and the lower weighting is a variable, depending on the forcing requests.

Upper weighting	Lower weighting							
from 15 to 8 bits	**bit 7**	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**
01100110 fixed value	x AO3	x AO2	x AO1	x DO5	x DO4	x DO3	x DO2	x DO1

x=0 refers to an output which is not able to be forced (the output takes the value given by the regulation);
x=1 refers to an output which can be forced. The output is disconnected from the controller and takes the value imposed via Modbus, writing to the relevant register.

Output enabled in forced mode	Modbus write register and address	
AO3	**OUT_C**	10015
AO2	**OUT_B**	10014
AO1	**OUT_A**	10013
DO5	**STATE_REL5**	10012
DO4	**STATE_REL4**	10011
DO3	**STATE_REL3**	10010
DO2	**STATE_REL2**	10009
DO1	**STATE_REL1**	10008

Example:
Enabling of relay 1 in forced mode:
Forced key = 01100110 00000001 in binary, 26113 in decimal.
Write variable FORCED_OUTPUTS_KEY to 26113.
Activation of the relay: write variable STATE_REL1 to 1.
Deactivation of the relay: write variable STATE_REL1 to 0.

Enabling of analogue output **AO2**:
Forced key = 01100110 01000000 in binary, 26176 in decimal.
Write variable FORCED_OUTPUTS_KEY to 26176.
Configuration of output to 3.4 V: write variable OUT_B to 34.

It is possible to enable forced mode for one or more outputs.

Example:
Enabling of relays 2 and 3 and analogue output **AO1** in forced mode:
Forced key = 01100110 00100110 in binary, 26150 in decimal.
Write variable FORCED_OUTPUTS_KEY to 26150.
Activation of relay 2: write variable STATE_REL2 to 1.
Activation of relay 3: write variable STATE_REL3 to 1.
Configuration of output to 4.2 V: write the variable OUT_A to 42.

In forced mode, the ⚠ 485 icon is continuously displayed on the setpoint modification menu.

To exit forced outputs mode, write variable FORCED_OUTPUTS_KEY to 0.

Note:
If the controller is connected to a master control system and the forced outputs option is selected, AB Industrietechnik does not take responsibility for any damage caused by the incorrect command of these outputs.

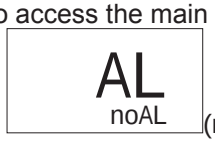
33. Alarms

The alarms enable the detection of one or more abnormal conditions during the operation of the controller. You can see more alarms by accessing the dedicated alarms pages.

To access the alarms pages, proceed as follows:

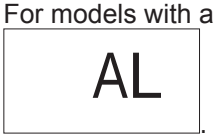
Press the ▲ and ▼ buttons together to access the main menu. The following screen displays:

(model **AHU-xxCSx1**) or



(model **AHU-xxSSx1**)

For models with a clock, press the ▲ or ▼ button until the following screen is displayed:



Press the ⏻ button to access the alarms pages.

Display A displays the alarms page and display B displays an alarm message (see the table below) or if there is no alarm, the message noAL appears.
Press the ▲ button to see more alarms that may be present. Press the ▼ button to return to the list of alarms.

Alarms table

Message	Alarm type	Action on control	Icons displayed
noAL	No alarm_	-	-
CoF	Configuration not valid	Outputs for valves, electric heater, humidifier and dehumidifier are deactivated	⚠
FIA	Severe filter	All control is stopped.	⚠
FI-	General filter	Just an indication, no effect on control.	⚠
FIS	Supply filter	Just an indication, no effect on control.	⚠
FIE	Extractor filter	Just an indication, no effect on control.	⚠
AL-	General	Just an indication, no effect on control.	⚠
ALC	Condensation	Only operates in cooling. Humidifier OFF. Cooling valve closed.	⚠
ALF	Frost protection	Dehumidifier OFF. Humidifier OFF. Fans OFF. Free heating or free cooling OFF. Heating valve opened to the maximum. Modulating cooling valve positioned based on the parameter 191.	⚠
AFC	Frost protection heat exchanger	If 186=0, reduction of supply fan speed. If 186=1, bypass open. If 186=2, activation of pre-heating heat exchanger resistance. If 186=3 reduction of supply fan speed and bypass open If 186=4 reduction of supply fan speed and activation of pre-heating heat exchanger resistance	⚠
E0t	Internal sensor has an error	If used as a regulation sensor, the elements being controlled are disabled.	⚠
E01	AI1 sensor has an error (*)	If used as a regulation sensor, the elements being controlled are disabled.	⚠

E02	AI2 sensor has an error (*)	If used as a regulation sensor, the elements being controlled are disabled.	⚠.
E03	AI3 sensor has an error (*)	If used as a regulation sensor, the elements being controlled are disabled.	⚠.
E0H	Internal humidity sensor (*)	If used for humidity control, the humidity detected is set to 0.	⚠.
LILt	Low temperature limit	see paragraph *"14. Supply limits function with fixed-point control" page 33*	⚠.
LIHt	High temperature limit	see the limits paragraph *"14. Supply limits function with fixed-point control" page 33*	⚠.
LILH	Low humidity limit	Dehumidifier OFF	
LIHH	High humidity limit	Humidifier OFF	
ALU	Fans	Activation of digital output for fan alarms if configured 025=18 (DO1) or 026=18 (DO2) or 027=18 (DO3) or 028=18 (DO4) or 029=18 (DO5)	
ECL	Clock	Just an indication, no effect on control.	

(*) If the sensors used for the controller are faulty (open or in short circuit), the valve and/or electrical resistances are deactivated, the free cooling/heating is deactivated (if in operation) and the bypass damper is set to off.
Example:
001=0, 015=1 and 106=75, sensor **AI1** used as a remote sensor in combination with the internal sensor.
If the sensor **AI1** is broken, the operating sensor becomes the internal sensor, regardless of the value of parameter 106.
If the internal sensor is broken, the operating sensor becomes the sensor **AI1,** regardless of the value of parameter 106.
If both are broken, the operating sensor cannot be determined. Regulation is stopped.

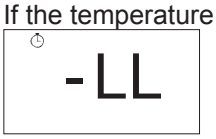
If parameter 193 or 194 is set to 6, the corresponding operating setpoint is shown on the display. If the operating temperature cannot be calculated (sensor open or in short circuit), "- - -" is shown on the display.

For sensors used as external sensors in the event of a sensor failure, the heating compensation setpoint function is not blocked:
- in the event of a short circuit on the sensor, the temperature is considered to be high and setpoint 134 is used as the compensated setpoint.
- in the event of an open sensor, the temperature of the sensor is considered to be low and the setpoint 133 is used as the compensation setpoint (see paragraph *"15. Control with setpoint compensation" page 37*).

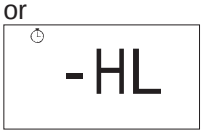
For sensors used as external sensors, in the event of a sensor failure, the cooling compensation setpoint function is not blocked:
- in the event of a short circuit on the sensor, the temperature is considered to be high and setpoint 138 is used as the compensation setpoint.
- in the event of an open sensor, the temperature of the sensor is considered to be low and the setpoint 137 is used as the compensation setpoint (see paragraph *"15. Control with setpoint compensation" page 37*).

If a sensor is used as a supply sensor, in the event of failure the functions of this sensor are blocked. If the limit functions are enabled, these are not taken into consideration.

If the temperature sensor displayed on display A is in alarm, the following screen is displayed if the sensor is open:



or

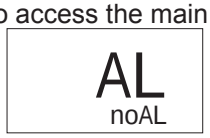


if the sensor is in short circuit.

34. Parameter factory settings (level 1 password)

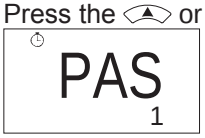
The manufacturer parameters are password protected.
Press the ▲ and ▼ buttons together to access the main menu. The following screen is displayed:

(model **AHU-xxCSx1**) or



(model **AHU-xxSSx1**)

Press the ▲ or ▼ button to display the following screen:



Press the ⏻ button and then the ▲ button until the value **22** is displayed.
Press the ⏻ button to access level 1. The screen corresponding to the first level 1 parameter is displayed:

Use the ▲ or ▼ button to scroll through the parameters.
To modify a parameter press the ⏻ button and then the ▲ or ▼ buttons to select its value.

Press the ⏻ button to save the value or the ESC button to exit the parameter editing mode without saving.

To exit the menu, press the ESC button one or more times or wait for about 120 seconds.

Parameter	Description	Default	Min	Max
001	Type of control sensor 0=control with room sensor 1=control with supply sensor	0	0	1
002	Type of heating battery 0=no heating battery 1=modulating electrical resistance 2=modulating valve 3=on/off electrical resistance 4=on/off valve	0	0	4
003	Type of cooling battery 0=no cooling battery 1=modulating valve 2=on/off valve	0	0	2
004	Type of post-heating battery 0=no post-heating battery 1=modulating electrical resistance 2=modulating valve 3=on/off electrical resistance 4=on/off valve	0	0	4
005	Post-heating battery operation 0=post-heating 1=integration and post-heating 2=additional heating battery	0	0	2
006	Type of humidifier battery 0=no humidifier battery 1=modulating 2=on/off	0	0	2
007	Type of dehumidifier battery 0=cooling battery 1=modulating 2=on/off	0	0	2
008	Type of fan 0=non-controlled fan 1=single-speed on/off fan 2=two-speed on/off fan 3=three-speed on/off fan 4=modulating fan 5=fan present but not controlled	0	0	5

Parameter	Description	Default	Min	Max
009	Type of fan control 0=manual 1=regulation based on CO_2 2=regulation based on temperature 3=regulation based on on/off temperature 4=regulation based on temperature+CO_2 5=regulation based on pressure/flow rate (direct action) 6=regulation based on pressure/flow rate (reverse action) 7=regulation based on dehumidification	0	0	7
010	Type of control damper 0=no damper regulated 1=on/off regulated 2=on/off bypass for heat exchanger 3=external modulating damper 4=modulating bypass for heat exchanger 5=on/off bypass for cross-flow heat exchanger (free H/C only)	0	0	5
011	Damper action 0=CO_2 1=free cooling/heating 2=free cooling/heating, CO_2 3=dehumidification	1	0	3
012	Type of heat exchanger 0=non-controlled heat exchanger 1=cross-flow heat exchanger 2=double battery heat exchanger 3=rotary on/off heat exchanger 4=modulating rotary heat exchanger	0	0	4
013	Activation of mid-season operation 0=not enabled 1=enabled	0	0	1
014	Unit regulation type 0=fixed point control for 2-pipe operation 1=control with offset for 2-pipe operation 2=cascade control 3=fixed point control for 4-pipe operation 4=control with compensation for 4-pipe operation	0	0	4
015	Digital input 1 function: 0=not used 1=remote season change (INPUT ON=winter, INPUT OFF=summer) 2=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 3=non-occupied holiday (INPUT ON=Occupied) 4=economy/boost (INPUT ON = economy activated) 5=forced presence contact (INPUT ON = forced -> control with base setpoint) 6=frost protection (INPUT ON=frost protection alarm) 7=generic alarm (INPUT ON=generic alarm) 8=condensation contact (INPUT ON=condensation alarm) 9=generic filter contact (INPUT ON=generic filter alarm) 10=supply filter contact (INPUT ON=supply filter alarm) 11=extractor filter contact (INPUT ON=extractor filter alarm) 12=stop all alarm contact (INPUT ON=stop all alarm) 13=fan alarm contact (INPUT ON=fan alarm) 14=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm)	0	0	14
016	Digital input 1 contact logic: 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	0	0	1
017	Digital input 2 function: 0=not used 1=remote season change (INPUT ON=winter, INPUT OFF=summer) 2=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 3=non-occupied holiday (INPUT ON=Occupied) 4=economy/boost (INPUT ON = economy activated) 5=forced presence contact (INPUT ON = forced -> control with base setpoint) 6=frost protection (INPUT ON=frost protection alarm) 7=generic alarm (INPUT ON=generic alarm) 8=condensation contact (INPUT ON=condensation alarm) 9=generic filter contact (INPUT ON=generic filter alarm) 10=supply filter contact (INPUT ON=supply filter alarm) 11=extractor filter contact (INPUT ON=extractor filter alarm) 12=stop all alarm contact (INPUT ON=stop all alarm) 13=fan alarm contact (INPUT ON=fan alarm) 14=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm)	0	0	14

Parameter	Description	Default	Min	Max
018	Digital input 2 contact logic: 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	0	0	1
019	Analogue input 1 function: 0=not used 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 8=season change remote contact (INPUT ON=winter, INPUT OFF=summer) 9=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 10=non-occupied/holiday (INPUT ON=occupied) 11=economy/boost (INPUT ON=economy activated) 12=forced presence contact (INPUT ON = forced -> control with base setpoint) 13=frost protection (INPUT ON= frost protection alarm) 14=generic alarm (INPUT ON=generic alarm) 15=condensation contact (INPUT ON=condensation alarm) 16=generic filter contact (INPUT ON=generic filter alarm) 17=supply filter contact (INPUT ON=supply filter alarm) 18=extract filter contact (INPUT ON=extract filter alarm) 19=stop all alarm contact (INPUT ON=stop all alarm) 20=fan alarm contact (INPUT ON=fan alarm) 21=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm) 22=antifreeze heating battery sensor	0	0	22
020	Logic for analogue input 1 (only with 019=8 to 21): 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	0	0	1
021	Analogue input 2 function: 0=not used 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 8=season change remote contact (INPUT ON=winter, INPUT OFF=summer) 9=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 10=non-occupied/holiday (INPUT ON=occupied) 11=economy/boost (INPUT ON=economy activated) 12=forced presence contact (INPUT ON = forced -> control with base setpoint) 13=frost protection (INPUT ON= frost protection alarm) 14=generic alarm (INPUT ON=generic alarm) 15=condensation contact (INPUT ON=condensation alarm) 16=generic filter contact (INPUT ON=generic filter alarm) 17=supply filter contact (INPUT ON=supply filter alarm) 18=extract filter contact (INPUT ON=extract filter alarm) 19=stop all alarm contact (INPUT ON=stop all alarm) 20=fan alarm contact (INPUT ON=fan alarm) 21=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm) 22=antifreeze heating battery sensor	0	0	22
022	Logic for analogue input 2 (only with 021=8 to 21): 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	0	0	1

Parameter	Description	Default	Min	Max
023	Analogue input 3 function: 0=not used 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 5=input 0...10 V for air quality sensor (excludes AHU-3xxSx1 models) 6=0....10 V input for humidity sensor (excludes AH-3xxSx1 models) 7=0...10 V input for pressure transmitter (excludes AHU-3xxSx1 models) 8=season change remote contact (INPUT ON=winter, INPUT OFF=summer) 9=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 10=non-occupied/holiday (INPUT ON=occupied) 11=economy/boost (INPUT ON=economy activated) 12=forced presence contact (INPUT ON = forced -> control with base setpoint) 13=frost protection (INPUT ON= frost protection alarm) 14=generic alarm (INPUT ON=generic alarm) 15=condensation contact (INPUT ON=condensation alarm) 16=generic filter contact (INPUT ON=generic filter alarm) 17=supply filter contact (INPUT ON=supply filter alarm) 18=extract filter contact (INPUT ON=extract filter alarm) 19=stop all alarm contact (INPUT ON=stop all alarm) 20=fan alarm contact (INPUT ON=fan alarm) 21=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm) 22=antifreeze heating battery sensor	0	0	22
024	Logic for analogue input 3 (only with 023=8 to 21): 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	0	0	1
025	Digital output function 1: 0=not used 1=speed 1 for on/off fan 2=speed 2 for on/off fan 3=speed 3 for on/off fan 4=heating valve 5=cooling valve 6=mixed-use valve 7=electrical resistance 8=post-heating valve 9=post-heating electrical resistance 10=authorisation for humidifier 11=external regulated damper 12=external not regulated damper 13=bypass damper for heat exchanger 14=double battery heat exchanger or on/off rotary heat exchanger 15=pre-heating electrical resistance for heat exchanger 16=on/off humidifier 17=on/off dehumidifier 18=fan alarm output 19=relay for EC motors 20=bypass damper for cross-flow heat exchanger (based on free c/h only) 21=antifreeze heating coil alarm relay	0	0	21
026	Digital output function 2 (models AHU-0xxSx1 excluded) 0=not used 1=speed 1 for on/off fan 2=speed 2 for on/off fan 3=speed 3 for on/off fan 4=heating valve 5=cooling valve 6=mixed-use valve 7=electrical resistance 8=post-heating valve 9=post-heating electrical resistance 10=authorisation for humidifier 11=external regulated damper 12=external not regulated damper 13=bypass damper for heat exchanger 14=double battery heat exchanger or on/off rotary heat exchanger 15=pre-heating electrical resistance for heat exchanger 16=on/off humidifier 17=on/off dehumidifier 18=fan alarm output 19=relay for EC motors 20=bypass damper for cross-flow heat exchanger (based on free c/h only) 21=antifreeze heating coil alarm relay	0	0	21

Parameter	Description	Default	Min	Max
027	Digital output function 3 (models AHU-0xxSx1, AHU-1xxSx1 excluded) 0=not used 1=speed 1 for on/off fan 2=speed 2 for on/off fan 3=speed 3 for on/off fan 4=heating valve 5=cooling valve 6=mixed-use valve 7=electrical resistance 8=post-heating valve 9=post-heating electrical resistance 10=authorisation for humidifier 11=external regulated damper 12=external not regulated damper 13=bypass damper for heat exchanger 14=double battery heat exchanger or on/off rotary heat exchanger 15=pre-heating electrical resistance for heat exchanger 16=on/off humidifier 17=on/off dehumidifier 18=fan alarm output 19=relay for EC motors 20=bypass damper for cross-flow heat exchanger (based on free c/h only) 21=antifreeze heating coil alarm relay	0	0	21
028	Digital output function 4 (models AHU-0xxSx1, AHU-1xxSx1, AHU-2xxSx1, AHU-3xxSx1 excluded) 0=not used 1=speed 1 for on/off fan 2=speed 2 for on/off fan 3=speed 3 for on/off fan 4=heating valve 5=cooling valve 6=mixed-use valve 7=electrical resistance 8=post-heating valve 9=post-heating electrical resistance 10=authorisation for humidifier 11=external regulated damper 12=external not regulated damper 13=bypass damper for heat exchanger 14=double battery heat exchanger or on/off rotary heat exchanger 15=pre-heating electrical resistance for heat exchanger 16=on/off humidifier 17=on/off dehumidifier 18=fan alarm output 19=relay for EC motors 20=bypass damper for cross-flow heat exchanger (based on free c/h only) 21=antifreeze heating coil alarm relay	0	0	21
029	Digital output function 5 (models AHU-0xxSx1, AHU-1xxSx1, AHU-2xxSx1, AHU-3xxSx1 excluded) 0=not used 1=speed 1 for on/off fan 2=speed 2 for on/off fan 3=speed 3 for on/off fan 4=heating valve 5=cooling valve 6=mixed-use valve 7=electrical resistance 8=post-heating valve 9=post-heating electrical resistance 10=authorisation for humidifier 11=external regulated damper 12=external not regulated damper 13=bypass damper for heat exchanger 14=double battery heat exchanger or on/off rotary heat exchanger 15=pre-heating electrical resistance for heat exchanger 16=on/off humidifier 17=on/off dehumidifier 18=fan alarm output 19=relay for EC motors 20=bypass damper for cross-flow heat exchanger (based on free c/h only) 21=antifreeze heating coil alarm relay	0	0	21

Parameter	Description	Default	Min	Max
030	Analogue output function 1 (models AHU-4xxSx1 excluded): 0=not used 1=supply fan output 2=extractor fan output 3=heating valve output for 2/4-pipe mode 4=cooling valve output for 2/4-pipe mode 5=mixed-use valve output for 2-tube mode 6=modulating electrical resistance output 7=post-heating valve output 8=post-heating electrical resistance output 9=modulating damper output 10=modulating humidifier 11=modulating dehumidifier 12=modulating rotary heat exchanger 13=modulating bypass damper for heat exchanger	0	0	13
031	Analogue output function 2 (models AHU-2xxSx1, AHU-4xxSx1 excluded): 0=not used 1=supply fan output 2=extractor fan output 3=heating valve output for 2/4-pipe mode 4=cooling valve output for 2/4-pipe mode 5=mixed-use valve output for 2-tube mode 6=modulating electrical resistance output 7=post-heating valve output 8=post-heating electrical resistance output 9=modulating damper output 10=modulating humidifier 11=modulating dehumidifier 12=modulating rotary heat exchanger 13=modulating bypass damper for heat exchanger	0	0	13
032	Analogue output function 3 (models AHU-1xxSx1, AHU-2xxSx1, AHU-3xxSx1, AHU-4xxSx1 excluded) 0=not used 1=supply fan output 2=extractor fan output 3=heating valve output for 2/4-pipe mode 4=cooling valve output for 2/4-pipe mode 5=mixed-use valve output for 2-tube mode 6=modulating electrical resistance output 7=post-heating valve output 8=post-heating electrical resistance output 9=modulating damper output 10=modulating humidifier 11=modulating dehumidifier 12=modulating rotary heat exchanger 13=modulating bypass damper for heat exchanger	0	0	13

Note: Depending on the model of the appliance used, certain parameters are not displayed.
Example: for the AHU-4xxSx1 model, the following parameters are not displayed: 030, 031, 032.

35. Configuration of installer parameters (level 2 password)

Installer parameters are password protected.

Press the ▲ and ▼ buttons together to access the main menu. The following screen is displayed:

(model **AHU-xxCSx1**) or

(model **AHU-xxSSx1**)

Press the ▲ or ▼ button to display the following screen:

Press the ⏻ button and then the ▲ button until the value **11** is displayed.

Press the ⏻ button to access level 2. The screen corresponding to the first level 2 parameter is displayed:

Use the ▲ or ▼ button to scroll through the parameters.

To modify a parameter press the ⏻ button and then the ▲ or ▼ buttons to select its value.

Press the ⏻ button to save the value or the ESC button to exit the parameter editing mode without saving.

To exit the menu, press the ESC button one or more times or wait for about 120 seconds.

Parameter	Description	Default	Min	Max
101	Internal temperature correction (K) (°C [°F]) The correction parameter 101 is added to the temperature reading of the internal sensor	0	-5.0 [-9.0]	5.0 [9.0]
102	Measured internal humidity correction (%r.H) The correction parameter 102 is added to the humidity reading (only for **AHU-xxxSH1** models)	0	-10.0	10.0
103	Correction of external temperature sensor **AI1** (K) (°C [°F]) The correction parameter 103 is added to the temperature reading of the external sensor **AI1**	0	-5.0 [-9.0]	5.0 [9.0]
104	Correction of the temperature sensor **AI2** (K) (°C [°F]) The correction parameter 104 is added to the temperature reading of the external sensor **AI2**	0	-5.0 [-9.0]	5.0 [9.0]
105	Correction of temperature sensor **AI3** (K) (°C [°F]) The correction parameter 105 is added to the temperature reading of the external sensor **AI3**	0	-5.0 [-9.0]	5.0 [9.0]
106	Weighting (%) of the remote control sensor **AI1** in relation to the internal sensor (if 019=1) to create the control sensor. 106=0 → internal sensor used alone as control sensor 106=100 → sensor **AI1** used alone as control sensor 106=Y → sensor **AI1** and internal sensor used together to create the control sensor based on the following formula Treg=[Ti (100 - Y) + (TA1 x Y)] / 100 The **AI1** sensor must be configured as a remote control sensor; otherwise, the parameter 106 is not considered.	100	0	100
107	Heating setpoint for regulation without compensation (°C [°F])	20.0 [68]	111	110
108	Cooling setpoint for regulation without compensation (°C [°F])	25.0 [77]	113	112
109	Setpoint for 4-pipe regulation without offset (°C [°F])	21.0 [70]	111	110
110	Maximum heating regulation setpoint value (°C [°F]) Sets an upper limit for setpoints 107,and 109	40.0 [104]	111	50.0 [122]
111	Minimum heating regulation setpoint value (°C [°F]) Sets a lower limit for setpoints 107,and 109	6.0 [43]	6.0 [43]	110
112	Maximum cooling regulation setpoint value (°C [°F]) Sets an upper limit for setpoints 108,	40.0 [104]	113	50.0 [122]
113	Minimum cooling regulation setpoint value (°C [°F]) Sets a lower limit for setpoints 108,	6.0 [43]	6.0 [43]	112
114	Heating regulation proportional band (K) (°C [°F])	2.0 [3.6]	1.0 [1.8]	20.0 [36.0]
115	Integral time for regulation in heating mode(s). Parameter used to regulate the 0..10 V modulating valves If 115=0, the integral action is excluded.	0	0	999
116	Cooling regulation proportional band (K) (°C [°F])	2.0 [3.6]	1.0 [1.8]	20.0 [36.0]

Parameter	Description	Default	Min	Max
117	Integral time for regulation in cooling mode(s). Parameter used to regulate the 0..10 V modulating valves If 117=0, the integral action is excluded.	0	0	999
118	Proportional band for calculation of supply setpoint in cascade control mode (K) (°C [°F])	20.0 [36.0]	1.0 [1.8]	50.0 [90.0]
119	Integral time(s) for calculation of supply setpoint in cascade regulation mode If 119=0, the integral action is excluded.	0	0	999
120	Economy or boost offset (K) (°C [°F]) In economy mode (120>0), the cooling setpoint is increased by120 In economy mode (120>0), the heating setpoint is reduced by120 In boost mode (120<0), the cooling setpoint is reduced by120 In boost mode (120<0), the heating setpoint is increased by120 Example: 120=3 -> economy mode BHS=20 - 120=17°C BCS=25 + 120=28°C	3.0 [5]	-12.0 [-22]	12.0 [22]
121	Offset mode for “non-occupied/holiday” operation (K) (°C [°F]) In the “non-occupied/holiday” mode, the cooling setpoint is increased by121 In the “non-occupied/holiday” mode, the heating setpoint is reduced by121 Example: 121=5 BHS=20 - 121=15°C BCS=25 + 121=30°C	5.0 [9]	1.0 [2]	14.0 [25]
122	Hysteresis for on/off output (°C [°F])	1.0 [1.8]	0.5 [1.0]	2.0 [3.6]
123	Neutral zone for 4-pipe systems (K) (°C [°F])	1.0 [1.8]	0.5 [1.0]	5.0 [9.0]
124	Differential addition of heating in summer season (mid-season) (K) (°C [°F])	3.0 [5.4]	0.5 [1.0]	10.0 [18.0]
125	Activation of minimum supply limit for fixed-point control 0=not enabled 1=enabled in cooling mode 2=enabled in heating mode 3=enabled in cooling and heating modes	0	0	3
126	Minimum low supply limit setpoint (°C [°F])	10.0 [50]	6.0 [43]	128
127	Activation of maximum supply limit for fixed-point control 0=not enabled 1=enabled in cooling mode 2=enabled in heating mode 3=enabled in cooling and heating modes	0	0	3
128	High supply limit setpoint (°C [°F])	30.0 [86]	126	50.0 [122]
129	Limit proportional band (K) (°C [°F])	2.0 [3.6]	1.0 [1.8]	20.0 [36.0]
130	Activation of compensation for operations with 014=1 or 4 0=not enabled 1=enabled in cooling mode 2=enabled in heating mode 3=enabled in cooling and heating modes	0	0	3
131	Minimum external temperature for winter compensation (°C [°F])	-10.0 [14.0]	-10.0 [14.0]	132
132	Maximum external temperature for winter compensation (°C [°F])	20.0 [68]	131	50.0 [122]
133	Compensated setpoint corresponding to the minimum external temperature for winter compensation 131 (°C [°F])	60.0 [140]	5.0 [41]	80.0 [176]
134	Compensated setpoint corresponding to the maximum external temperature for winter compensation 132 (°C [°F])	30.0 [86]	5.0 [41]	80.0 [176]
135	Minimum external temperature for summer compensation (°C [°F])	22.0 [72]	-10.0 [14.0]	136
136	Maximum external temperature for summer compensation (°C [°F])	35.0 [95]	135	50.0 [122]
137	Compensated setpoint corresponding to the minimum external temperature for summer compensation 135 (°C [°F])	19.0 [66]	5.0 [41]	80.0 [176]
138	Compensated setpoint corresponding to the maximum external temperature for summer compensation136 (°C [°F])	16.0 [61]	5.0 [41]	80.0 [176]
139	Dehumidification activation (see *“16. Dehumidification” page 39*) 0=not enabled 1=enabled with built-in humidity sensor 2=enabled with remote humidity sensor 3=enabled with built-in humidity sensor in cooling mode 4=enabled with remote humidity sensor in cooling mode	0	0	4
140	Dehumidification activation (see *“16. Dehumidification” page 39*) 0=not enabled 1=enabled with built-in humidity sensor 2=enabled with remote humidity sensor	0	0	2

Parameter	Description	Default	Min	Max
141	Humidity neutral zone (%r.h.)	6.0	4.0	20.0
142	Humidity setpoint (%r.h.)	50.0	0	100
143	Humidity proportional band (%r.h.)	5.0	2.0	100
144	Humidity integral time (s). Parameter used to control the 0...10 V modulating valves in cooling mode If 144=0, the integral action is excluded.	0	0	999
145	Activation of minimum humidity supply limit 0=not enabled 1=enabled	0	0	1
146	Lower humidity supply setpoint limit (%r.h.)	20.0	10.0	50.0
147	Activation of maximum humidity supply limit 0=not enabled 1=enabled	0	0	1
148	Higher humidity supply setpoint limit (%r.h.)	75.0	50.0	90.0
149	Proportional band of humidity limit (%r.h.)	5.0	3.0	30.0
150	Minimum voltage of supply fan	0	0	151
151	Maximum voltage of supply fan	10.0	150	10.0
152	Minimum voltage of extractor fan	0	0	153
153	Maximum voltage of extractor fan	10.0	152	10.0
154	Speed 1 of the modulating fans: - percentage of the range (151 -150) for the supply fan, - percentage of the range (153 -152) for the extractor fan.	10	0	100
155	Speed 2 of the modulating fans: - percentage of the range (151 -150) for the supply fan, - percentage of the range (153 -152) for the extractor fan.	65	0	100
156	Speed 3 of the modulating fans: - percentage of the range (151 -150) for the supply fan, - percentage of the range (153 -152) for the extractor fan.	100	0	100
157	Fan hysteresis (with fan control in temperature) (°C [°F])	1.0 [1.8]	1.0 [1.8]	5.0 [9.0]
158	Step activation of the modulating fans:	10	0	100
159	Start delay in control of start-up (s). Defines the minimum delay from the switching on the appliance before the control of the valves and/or electrical resistances and fans begins.	0	0	600
160	Ventilation off delay(s) Defines the minimum delay for maintaining operation of the fan after deactivation of the control of the valves and/or heating elements.	30	0	600
161	Pressure (Pa)/flow constant (m^3/h) setpoint	1500	0	5000
162	Proportional band for pressure (Pa)/flow constant (m^3/h)	300	1	5000
163	Integral time for pressure regulation (s). If 163=0, the integral action is excluded.	0	0	1000
164	Minimum opening of modulating damper (%)	10	0	165
165	Maximum modulating damper opening (%)	100	164	100
166	Damper off delay (s)	0	0	600
167	Air change setpoint IAQ (ppm)	1000	0	2000
168	IAQ proportional band (ppm)	200	50	2000
169	IAQ integral time(s). Parameter used to control IAQ 0..10V If 169=0, the integral action is excluded.	0	0	999
170	Enabling of free cooling/heating 0=not enabled 1=free cooling enabled 2=free heating enabled 3=free cooling and free heating enabled 4=free cooling in cooling only enabled 5=free heating in heating only enabled 6=free cooling in cooling only and free heating in heating only enabled	0	0	6
171	Differential setpoint for free cooling/heating (K) (°C [°F])	4.0[7.2]	0.4[0.8]	10.0 [18.0]
172	Free cooling/heating proportional band (K) (°C [°F])	2.0[3.6]	0.4[0.8]	10.0 [18.0]
173	Differential setpoint for free cooling/heating max (K) (°C [°F]). Defines the temperature difference between the external temperature and the control temperature, beyond which the free cooling/heating, if active, is shut down	10.0[18.0]	5.0[9.0]	20.0 [36.0]

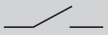
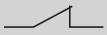
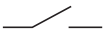
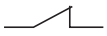
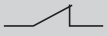
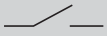
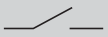
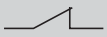
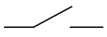
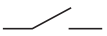
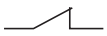
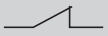
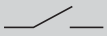
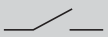
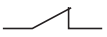
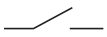
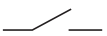
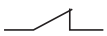
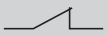
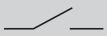
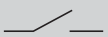
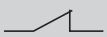
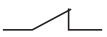
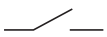
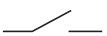
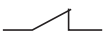
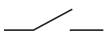
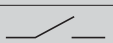
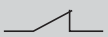
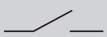
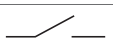
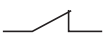
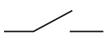
Parameter	Description	Default	Min	Max
174	Minimum external temperature for free cooling (°C [°F]). The external temperature must be greater than or equal to this value in order for free cooling to be available for activation.	17.0[63]	10.0[50]	20.0[68]
175	Minimum control temperature for free cooling (°C [°F]). The control temperature must be greater than or equal to this value for free cooling to be available for activation.	22.0[72]	15.0[59]	30.0[86]
176	Maximum external temperature for free heating (°C [°F]). The external temperature must be less than or equal to this value for free heating to be available for activation.	28.0[82]	20.0[68]	35.0[95]
177	Maximum control temperature for free heating (°C [°F]). The control temperature must be less than or equal to this value for free heating to be available for activation.	33.0[91]	20.0[68]	35.0[95]
178	Hysteresis for regulation free heating/cooling (K) (°C [°F])	1.0[1.8]	0.5[1.0]	10.0 [18.0]
179	Post-heating setpoint (K) (°C [°F])	24.0 [75]	5.0 [41]	50.0 [122]
180	Post-heating proportional band or hysteresis (K) (°C [°F]) Defines the hysteresis or proportional band for the on/off or modulating post-heating battery respectively	2.0 [3.6]	0.5 [1.0]	5.0 [9.0]
181	Differential setpoint for heat recovery (K) (°C [°F])	2.0 [3.6]	0.5[1.0]	10.0 [18.0]
182	Hysteresis for heat exchanger (K) (°C [°F])	0.5[1.0]	0.5[1.0]	181
183	Minimum speed of modulating rotary heat exchanger	0	0	184
184	Maximum speed of modulating rotary heat exchanger	100	183	100
185	Frost protection heat exchanger setpoint (°C[°F])	5.0 [41]	4.0 [39]	10.0 [50]
186	Frost protection heat exchanger action 0=reduction of the supply fan speed 1=bypass of the heat exchanger 2=activation of pre-heating electrical resistance of the heat exchanger 3=reduction of the supply fan speed and bypass of the heat exchanger 4=reduction of the supply fan speed and activation of pre-heating electrical resistance of the heat exchanger	0	0	4
187	Percentage reduction of the supply fan speed relative to the extractor fan (%)	10	0	100
188	Activation of the heat frost protection battery 0=not enabled 1=enabled	1	0	1
189	Setpoint of the frost protection heat battery (°C[°F])	5.0 [41]	4.0 [39]	10.0 [50]
190	Frost protection heat battery or heat exchanger hysteresis (K) (°C [°F])	2.0[3.6]	2.0[3.6]	10.0 [18.0]
191	Percentage of cooling valve opening in case of frost protection heat battery (%)	0	0	100
192	Maximum fan run time before filter is considered dirty (hours) 0=function not used X=maximum number of on/off or modulating supply fan operating hours before a warning appears on the display.	2000	0	9990
193	Value displayed on display A 0=internal sensor temperature 1=external sensor temperature **AI1** 2=external sensor temperature **AI2** 3=external sensor temperature **AI3** 4=control temperature (see *"8. Control sensors" page 16*) 5=internal humidity reading (for **AHU-xxxSH1** models only) 6=operating temperature setpoint (see *"9. Operating setpoint, economy/BOOST, holiday modes" page 17*) 7=supply setpoint calculated in cascade control mode 8=operating humidity setpoint 9=value of output 0..10 V **AO1** (V) 10=value of output 0..10 V **AO2** (V) 11=value of output 0..10 V **AO3** (V)	0	0	11

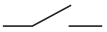
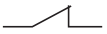
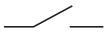
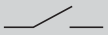
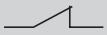
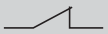
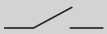
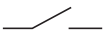
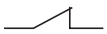
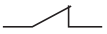
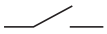
Parameter	Description	Default	Min	Max
194	Value displayed on display B 0=internal sensor temperature 1=external sensor temperature **AI1** 2=external sensor temperature **AI2** 3=external sensor temperature **AI3** 4=control temperature (see *"8. Control sensors" page 16*) 5=internal humidity reading (for **AHU-xxxSH1** models only) 6=operating temperature setpoint (see *"9. Operating setpoint, economy/BOOST, holiday modes" page 17*) 7=supply setpoint calculated in cascade control mode 8=operating humidity setpoint 9=value of output 0..10 V **AO1** (V) 10=value of output 0..10 V **AO2** (V) 11=value of output 0..10 V **AO3** (V) 12=current hour:minutes 13=total hours of fan operation 14=value of input **AI3** configured as 0...10 V input 15=display B off 16=flow rate	12	0	16
195	MODE button functionality 0=local change of season if a season change contact is not used. 1=timer extension. 2=operating mode (normal, using the timer or "non-occupied holiday")	1	0	2
196	Unit of measurement (0 = °C, 1 = °F)	0	0	1
197	Summertime change Determines whether summertime is used automatically 0=no automatic update of summertime change 1=automatic summertime change in Europe 2=automatic summertime change in the USA	1	0	2
198	Duration of extension timer (minutes): With timer extension function activated • if 199=0, the operating setpoint does not consider the economy/boost and holiday modes for the duration198 • if 199=1, the appliance remains switched on for the duration 198 regardless of the timer periods.	60	1	480
199	Timer periods function 0=timer periods for normal/economy-boost operation 1=timer periods to switch on/off the appliance	0	0	1
200	Modbus baud rate (1 = 2400, 2 = 4800, 3 = 9600, 4 = 19200, 5 = 38400 bit/s) (for **AHU-xMxSx1** models only)	4	1	5
201	Modbus parity (0=none, 1= odd, 2=even) (for **AHU-xMxSx1** models only)	2	0	2
202	Device's Modbus address (1…247) (for **AHU-xMxSx1** models only)	1	1	247
203	Reset hour counter for fan operation The operating hours of the fan are stored. When they exceed the value 192, the icon appears. To cancel the counter, set 203=1. The parameter 203 automatically returns to 0 after reset	0	0	1
204	COMFORT function: 0=current setpoint, modified via quick access 1=setpoint offset, modified via quick access See paragraph for further information *"Setpoint and setpoint offset configuration" page 9*	0	0	1
205	Setpoint offset range applied in the comfort function (K) (°C [°F]). Defines how much the setpoint can be varied in the comfort function	3.0[5]	0[0]	10[18]
206	Low scale for 0...10 V input	0	0	207
207	High scale 0...10 V input	2000	206	9999
208	Unit of measurement on display B for 0...10 V input 0=ppm 1=% R.H. 2=no unit	0	0	2
209	Correction of input 0...10 V **AI3**	0	-98.0	98.0
210	Manual switch-off priority 0=manual on/off not priority 1=manual on/off priority	0	0	1

Parameter	Description	Default	Min	Max
211	Manual speed limit. In case of activation of electrical resistance, if the percentage power applied to the electrical resistance exceeds the parameter 211,the speed of the fan increases by the same percentage.	50	15	100
212	Temperature/humidity control priority 0=Temperature priority 1=Humidity priority	0	0	1
213	Flow rate coefficient k 0=control in constant pressure otherwise control in constant flow rate	0	0	1000

36. Digital and analogue input logic

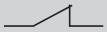
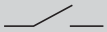
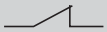
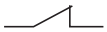
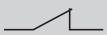
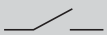
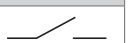
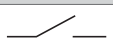
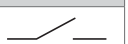
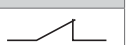
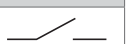
• Digital inputs DI1 and DI2

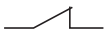
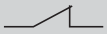
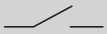
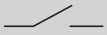
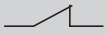
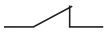
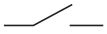
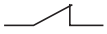
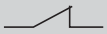
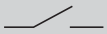
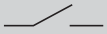
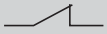
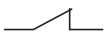
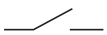
Parameter	Logic		
015=0 (*Input DI1*) or 017=0 (*Input DI2*) Not used			
015=1 (*Input DI1*) or 017=1 (*Input DI2*) Remote season change contact	Logic DI1 016 = Logic DI2 018 =	0	1
	Summer		
	Winter		
015=2 (*Input DI1*) or 017=2 (*Input DI2*) Remote On/Off	Logic DI1 016 = Logic DI2 018 =	0	1
	On		
	Off		
015=3 (*Input DI1*) or 017=3 (*Input DI2*) Not occupied	Logic DI1 016 = Logic DI2 018 =	0	1
	“Non-occupied holiday” mode		
	“Occupied” mode		
015=4 (*Input DI1*) or 017=4 (*Input DI2*) Economy mode	Logic DI1 016 = Logic DI2 018 =	0	1
	No economy/boost mode		
	Economy/boost mode		
015=5 (*Input DI1*) or 017=5 (*Input DI2*) Forced presence	Logic DI1 016 = Logic DI2 018 =	0	1
	No forced presence		
	Forced presence		
015=6 (*Input DI1*) or 017=6 (*Input DI2*) Heat frost protection battery	Logic DI1 016 = Logic DI2 018 =	0	1
	Frost protection off		
	Frost protection on		
015=7 (*Input DI1*) or 017=7 (*Input DI2*) Generic alarm	Logic DI1 016 = Logic DI2 018 =	0	1
	No alarm		
	Alarm active		
015=8 (*Input DI1*) or 017=8 (*Input DI2*) Condensation alarm	Logic DI1 016 = Logic DI2 018 =	0	1
	No condensation		
	Condensation alarm		
015=9 (*Input DI1*) or 017=9 (*Input DI2*) Generic filter alarm	Logic DI1 016 = Logic DI2 018 =	0	1
	No generic filter alarm		
	Generic filter alarm		
015=10 (*Input DI1*) or 017=10 (*Input DI2*) Supply filter alarm	Logic DI1 016 = Logic DI2 018 =	0	1
	no supply filter alarm		
	supply filter alarm		
015=11 (*Input DI1*) or 017=11 (*Input DI2*) Extraction filter alarm	Logic DI1 016 = Logic DI2 018 =	0	1
	No extraction filter alarm		
	Extraction filter alarm		

Parameter	Logic		
015=12 (*Input DI1*) or 017=12 (*Input DI2*) Stop all alarm	Logic DI1 016 = Logic DI2 018 =	0	1
	No stop all alarm		
	Stop all alarm		
015=13 (*Input DI1*) or 017=13 (*Input DI2*) Fan alarm	Logic DI1 016 = Logic DI2 018 =	0	1
	No fan alarm		
	Fan alarm		
015=14 (*Input DI1*) or 017=14 (*Input DI2*) Frost protection heat exchanger alarm	Logic DI1 016 = Logic DI2 018 =	0	1
	No frost protection heat exchanger		
	Frost protection heat exchanger		

- **Analogue inputs**

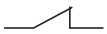
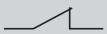
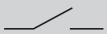
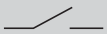
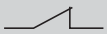
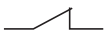
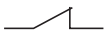
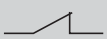
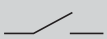
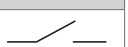
1. Analogue input 1 (**AI1**):

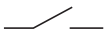
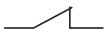
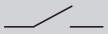
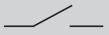
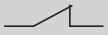
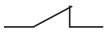
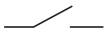
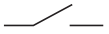
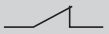
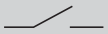
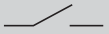
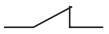
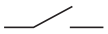
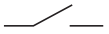
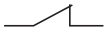
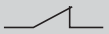
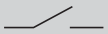
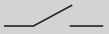
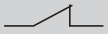
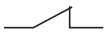
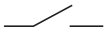
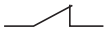
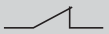
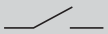
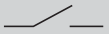
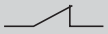
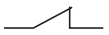
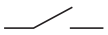
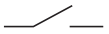
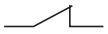
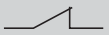
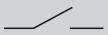
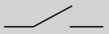
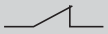
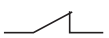
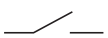
Parameter	Logic		
019=0	Sensor not used		
019=1 Remote regulation sensor	The **AI1** sensor is used together with the internal sensor to obtain the final room regulation temperature according to the parameter 106 (see *"8. Control sensors" page 16*)		
019=2 Supply sensor	The **AI1** sensor is used as a limit sensor for fixed-point regulation with limits (125 and/or 127 not equal to 0), or as a regulation sensor for the valves (001=1), or as a regulation sensor in the cascade regulation (014=2).		
019=3 External sensor	The **AI1** sensor is used for the compensation (130 not equal to 0)		
019=4 Frost protection heat exchanger sensor	The **AI1** sensor is used as a frost protection heat exchanger sensor		
019=5 to 7	Not selectable by the **AI1** sensor		
019=8 Remote season change contact	020 =	0	1
	Summer		
	Winter		
019=9 Remote on/off contact	020 =	0	1
	On		
	Off		
019=10 Non-occupied/ holiday remote contact	020 =	0	1
	"Non-occupied holiday" mode		
	"Occupied" mode		
019=11 Energy savings remote contact	020 =	0	1
	No economy/boost mode		
	Economy/boost mode		
019=12 Forced presence contact	020 =	0	1
	No forced presence		
	Forced presence		
019=13 Heat frost protection battery contact	020 =	0	1
	Frost protection off		
	Frost protection on		
019=14 Generic alarm contact	020 =	0	1
	No alarm		
	Alarm active		
019=15 Condensation alarm contact	020 =	0	1
	No condensation		
	Condensation alarm		
019=16 Generic filter alarm contact	020 =	0	1
	No generic filter alarm		
	Generic filter alarm		
019=17 Supply filter alarm contact	020 =	0	1
	No supply filter alarm		
	Supply filter alarm		

Parameter	Logic		
019=18 Extraction filter alarm contact	020 =	0	1
	No extraction filter alarm		
	Extraction filter alarm		
019=19 Stop all alarm contact	020 =	0	1
	No stop all alarm		
	Stop all alarm		
019=20 Fan alarm contact	020 =	0	1
	No fan alarm		
	Fan alarm		
019=21 Frost protection heat exchanger alarm contact	020 =	0	1
	No frost protection heat exchanger		
	Frost protection heat exchanger alarm		
019=22 Frost protection heating battery sensor	The **AI1** sensor is used as antifreeze heating battery sensor		

For configurations 019=8 to 21, the analogue input 1 is used as a digital input. The contact is considered closed if it is short-circuited at the analogue input. The contact is considered open if there is no connection.

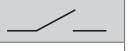
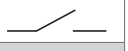
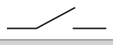
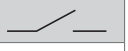
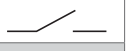
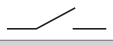
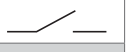
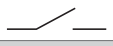
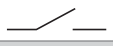
2. Analogue input 2 (**AI2**):

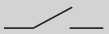
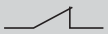
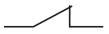
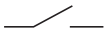
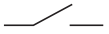
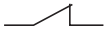
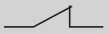
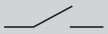
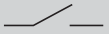
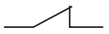
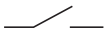
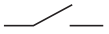
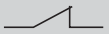
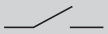
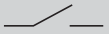
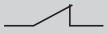
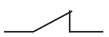
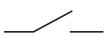
Parameter	Logic		
021=0	Sensor not used		
021=1 Remote regulation sensor	The **AI2** sensor is used together with the internal sensor to obtain the final room regulation temperature according to the parameter 106 (see *"8. Control sensors" page 16*■		
021=2 Supply sensor	The **AI2** sensor is used as a limit sensor for fixed-point regulation with limits (125 and/or 127 not equal to 0), or as a regulation sensor for the valves (001=1), or as a regulation sensor in the cascade regulation (014=2).		
021=3 External sensor	The **AI2** sensor is used for the compensation (130 not equal to 0)		
021=4 Frost protection heat exchanger sensor	The **AI2** sensor is used as a frost protection heat exchanger sensor		
021=5 to 7	Not selectable by the **AI2** sensor		
021=8 Remote season change contact	022 =	0	1
	Summer		
	Winter		
021=9 Remote on/off contact	022 =	0	1
	On		
	Off		
021=10 Non-occupied/ holiday remote contact	022 =	0	1
	"Non-occupied holiday" mode		
	"Occupied" mode		
021=11 Energy savings remote contact	022 =	0	1
	No economy/boost mode		
	Economy/boost mode		

Parameter	Logic		
021=12 Forced presence contact	022 =	0	1
	No forced presence		
	Forced presence		
021=13 Heat frost protection battery contact	022 =	0	1
	Frost protection off		
	Frost protection on		
021=14 Generic alarm contact	022 =	0	1
	No alarm		
	Alarm active		
021=15 Condensation alarm contact	022 =	0	1
	No condensation		
	Condensation alarm		
021=16 Generic filter alarm contact	022 =	0	1
	No generic filter alarm		
	Generic filter alarm		
021=17 Supply filter alarm contact	022 =	0	1
	No supply filter alarm		
	Supply filter alarm		
021=18 Extraction filter alarm contact	022 =	0	1
	No extraction filter alarm		
	Extraction filter alarm		
021=19 Stop all alarm contact	022 =	0	1
	No stop all alarm		
	Stop all alarm		
021=20 Fan alarm contact	022 =	0	1
	No fan alarm		
	Fan alarm		
021=21 Frost protection heat exchanger alarm contact	022 =	0	1
	No frost protection heat exchanger		
	Frost protection heat exchanger alarm		
021=22 Frost protection heating battery sensor	The **AI2** sensor is used as antifreeze heating battery sensor		

For configurations 021=8 to 21, the analogue input 2 is used as a digital input. The contact is considered closed if it is short-circuited at the analogue input. The contact is considered open if there is no connection.

3. Analogue input 3 (**AI3**):

Parameter	Logic		
023=0	Sensor not used		
023=1 Remote regulation sensor	The **AI3** sensor is used together with the internal sensor to obtain the final room regulation temperature according to the parameter 106 (see *"8. Control sensors" page 16*■		
023=2 Supply sensor	The **AI3** sensor is used as a limit sensor for fixed-point regulation with limits (125 and/or 127 not equal to 0), or as a regulation sensor for the valves (001=1), or as a regulation sensor in the cascade regulation (014=2).		
023=3 External sensor	The **AI3** sensor is used for the compensation (130 not equal to 0)		
023=4 Frost protection heat exchanger sensor	The **AI3** sensor is used as a frost protection heat exchanger sensor		
023=5 Air quality input 0..10V	Jumper JP1 = position "3-2". Setting 023=5, automatically 206=0, 207=2000, 208=0		
023=6 Humidity transmitter input 0..10V	Jumper JP1 = position "3-2". Setting 023=6, automatically 206=0, 207=100, 208=1		
023=7 Pressure transmitter input 0..10V	Jumper JP1 = position "3-2". Set the scale of the connected pressure transmitter 206, 207, and set 208=0		
023=8 Remote season change contact	024 =	0	1
	Summer		
	Winter		
023=9 Remote on/off contact	024 =	0	1
	On		
	Off		
023=10 Non-occupied/ holiday contact	024 =	0	1
	"Non-occupied holiday" mode		
	"Occupied" mode		
023=11 Energy savings remote contact	024 =	0	1
	No economy/boost mode		
	Economy/boost mode		
023=12 Forced presence contact	024 =	0	1
	No forced presence		
	Modes with forced presence		
023=13 Heat frost protection battery contact	024 =	0	1
	Frost protection off		
	Frost protection on		
023=14 Generic alarm contact	024 =	0	1
	No alarm		
	Alarm active		
023=15 Condensation alarm contact	024 =	0	1
	No condensation		
	Condensation alarm		
023=16 Generic filter alarm contact	024 =	0	1
	No generic filter alarm		
	Generic filter alarm		

Parameter	Logic		
023=17 Supply filter alarm contact	024 =	0	1
	No supply filter alarm		
	Supply filter alarm		
023=18 Extraction filter alarm contact	024 =	0	1
	No extractor filter alarm		
	Extractor filter alarm		
023=19 Stop all alarm contact	024 =	0	1
	No stop all alarm		
	Stop all alarm		
023=20 Fan alarm contact	024 =	0	1
	No fan alarm		
	Fan alarm		
023=21 Frost protection heat exchanger alarm contact	024 =	0	1
	No frost protection heat exchanger		
	Frost protection heat exchanger alarm		
023=22 Frost protection heating battery sensor	The **AI3** sensor is used as antifreeze heating battery sensor		

For configurations 023=8 to 21, the analogue input 3 is used as a digital input. The contact is considered closed if it is short-circuited at the analogue input. The contact is considered open if there is no connection.

Note:
In case the same function is assigned to the digital and/or analogue inputs, the following priority is considered in case of identical assignment:

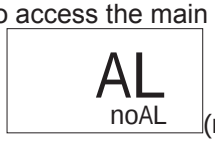
Input priority:
Digital input 1 (**DI1**) - Highest priority
Digital input 2 (**DI2**)
Analogue input 1 (**AI1**)
Analogue input 2 (**AI2**)
Analogue input 3 (**AI3**) - Lowest priority

The selection of the remote contact configuration with a particular function can be selected for a digital input or an analogue input, but not both.

37. Visualizzazione stato ingressi/uscite

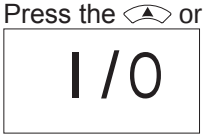
It is possible to visualize the state of inputs and outputs during operating.

Press the ▲ and ▼ buttons together to access the main menu. The following screen is displayed:

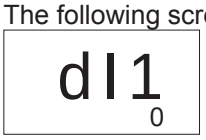
(model **AHU-xxCSx1**) or


(model **AHU-xxSSx1**)

Press the ▲ or ▼ button until the following screen is displayed:



Press the ⏻ button to access the list of inputs, outputs.
The following screen appears corresponding to digital input 1:



the second line indicates the state of input 1.

Use the ▲ or ▼ button to scroll through the state of inputs and outputs present on regulator.
The following screen are visualized:

Screen	Input / output	Second line indication
dI1 0	Digital input 1	0 = contact open 1 = contact closed
dI2 0	Digital input 2	0 = contact open 1 = contact closed
AI1 173	Analogue input 1	Input sensor 019>=1 and 019<=4: -200 = sensor open 970 = short-circuit on sensor -150..900 = temperature value noS = input not used
		Contact input 019>=8 0 = contact open 1 = contact closed
AI1 205	Analogue input 2	Input sensor 021>=1 and 021<=4: -200 = sensor open 970 = short-circuit on sensor -150..900 = temperature value noS = input not used
		Contact input 021>=8 0 = contact open 1 = contact closed
AI3 500	Analogue input 3	Input sensor 023>=1 and 023<=4: -200 = sensor open 970 = short-circuit on sensor -150..900 = temperature value noS = input not used
		Input 0..10V 023>=5 e 023<=7 - - - - = input 0..10V broken 00..100 = voltage value
		Contact input 023>=8 0 = contact open 1 = contact closed
dO1 0	Digital output 1	0 = relay deactivated 1 = relay activated
dO2 0	Digital output 2	0 = relay deactivated 1 = relay activated

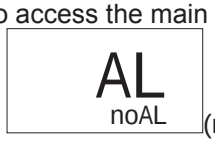
d03 0	Digital output 3	0 = relay deactivated 1 = relay activated
d04 0	Digital output 4	0 = relay deactivated 1 = relay activated
d05 0	Digital output 5	0 = relay deactivated 1 = relay activated
A01 0	Analogue output 1	00..100 = voltage value
A02 0	Analogue output 2	00..100 = voltage value
A03 0	Analogue output 3	00..100 = voltage value

To exit the menu, press the  button one or more times or wait for about 120 seconds.

38. Resetting the default parameters

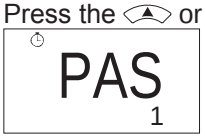
The initial (default) configuration of the parameters can be reloaded as follows:

Press the ▲ and ▼ buttons together to access the main menu. The following screen is displayed:

(model **AHU-xxCSx1**) or 

(model **AHU-xxSSx1**)

Press the ▲ or ▼ button until the following screen is displayed:



Press the ⏻ button and then the ▲ button until the value **33** is displayed.
Press the ⏻ button to access the default parameters reset level.

To cancel and return to the controller, press the ESC button.
To activate the procedure, press the ⏻ button, the value 0 starts to flash. Press the ▲ button to change the value to 1 and press the ⏻ button again.
The reset procedure starts, the display reports the following messages:

loading default settings begins

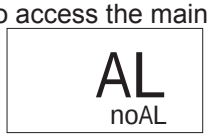
default parameters loaded.

When the following screen appears again, it is possible to exit the menu by pressing the ESC button once, or by waiting for around 120 seconds.

39. Visualization of firmware version

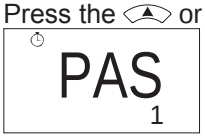
It is possible to visualize the firmware revision doing the following procedure:

Press the ▲ and ▼ buttons together to access the main menu. The following screen is displayed:

(model **AHU-xxCSx1**) or 

(model **AHU-xxSSx1**)

Press the ▲ or ▼ button to display the following screen:



Press the ⏻ button and then the ▲ button until the value **25** is displayed.
Press the ⏻ button to access firmware version level. The screen corresponding to the first parameter is displayed:

Use the ▲ or ▼ button to scroll through the parameters.

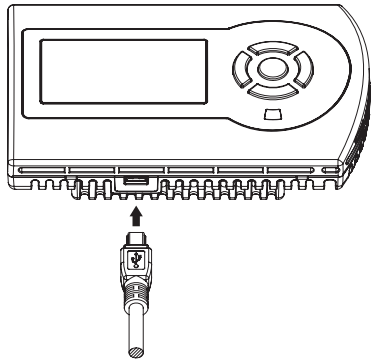
Press the ESC button one or more times or wait for about 120 seconds to exit firmware version level.

Parameter	Description	Value	Min	Max
U01	Major release of firmware	x	0	9
U02	Minor release of firmware	y	0	9
U03	Built release of firmware	z	0	9

The firmware revision is x.y.z

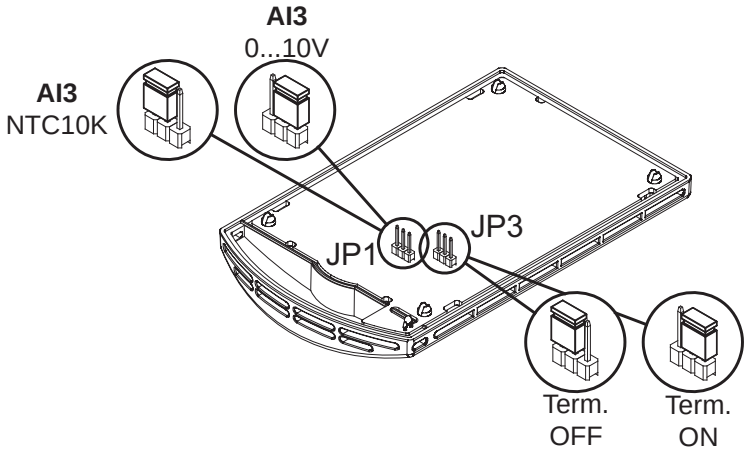
40. USB connection

The device is equipped with a USB “device” interface which can be used to configure parameters or update the software.
To connect the controller to a PC via the USB connection, use a cable with Type A connector on one end and Mini B connector on the other.



The connection can be made with the device powered up or switched off.
When the USB cable is connected to the device, the display switches off and the device is ready for configuration/update.

41. Jumper configuration



JP3=Term. ON → 120 ohm termination resistor of the Modbus line INSERTED (**AHU-xMxSx1** model).
JP3=OFF → 120 ohm termination resistor of the Modbus line NOT INSERTED (**AHU-xMxSx1** model).

JP1=position “1-2” → a third NTC10K remote sensor can be used for all models except for **AHU-3xxSx1**

JP1=position “3-2” → the third remote sensor is 0...10 V type

42. Modbus (for AHU-xMxSx1 models)

The regulator implements the Modbus Slave protocol and can communicate remotely with a Modbus Master unit.
All parameters and variables are accessible as holding registers and R/W operations can be implemented as function codes (FC=03, 06, 16).
Given the large number of parameters, the protocol can read up to 125 variables at a time.
Select a suitable timeout between readings, in relation to the baud rate.
A timeout of 1.5 is sufficient for baud rates of 19200 and 9600. For other baud rates, increase the timeout value to 2 seconds.
To obtain the address of a register indicated in the following tables, subtract 1 from the register number indicated: example: the address of the Modbus variable STATE_DI1 is 10000 - 1 = 9999

• MODBUS VARIABLES FOR CONTROLLER STATUS:

Register	Description	Min	Max	R/W
10000	**STATE_DI1** → 0=contact **DI1** open, 1=contact **DI1** closed	0	1	R
10001	**STATE_DI2** → 0=contact **DI2** open, 1=contact **DI2** closed	0	1	R
10002	**INT_TEMP_COMP** → internal sensor temperature (°C [°F]) (Note1)	-250 [-13]	900 [195]	R
10003	**TEMP_AI1** → remote sensor temperature 1 (°C [°F]) (Note1)	-250 [-13]	900 [195]	R
10004	**TEMP_AI2** → remote sensor temperature 2 (°C [°F]) (Note1)	-250 [-13]	900 [195]	R
10005	**TEMP_AI3** → remote sensor temperature 3 (°C [°F]) (Note1)	-250 [-13]	900 [195]	R
10006	**INT_HUM_COMP** → internal humidity sensor (% R.H.)	0	100	R
10007	**0_10V_AI3** → value connected to the input 0...10 V **AI3** (Note4)	-999	9999	R
10008	**STATE_REL1** → 0=relay 1 deactivated, 1=relay 1 activated	0	1	R/W
10009	**STATE_REL2** →0=relay 2 deactivated, 1=relay 2 activated	0	1	R/W
10010	**STATE_REL3** → 0=relay 3 deactivated, 1=relay 3 activated	0	1	R/W
10011	**STATE_REL4** →0=relay 4 deactivated, 1=relay 4 activated	0	1	R/W
10012	**STATE_REL5** →0=relay 5 deactivated, 1=relay 5 activated	0	1	R/W
10013	**OUT_A** → output value **AO1** (volt) (Note3)	0	100	R/W
10014	**OUT_B** → output value **AO2** (volt) (Note3)	0	100	R/W
10015	**OUT_C** → output value **AO3** (volt) (Note3)	0	100	R/W
10016	**WORKING_TEMP** → working temperature (Note1)	-250 [-13]	900 [195]	R
10017	**WORKING_SET_HEAT** → heating operation setpoint WHS (Note2)	see parameters	see parameters	R
10018	**WORKING_SET_COOL** → cooling operation setpoint WCS (Note2)	see parameters	see parameters	R
10019	**SET_MAND_CALC** → calculated supply setpoint in cascade control mode (Note2)	see regulation.	see regulation.	R
10020	**SET_COMP_HEAT_CALC** → calculated compensation setpoint for winter compensation control mode (Note2)	see regulation.	see regulation.	R
10021	**SET_COMP_COOL_CALC** → calculated compensation setpoint for summer compensation control mode (Note2)	see regulation.	see regulation.	R
10022	**WORKING_SET_DEHUM** → dehumidifying operation setpoint WDS (Not5)	see regulation.	see regulation.	R
10023	**WORKING_SET_HUM** → humidifying operation setpoint WUS (Note5)	see regulation.	see regulation.	R
10024	**YEAR** → current year	2012	2100	R
10025	**MONTH** → current month	1	12	R
10026	**DAY** → current day	1	31	R
10027	**DAY_NAME** → name of current day 0=sunday 1=monday 2=tuesday 3=wednesday 4=thursday 5=friday 6=saturday	0	6	R
10028	**HOUR** → current time (hour)	0	23	R
10029	**MIN** → current time (min.)	0	59	R
10030	**SEC** → current time (sec.)	0	59	R
10031	**TOTAL_HOUR_OF_FAN** → number of hours of operation of the fan (only if the parameter 192 is not equal to 0; otherwise, the value read is always 0)	0	9999	R
10032	**CURRENT_WORKING_SET** → current operation setpoint (Note2)	see controllers.	see controllers.	R

Register	Description	Min	Max	R/W
10033	**CURRENT_WORKING_HUM_SET** → current humidity operation setpoint (Note5)	see controllers.	see controllers.	R
10034	**CURRENT_WORKING_POST_SET** → current post-heating operation setpoint (Note2)	see controllers.	see controllers.	R
10035	**FLAG_GLOBAL_ON/OFF** 0=switched off using remote contact 1=switched off using timer 2=switched off using keyboard 3=switched off using Modbus 4=switched on using remote contact 5=switched on using timer 6=switched on using keyboard 7=switched on using Modbus	0	7	R
10036	**FLAG_CURRENT_MODE_REG** → control status 0=control without the timer periods 1=normal control (within a timer period interval if 199=0) 2=normal control forced manually (“Oc” for the duration of the 198 timer) 3=economy control 4=non-occupied/holiday mode control	0	4	R
10037	**FLAG_STA_WORKING** → operating season status 0=heating 1=cooling	0	1	R
10038	**FLAG_HEATING** → heating status 0=heating in progress 1=heating stopped	0	1	R
10039	**FLAG_ELECTRIC_HEATER** → electrical resistance status 0=electrical resistance ON 1=electrical resistance OFF	0	1	R
10040	**FLAG_COOLING** → cooling status 0=cooling in progress 1=cooling stopped	0	1	R
10041	**FLAG_POST_HEATING** → post-heating status 0=post-heating in progress 1=post-heating stopped	0	1	R
10042	**FLAG_FROST_PROTECTION** → frost protection heating battery status 0=frost protection alarm not present 1=frost protection alarm	0	1	R
10043	**FLAG_FREE_COOLING_CONDITION** → free cooling condition 0=conditions for free cooling present 1= conditions for free cooling not present	0	1	R
10044	**FLAG_FREE_HEATING_CONDITION** → free heating condition 0=conditions for free heating present 1= conditions for free heating not present	0	1	R
10045	**FLAG_CURRENT_SPEED** → one or more speed fan status ON/OFF 0=fan coil off 1=fan coil at speed 1 for ON/OFF 3-speed fan coil 2=fan coil at speed 2 for ON/OFF 3-speed fan coil 3=fan coil at speed 3 for ON/OFF 3-speed fan coil	0	3	R
10046	**FLAG_CURRENT_SPEED_SUPPLY_EXTRACT** → modulating supply fan status (or extract fan status if supply fan not present) 0=fan coil off 1=fan converter at speed 1 2=fan converter at speed 2 3=fan converter at speed 3	0	3	R
10047	**FLAG_LIM_ALARM** → temperature limit alarm status 0=no limit alarm 1=low limit alarm 2=high limit alarm	0	2	R
10048	**FLAG_DEHUMIDIFICATION** → dehumidification status 0=dehumidification in progress 1=dehumidification stopped	0	1	R
10049	**FLAG_HUMIDIFICATION** → humidification status 0=humidification in progress 1=humidification stopped	0	1	R
10050	**FLAG_DIRTY_FILTER** → fan filter status 0=fan filter clean 1=fan filter dirty (has exceeded the operational hours defined by parameter 192.	0	1	R
10051	**FLAG_DECREASE_CO2** → status of CO_2 decrease 0=air exchange finished 1=air exchange in progress	0	1	R
10052	**FLAG_EXCHANGER_FROST_PROTECTION** → frost protection heat exchanger status 0=frost protection alarm not present in the heat exchanger 1=frost protection alarm present in the heat exchanger	0	1	R

Register	Description	Min	Max	R/W
10053	**FLAG_STATE_EXCHANGER** → heat exchanger status 0=heat recovery stopped 1=heat recovery in progress 2=frost protection alarm present in the heat exchanger 3=heat exchanger stopped for free cooling or free heating	0	3	R
10054	**FLAG_GEN_ALARM** → general alarm status 0=no alarm 1=general alarm	0	1	R
10055	**FLAG_ALARM_CONDENSATION** → condensation alarm status 0=no condensation alarm 1=condensation alarm	0	1	R
10056	**FLAG_GENERAL_FILTER_ALARM** → filter alarm status 0=no filter alarm 1=filter alarm	0	1	R
10057	**FLAG_SUPPLY_FILTER_ALARM** 0=no supply fan filter alarm 1=filter alarm for supply fan	0	1	R
10058	**FLAG_EXTRACT_FILTER_ALARM** 0=no filter alarm for extract fan 1=filter alarm for extract fan	0	1	R
10059	**FLAG_ALARM_STOP_ALL** 0=no alarm stop all 1=stop all alarm	0	1	R
10060	**FLAG_ALARM_VENTILATION** → fan alarm status 0=no alarm for fan 1=fan alarm	0	1	R
from 10061 to 10077	Reserved addresses			R
10078	**TYPE_OF_HARDWARE** 0=1 digital output, 3 analogue outputs 1=2 digital outputs, 2 analogue outputs 2=3 digital outputs, 1 analogue output 3=3 digital outputs, 2 analogue outputs 4=5 digital outputs	0	4	R
10079	**TYPE_COMMUNICATION** 0=not present 1=MODBUS	0	1	R
10080	**RTC_PRESENCE** 0=not present 1=present	0	1	R
10081	**HUM_PRESENCE** 0=not present 1=present	0	1	R
10082	**IR_PRESENCE** 0=not present 1=present	0	1	R
10083	**FORCED_OUTPUTS_KEY** → key to select forced outputs	0 / 26312	26367	R/W
from 10084 to 10085	Reserved addresses			R
10086	**FLOW_RATE** → value of flow rate (m^3/h) if parameter 213≠0	0	9999	R

Note 1: if a fault sensor is used, the temperature displayed refers to that shown in the table below:

Sensor temperature with units in °C (196**=0)**	**Value read**	**Corresponding value °C**
Sensor open	-200	-20.0°C
Sensor in short circuit	970	97.0°C
Sensor temperature with units in °F (196**=1)**	**Value read**	**Corresponding value °F**
Sensor open	-40	-4.0°F
Sensor in short circuit	2066	206.6°F

Note 2: the operating setpoint displayed is calculated based on operating parameters (see *"9. Operating setpoint, economy/ BOOST, holiday modes" page 17*. If the frost protection alarm is activated or the operating temperature is in alarm, the operating setpoint is forced to:

Operating setpoint with units in °C (196**=0)**	**Value read**	**Corresponding value °C**
Frost alarm	700	70.0°C
Operating temperature in fault mode (heating)	-300	-30.0°C
Operating temperature in fault mode (cooling)	980	98.0°C
Operating setpoint with units in °F (196**=1)**	**Value read**	**Corresponding value °F**
Frost alarm	158	158°F
Operating temperature in fault mode (heating)	-22	-22°F
Operating temperature in fault mode (cooling)	209	209°F

In 2-pipe mode, the setpoint which is not used is indicated with the value 0.

Note 3: The value displayed corresponds to the value in Volts, multiplied by 10 (for example: value of 80 = 8.0 V)

Nota 4: For input **AI3** configured as 0...10 V input, if the input voltage exceeds around 13.5V, the off-the-scale value of 32000 is displayed.

Note 5: The value displayed corresponds to the value multiplied by 10 (for example: value of 605 = 60.5%R.H.)

In general, the values indicated for the temperature, humidity, setpoints, are values that are multiplied by 10.
For example, the variable WORKING_SET_DEHUM equals 505 corresponds to 50.5% R.H.

• MODBUS VARIABLES FOR OPERATING PARAMETERS

Register	Description	Default	Min	Max	R/W
9000	**SUN_HOUR_ON_1** → Start of Sunday hour timer period 1	8	0	23	R/W
9001	**SUN_MIN_ON_1** → Start of Sunday minute timer period 1	0	0	59	R/W
9002	**SUN_HOUR_OFF_1** → End of Sunday hour timer 1	17	0	23	R/W
9003	**SUN_MIN_OFF_1** → End of Sunday hour timer period 1	0	0	59	R/W
9004	**SUN_HOUR_ON_2** → Start of Sunday hour timer period 2	11	0	23	R/W
9005	**SUN_MIN_ON_2** → Start of Sunday minute timer period 2	0	0	59	R/W
9006	**SUN_HOUR_OFF_2** → End of Sunday hour timer period 2	11	0	23	R/W
9007	**SUN_MIN_OFF_2** → End of Sunday minute timer period 2	0	0	59	R/W
9008	**SUN_HOUR_ON_3** → Start of Sunday hour timer period 3	17	0	23	R/W
9009	**SUN_MIN_ON_3** → Start of Sunday minute timer period 3	0	0	59	R/W
9010	**SUN_HOUR_OFF_3** → End of Sunday hour timer period 3	17	0	23	R/W
9011	**SUN_MIN_OFF_3** → End of Sunday minute timer period 3	0	0	59	R/W
9012	**SUN_HOUR_ON_4** → Start of Sunday hour timer period 4	21	0	23	R/W
9013	**SUN_MIN_ON_4** → Start of Sunday minute timer period 4	0	0	59	R/W
9014	**SUN_HOUR_OFF_4** → End of Sunday hour timer period 4	21	0	23	R/W
9015	**SUN_MIN_OFF_4** → End of Sunday minute timer period 4	0	0	59	R/W
9016	**MON_HOUR_ON_1** → Start of Monday hour timer period 1	8	0	23	R/W
9017	**MON_MIN_ON_1** → Start of Monday minute timer period 1	0	0	59	R/W
9018	**MON_HOUR_OFF_1** → End of Monday hour timer period 1	17	0	23	R/W
9019	**MON_MIN_OFF_1** → End of Monday minute timer period 1	0	0	59	R/W
9020	**MON_HOUR_ON_2** → Start of Monday hour timer period 2	11	0	23	R/W
9021	**MON_MIN_ON_2** → Start of Monday minute timer period 2	0	0	59	R/W
9022	**MON_HOUR_OFF_2** → End of Monday hour timer period 2	11	0	23	R/W
9023	**MON_MIN_OFF_2** → End of Monday minute timer period 2	0	0	59	R/W
9024	**MON_HOUR_ON_3** → Start of Monday hour timer period 3	17	0	23	R/W
9025	**MON_MIN_ON_3** → Start of Monday minute timer period 3	0	0	59	R/W
9026	**MON_HOUR_OFF_3** → End of Monday hour timer period 3	17	0	23	R/W
9027	**MON_MIN_OFF_3** → End of Monday minute timer period 3	0	0	59	R/W
9028	**MON_HOUR_ON_4** → Start of Monday hour timer period 4	21	0	23	R/W
9029	**MON_MIN_ON_4** → Start of Monday minute timer period 4	0	0	59	R/W
9030	**MON_HOUR_OFF_4** → End of Monday hour timer period 4	21	0	23	R/W
9031	**MON_MIN_OFF_4** → End of Monday minute timer period 4	0	0	59	R/W
9032	**TUE_HOUR_ON_1** → Start of Tuesday hour timer period 1	8	0	23	R/W
9033	**TUE_MIN_ON_1** → Start of Tuesday minute timer period 1	0	0	59	R/W
9034	**TUE_HOUR_OFF_1** → End of Tuesday hour timer period 1	17	0	23	R/W
9035	**TUE_MIN_OFF_1** → End of Tuesday minute timer period 1	0	0	59	R/W
9036	**TUE_HOUR_ON_2** → Start of Tuesday hour timer period 2	11	0	23	R/W
9037	**TUE_MIN_ON_2** → Start of Tuesday minute timer period 2	0	0	59	R/W
9038	**TUE_HOUR_OFF_2** → End of Tuesday hour timer period 2	11	0	23	R/W
9039	**TUE_MIN_OFF_2** → End of Tuesday minute timer period 2	0	0	59	R/W
9040	**TUE_HOUR_ON_3** → Start of Tuesday hour timer period 3	17	0	23	R/W
9041	**TUE_MIN_ON_3** → Start of Tuesday minute timer period 3	0	0	59	R/W
9042	**TUE_HOUR_OFF_3** → End of Tuesday hour timer period 3	17	0	23	R/W
9043	**TUE_MIN_OFF_3** → End of Tuesday minute timer period 3	0	0	59	R/W
9044	**TUE_HOUR_ON_4** → Start of Tuesday hour timer period 4	21	0	23	R/W
9045	**TUE_MIN_ON_4** → Start of Tuesday minute timer period 4	0	0	59	R/W
9046	**TUE_HOUR_OFF_4** → End of Tuesday hour timer period 4	21	0	23	R/W
9047	**TUE_MIN_OFF_4** → End of Tuesday minute timer period 4	0	0	59	R/W
9048	**WED_HOUR_ON_1** → Start of Wednesday hour timer period 1	8	0	23	R/W
9049	**WED_MIN_ON_1** → Start of Wednesday minute timer period 1	0	0	59	R/W
9050	**WED_HOUR_OFF_1** → End of Wednesday hour timer period 1	17	0	23	R/W
9051	**WED_MIN_OFF_1** → End of Wednesday minute timer period 1	0	0	59	R/W
9052	**WED_HOUR_ON_2** → Start of Wednesday hour timer period 2	11	0	23	R/W

Register	Description	Default	Min	Max	R/W
9053	**WED_MIN_ON_2** → Start of Wednesday minute timer period 2	0	0	59	R/W
9054	**WED_HOUR_OFF_2** → End of Wednesday hour timer period 2	11	0	23	R/W
9055	**WED_MIN_OFF_2** → End of Wednesday minute timer period 2	0	0	59	R/W
9056	**WED_HOUR_ON_3** → Start of Wednesday hour timer period 3	17	0	23	R/W
9057	**WED_MIN_ON_3** → Start of Wednesday minute timer period 3	0	0	59	R/W
9058	**WED_HOUR_OFF_3** → End of Wednesday hour timer period 3	17	0	23	R/W
9059	**WED_MIN_OFF_3** → End of Wednesday minute timer period 3	0	0	59	R/W
9060	**WED_HOUR_ON_4** → Start of Wednesday hour timer period 4	21	0	23	R/W
9061	**WED_MIN_ON_4** → Start of Wednesday minute timer period 4	0	0	59	R/W
9062	**WED_HOUR_OFF_4** → End of Wednesday hour timer period 4	21	0	23	R/W
9063	**WED_MIN_OFF_4** → End of Wednesday minute timer period 4	0	0	59	R/W
9064	**THU_HOUR_ON_1** → Start of Thursday hour timer period 1	8	0	23	R/W
9065	**THU_MIN_ON_1** → Start of Thursday minute timer period 1	0	0	59	R/W
9066	**THU_HOUR_OFF_1** → End of Thursday hour timer period 1	17	0	23	R/W
9067	**THU_MIN_OFF_1** → End of Thursday minute timer period 1	0	0	59	R/W
9068	**THU_HOUR_ON_2** → Start of Thursday hour timer period 2	11	0	23	R/W
9069	**THU_MIN_ON_2** → Start of Thursday minute timer period 2	0	0	59	R/W
9070	**THU_HOUR_OFF_2** → End of Thursday hour timer period 2	11	0	23	R/W
9071	**THU_MIN_OFF_2** → End of Thursday minute timer period 2	0	0	59	R/W
9072	**THU_HOUR_ON_3** → Start of Thursday hour timer period 3	17	0	23	R/W
9073	**THU_MIN_ON_3** → Start of Thursday minute timer period 3	0	0	59	R/W
9074	**THU_HOUR_OFF_3** → End of Thursday hour timer period 3	17	0	23	R/W
9075	**THU_MIN_OFF_3** → End of Thursday minute timer period 3	0	0	59	R/W
9076	**THU_HOUR_ON_4** → Start of Thursday hour timer period 4	21	0	23	R/W
9077	**THU_MIN_ON_4** → Start of Thursday minute timer period 4	0	0	59	R/W
9078	**THU_HOUR_OFF_4**→ End of Thursday hour timer period 4	21	0	23	R/W
9079	**THU_MIN_OFF_4** → End of Thursday minute timer period 4	0	0	59	R/W
9080	**FRI_HOUR_ON_1** → Start of Friday hour timer period 1	8	0	23	R/W
9081	**FRI_MIN_ON_1** → Start of Friday minute timer period 1	0	0	59	R/W
9082	**FRI_HOUR_OFF_1** → End of Friday hour timer period 1	17	0	23	R/W
9083	**FRI_MIN_OFF_1** → End of Friday minute timer period 1	0	0	59	R/W
9084	**FRI_HOUR_ON_2** → Start of Friday hour timer period 2	11	0	23	R/W
9085	**FRI_MIN_ON_2** → Start of Friday minute timer period 2	0	0	59	R/W
9086	**FRI_HOUR_OFF_2** → End of Friday hour timer period 2	11	0	23	R/W
9087	**FRI_MIN_OFF_2** → End of Friday minute timer period 2	0	0	59	R/W
9088	**FRI_HOUR_ON_3** → Start of Friday hour timer period 3	17	0	23	R/W
9089	**FRI_MIN_ON_3** → Start of Friday minute timer period 3	0	0	59	R/W
9090	**FRI_HOUR_OFF_3** → End of Friday hour timer period 3	17	0	23	R/W
9091	**FRI_MIN_OFF_3** → End of Friday minute timer period 3	0	0	59	R/W
9092	**FRI_HOUR_ON_4** → Start of Friday hour timer period 4	21	0	23	R/W
9093	**FRI_MIN_ON_4** → Start of Friday minute timer period 4	0	0	59	R/W
9094	**FRI_HOUR_OFF_4** → End of Friday hour timer period 4	21	0	23	R/W
9095	**FRI_MIN_OFF_4** → End of Friday minute timer period 4	0	0	59	R/W
9096	**SAT_HOUR_ON_1** → Start of Saturday hour timer period 1	8	0	23	R/W
9097	**SAT_MIN_ON_1** → Start of Saturday minute timer period 1	0	0	59	R/W
9098	**SAT_HOUR_OFF_1** → End of Saturday hour timer period 1	17	0	23	R/W
9099	**SAT_MIN_OFF_1** → End of Saturday minute timer period 1	0	0	59	R/W
9100	**SAT_HOUR_ON_2** → Start of Saturday hour timer period 2	11	0	23	R/W
9101	**SAT_MIN_ON_2** → Start of Saturday minute timer period 2	0	0	59	R/W
9102	**SAT_HOUR_OFF_2** → End of Saturday hour timer period 2	11	0	23	R/W
9103	**SAT_MIN_OFF_2** → End of Saturday minute timer period 2	0	0	59	R/W
9104	**SAT_HOUR_ON_3** → Start of Saturday hour timer period 3	17	0	23	R/W
9105	**SAT_MIN_ON_3** → Start of Saturday minute timer period 3	0	0	59	R/W
9106	**SAT_HOUR_OFF_3** → End of Saturday hour timer period 3	17	0	23	R/W
9107	**SAT_MIN_OFF_3** → End of Saturday minute timer period 3	0	0	59	R/W

Register	Description		Default	Min	Max	R/W
9108	**SAT_HOUR_ON_4** → Start of Saturday hour timer period 4		21	0	23	R/W
9109	**SAT_MIN_ON_4** → Start of Saturday minute timer period 4		0	0	59	R/W
9110	**SAT_HOUR_OFF_4** → End of Saturday hour timer period 4		21	0	23	R/W
9111	**SAT_MIN_OFF_4** → End of Saturday minute timer period 4		0	0	59	R/W
9112	**TYPE_OF_HARDWARE** 0=1 digital output, 3 analogue outputs 1=2 digital outputs, 2 analogue outputs 2=3 digital outputs, 1 analogue output 3=3 digital outputs, 2 analogue outputs 4=5 digital outputs	H01		0	4	R
9113	**RTC_PRESENCE** 0=not present 1=present	H02		0	1	R
9114	**IR_PRESENCE** 0=not present 1=present	H03		0	1	R
9115	**HUM_PRESENCE** 0=not present 1=present	H04		0	1	R
9116	**TYPE_COMMUNICATION** 0=not present 1=MODBUS	H05		0	1	R
9117	**TYPE_SENSOR_REG** → type of control sensor 0=control with room sensor 1=control with supply sensor	001	0	0	1	R/W
9118	**TYPE_HEATING_COIL** → type of heating battery 0=no heating battery 1=modulating electrical resistance 2=modulating valve 3=on/off electrical resistance 4=on/off valve	002	0	0	4	R/W
9119	**TYPE_COOLING_COIL** → type of cooling battery 0=no cooling battery 1=modulating valve 2=on/off valve	003	0	0	2	R/W
9120	**TYPE_POST_HEATING_COIL** → type of post-heating battery 0=no post-heating battery 1=modulating electrical resistance 2=modulating valve 3=on/off electrical resistance 4=on/off valve	004	0	0	4	R/W
9121	**FUNC_POST_HEATING_COIL** → Post-heating battery operation 0=post-heating 1=integration and post-heating 2=additional heating battery	005	0	0	2	R/W
9122	**TYPE_HUMIDIFICATOR** → Type of humidifier battery 0=no humidifier battery 1=modulating 2=on/off	006	0	0	2	R/W
9123	**TYPE_DEHUMIDIFICATOR** → Type of dehumidifier battery 0=cooling battery 1=modulating 2=on/off	007	0	0	2	R/W
9124	**TYPE_VENTILATOR** → Type of fan 0=fan not present 1=single-speed on/off fan 2=two-speed on/off fan 3=three-speed on/off fan 4=modulating fan 5=fan present and not controlled	008	0	0	5	R/W
9125	**REG_TYPE_VENTILATOR** → Type of fan control 0=manual 1=control based on CO_2 2=controlled based on temperature 3=controlled based on on/off temperature 4=controlled based on temperature+CO_2 5=controlled based on pressure/flow rate (direct action) 6=controlled based on pressure/flow rate (reverse action) 7=controlled based on dehumidification	009	0	0	7	R/W

Register	Description		Default	Min	Max	R/W
9126	**TYPE_DAMPER** → Type of controlled damper 0=no control damper 1=on/off control 2=on/off bypass for heat exchanger 3=external modulating damper 4=modulating bypass for heat exchanger 5=on/off bypass for cross-flow heat exchanger (free H/C only)	010	0	0	5	R/W
9127	**REG_TYPE_DAMPER** → Damper action 0=CO_2 1=free cooling/heating 2=free cooling/heating, CO_2 3=dehumidification	011	1	0	3	R/W
9128	**TYPE_HEAT_EXCHANGER** → Type of heat exchanger 0=non-controlled heat exchanger 1=cross-flow heat exchanger 2=double battery heat exchanger 3=rotary on/off heat exchanger 4=modulating rotary heat exchanger	012	0	0	4	R/W
9129	**ACTIV_HALF_SEASON_MODE** → Activation of mid-season operation 0=not enabled 1=enabled	013	0	0	1	R/W
9130	**CONTROL_STATE** → Type of appliance control 0=fixed point control for 2-pipe operation 1=control with offset for 2-pipe operation 2=cascade control 3=fixed point control for 4-pipe operation 4=control with compensation for 4-pipe operation	014	0	0	4	R/W
9131	**DIG_INPUT1_FUNC** → Digital input operation 1: 0=not used 1=remote season change (INPUT ON=winter, INPUT OFF=summer) 2=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 3=non-occupied holiday (INPUT ON=Occupied) 4=economy/boost (INPUT ON = economy activated) 5=forced contact presence (INPUT ON=forced control with base setpoint) 6=frost protection alarm contact (INPUT ON=frost protection active) 7=generic alarm contact (INPUT ON=generic alarm) 8=condensation contact (INPUT ON=condensate alarm) 9=generic filter contact (INPUT ON=generic filter alarm) 10=supply filter contact (INPUT ON=supply filter alarm) 11=extraction filter contact (INPUT ON=extractor filter alarm) 12=stop all alarm contact (INPUT ON=stop all alarm) 13=fan alarm contact (INPUT ON=fan alarm) 14=frost protection alarm contact of heat exchanger (INPUT ON=frost protection heat exchanger active)	015	0	0	14	R/W
9132	**DIG_INPUT1_LOG** → Digital input contact logic 1: 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	016	0	0	1	R/W
9133	**DIG_INPUT2_FUNC** → Digital input operation 2: 0=not used 1=remote season change (INPUT ON=winter, INPUT OFF=summer) 2=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 3=non-occupied holiday (INPUT ON=Occupied) 4=economy/boost (INPUT ON = economy activated) 5=forced contact presence (INPUT ON=forced control with base setpoint) 6=frost protection alarm contact (INPUT ON=frost protection active) 7=generic alarm contact (INPUT ON=generic alarm) 8=condensation contact (INPUT ON=condensate alarm) 9=generic filter contact (INPUT ON=generic filter alarm) 10=supply filter contact (INPUT ON=supply filter alarm) 11=extraction filter contact (INPUT ON=extractor filter alarm) 12=stop all alarm contact (INPUT ON=stop all alarm) 13=fan alarm contact (INPUT ON=fan alarm) 14=frost protection alarm contact of heat exchanger (INPUT ON=frost protection heat exchanger active)	017	0	0	14	R/W
9134	**DIG_INPUT2_LOG** → Digital input contact logic 2: 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	018	0	0	1	R/W

Register	Description		Default	Min	Max	R/W
9135	**ANALOG_INPUT1_FUNC** → Analogue input operation 1: 0=not used 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 8=season change remote contact (INPUT ON=winter, INPUT OFF=summer) 9=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 10=non-occupied/holiday (INPUT ON=occupied) 11=economy/boost (INPUT ON=economy activated) 12=forced contact presence (INPUT ON=forced control with base setpoint) 13=frost protection alarm contact (INPUT ON=frost protection active) 14=generic contact alarm (INPUT ON=generic alarm) 15=condensation contact (INPUT ON=condensate alarm) 16=generic filter contact (INPUT ON=generic filter alarm) 17=supply filter contact (INPUT ON=supply filter alarm) 18=extract filter contact (INPUT ON=extract filter alarm) 19=stop all alarm contact (INPUT ON=stop all alarm) 20=fan alarm contact (INPUT ON=fan alarm) 21=frost protection alarm contact for heat exchanger (INPUT ON=frost protection heat exchanger active) 22=antifreeze heating battery sensor	019	0	0	22	R/W
9136	**ANALOG_INPUT1_LOG** → Analogue input logic 1 (with 019=8 to 21): 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	020	0	0	1	R/W
9137	**ANALOG_INPUT2_FUNC** → Analogue input operation 2: 0=not used 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 8=season change remote contact (INPUT ON=winter, INPUT OFF=summer) 9=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 10=non-occupied/holiday (INPUT ON=occupied) 11=economy/boost (INPUT ON=economy activated) 12=forced contact presence (INPUT ON=forced control with base setpoint) 13=frost protection alarm contact (INPUT ON=frost protection active) 14=generic contact alarm (INPUT ON=generic alarm) 15=condensation contact (INPUT ON=condensate alarm) 16=generic filter contact (INPUT ON=generic filter alarm) 17=supply filter contact (INPUT ON=supply filter alarm) 18=extract filter contact (INPUT ON=extract filter alarm) 19=stop all alarm contact (INPUT ON=stop all alarm) 20=fan alarm contact (INPUT ON=fan alarm) 21=frost protection alarm contact for heat exchanger (INPUT ON=frost protection heat exchanger active) 22=antifreeze heating battery sensor	021	0	0	22	R/W
9138	**ANALOG_INPUT2_LOG** → Analogue input logic 2 (with 021=8 to 21): 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	022	0	0	1	R/W

Register	Description		Default	Min	Max	R/W
9139	**ANALOG_INPUT3_FUNC** → Analogue input operation 3 (models AHU-3xxSx1 excluded) Analogue input 1 function: 0=not used 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 5=0...10 V for air quality sensor (models AHU-3xxSx1 excluded) 6=0....10 V input for humidity sensor (models AH-3xxSx1 excluded) 7=0...10 V input for pressure transmitter (models AHU-3xxSx1 excluded) 8=season change remote contact (INPUT ON=winter, INPUT OFF=summer) 9=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 10=non-occupied/holiday (INPUT ON=occupied) 11=economy/boost (INPUT ON=economy activated) 12=forced contact presence (INPUT ON=forced control with base setpoint) 13=frost protection alarm contact (INPUT ON=frost protection active) 14=generic contact alarm (INPUT ON=generic alarm) 15=condensation contact (INPUT ON=condensate alarm) 16=generic filter contact (INPUT ON=generic filter alarm) 17=supply filter contact (INPUT ON=supply filter alarm) 18=extract filter contact (INPUT ON=extract filter alarm) 19=stop all alarm contact (INPUT ON=stop all alarm) 20=fan alarm contact (INPUT ON=fan alarm) 21=frost protection alarm contact for heat exchanger (INPUT ON=frost protection heat exchanger active) 22=antifreeze heating battery sensor	023	0	0	22	R/W
9140	**ANALOG_INPUT3_LOG** → Analogue input logic 3 (with 023=8 to 21): 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	024	0	0	1	R/W
9141	**DIG_OUTPUT1_FUNC** → Digital output operation 1 0=not used 1=speed 1 for on/off fan 2=speed 2 for on/off fan 3=speed 3 for on/off fan 4=heating valve 5=cooling valve 6=mixed-use valve 7=electrical resistance 8=post-heating valve 9=post-heating electrical resistance 10=authorisation for humidifier 11=external regulated damper 12=external not regulated damper 13=bypass damper for cross-flow heat exchanger 14=double battery heat exchanger or on/off rotary heat exchanger 15=pre-heating electrical resistance for heat exchanger 16=on/off humidifier 17=on/off dehumidifier 18=fan alarm output 19=relay for EC motors 20=bypass damper for cross-flow heat exchanger (based on free c/h only) 21=antifreeze heating coil alarm relay	025	0	0	21	R/W

Register	Description		Default	Min	Max	R/W
9142	**DIG_OUTPUT2_FUNC** → Digital output operation 2 (models AHU-0xxSx1 excluded) 0=not used 1=speed 1 for on/off fan 2=speed 2 for on/off fan 3=speed 3 for on/off fan 4=heating valve 5=cooling valve 6=mixed-use valve 7=electrical resistance 8=post-heating valve 9=post-heating electrical resistance 10=authorisation for humidifier 11=external regulated damper 12=external not regulated damper 13=bypass damper for cross-flow heat exchanger 14=double battery heat exchanger or on/off rotary heat exchanger 15=pre-heating electrical resistance for heat exchanger 16=on/off humidifier 17=on/off dehumidifier 18=fan alarm output 19=relay for EC motors 20=bypass damper for cross-flow heat exchanger (based on free c/h only) 21=antifreeze heating coil alarm relay	026	0	0	21	R/W
9143	**DIG_OUTPUT3_FUNC** → Digital output operation 3 (models AHU-0xxSx1, AHU-1xxSx1 excluded) 0=not used 1=speed 1 for on/off fan 2=speed 2 for on/off fan 3=speed 3 for on/off fan 4=heating valve 5=cooling valve 6=mixed-use valve 7=electrical resistance 8=post-heating valve 9=post-heating electrical resistance 10=authorisation for humidifier 11=external regulated damper 12=external not regulated damper 13=bypass damper for cross-flow heat exchanger 14=double battery heat exchanger or on/off rotary heat exchanger 15=pre-heating electrical resistance for heat exchanger 16=on/off humidifier 17=on/off dehumidifier 18=fan alarm output 19=relay for EC motors 20=bypass damper for cross-flow heat exchanger (based on free c/h only) 21=antifreeze heating coil alarm relay	027	0	0	21	R/W
9144	**DIG_OUTPUT4_FUNC** → Digital output operation 4 (models AHU-0xxSx1, AHU-1xxSx1, AHU-2xxSx1, AHU-3xxSx1 excluded) 0=not used 1=speed 1 for on/off fan 2=speed 2 for on/off fan 3=speed 3 for on/off fan 4=heating valve 5=cooling valve 6=mixed-use valve 7=electrical resistance 8=post-heating valve 9=post-heating electrical resistance 10=authorisation for humidifier 11=external regulated damper 12=external not regulated damper 13=bypass damper for cross-flow heat exchanger 14=double battery heat exchanger or on/off rotary heat exchanger 15=pre-heating electrical resistance for heat exchanger 16=on/off humidifier 17=on/off dehumidifier 18=fan alarm output 19=relay for EC motors 20=bypass damper for cross-flow heat exchanger (based on free c/h only) 21=antifreeze heating coil alarm relay	028	0	0	21	R/W

Register	Description		Default	Min	Max	R/W
9145	**DIG_OUTPUT5_FUNC** → Digital output operation 5 (models AHU-0xxSx1, AHU-1xxSx1, AHU-2xxSx1, AHU-3xxSx1 excluded) 0=not used 1=speed 1 for on/off fan 2=speed 2 for on/off fan 3=speed 3 for on/off fan 4=heating valve 5=cooling valve 6=mixed-use valve 7=electrical resistance 8=post-heating valve 9=post-heating electrical resistance 10=authorisation for humidifier 11=external regulated damper 12=external not regulated damper 13=bypass damper for cross-flow heat exchanger 14=double battery heat exchanger or on/off rotary heat exchanger 15=pre-heating electrical resistance for heat exchanger 16=on/off humidifier 17=on/off dehumidifier 18=fan alarm output 19=relay for EC motors 20=bypass damper for cross-flow heat exchanger (based on free c/h only) 21=antifreeze heating coil alarm relay	029	0	0	21	R/W
9146	**ANALOG_OUTPUT1_FUNC** → Analogue output operation 1 (models AHU-4xxSx1 excluded) 0=not used 1=supply fan output 2=extraction fan output 3=heating valve output for 2/4-pipe appliances 4=cooling valve output for 2/4-pipe appliances 5=mixed-use valve output for 2-tube appliances 6=modulating electrical resistance output 7=post-heating valve output 8=post-heating electrical resistance output 9=modulating damper output 10=modulating humidifier 11=modulating dehumidifier 12=modulating rotary heat exchanger 13=modulating bypass damper for heat exchanger	030	0	0	13	R/W
9147	**ANALOG_OUTPUT2_FUNC** → Analogue output operation 2 (models AHU-2xxSx1, AHU-4xxSx1 excluded) 0=not used 1=supply fan output 2=extraction fan output 3=heating valve output for 2/4-pipe appliances 4=cooling valve output for 2/4-pipe appliances 5=mixed-use valve output for 2-tube appliances 6=modulating electrical resistance output 7=post-heating valve output 8=post-heating electrical resistance output 9=modulating damper output 10=modulating humidifier 11=modulating dehumidifier 12=modulating rotary heat exchanger 13=modulating bypass damper for heat exchanger	031	0	0	13	R/W
9148	**ANALOG_OUTPUT3_FUNC** → Analogue output operation 3 (models AHU-1xxSx1, AHU-2xxSx1, AHU-3xxSx1, AHU-4xxSx1 excluded) 0=not used 1=supply fan output 2=extraction fan output 3=heating valve output for 2/4-pipe appliances 4=cooling valve output for 2/4-pipe appliances 5=mixed-use valve output for 2-tube appliances 6=modulating electrical resistance output 7=post-heating valve output 8=post-heating electrical resistance output 9=modulating damper output 10=modulating humidifier 11=modulating dehumidifier 12=modulating rotary heat exchanger 13=modulating bypass damper for heat exchanger	032	0	0	13	R/W
9149	Reserved address					
9150	**COR_INT_TEMP** → Correction of internal temperature (Δ°C [Δ°F]) (Note1)	101	0	-50 [-90]	50 [90]	R/W

Register	Description		Default	Min	Max	R/W
9151	**COR_INT_HUM** → Correction of internal humidity detected (Note2)	102	0	-100	100	R/W
9152	**COR_REM_AI1** → Correction of temperature **AI1** (Δ°C [Δ°F]) (Note1)	103	0	-50 [-90]	50 [90]	R/W
9153	**COR_REM_AI2** → Correction of temperature **AI2** (Δ°C [Δ°F]) (Note1)	104	0	-50 [-90]	50 [90]	R/W
9154	**COR_REM_AI3** → Correction of temperature **AI3** (Δ°C [Δ°F]) (Note1)	105	0	-50 [-90]	50 [90]	R/W
9155	**WEIGHT_REM_AIR** → Weighting % of the remote control sensor in relation to the internal sensor (if 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3))	106	0	0	100	R/W
9156	**BASIC_HEAT_SET** → Heating setpoint for control without compensation (°C [°F]) (Note1)	107	200 [68]	111	110	R/W
9157	**BASIC_COOL_SET** → Cooling setpoint for control without compensation (°C [°F]) (Note1)	108	250 [77]	113	112	R/W
9158	**BASIC_SET_4_PIPE** → Setpoint for 4-pipe control without compensation (°C [°F]) (Note1)	109	210 [70]	111	110	R/W
9159	**DEV_SET_UPWARD_HEAT** → Maximum heating control setpoint value (°C [°F]) (Nota1)	110	400 [104]	111	500 [122]	R/W
9160	**DEV_SET_DOWNWARD_HEAT**→ Minimum heating control setpoint value (°C [°F]) (Note1)	111	60 [43]	60 [43]	110	R/W
9161	**DEV_SET_UPWARD_COOL** → Maximum cooling control setpoint (°C [°F]) (Note1)	112	400 [104]	113	500 [122]	R/W
9162	**DEV_SET_DOWNWARD_COOL** → Minimum cooling control setpoint (°C [°F]) (Note1)	113	60 [43]	60 [43]	112	R/W
9163	**PROP_BAND_REG_HEAT** → Heating proportional band (Δ°C [Δ°F]) (Note1)	114	20 [36]	10 [18]	200 [360]	R/W
9164	**INTEGRAL_TIME_REG_HEAT** → Heating integral time (s)	115	0	0	999	R/W
9165	**PROP_BAND_REG_COOL** → Cooling proportional band (Δ°C [Δ°F]) (Note1)	116	20 [36]	10 [18]	200 [360]	R/W
9166	**INTEGRAL_TIME_REG_COOL** → Cooling integral time (s)	117	0	0	999	R/W
9167	**PROP_BAND_SUPPLY** → Proportional band for the calculation of the supply setpoint in cascade control (Δ°C [Δ°F]) (Note1)	118	200 [360]	10 [18]	500 [900]	R/W
9168	**INTEGRAL_TIME_SUPPLY** → Integral time for calculation of supply setpoint in cascade control (s)	119	0	0	999	R/W
9169	**ECO_SET_ADJUST** → Economy or boost offset (Δ°C [Δ°F]) (Note1)	120	30 [5]	-120 [-22]	120 [22]	R/W
9170	**HOL_SET_ADJUST** → Offset mode for “non-occupied/holiday” operation (Δ°C [Δ°F]) (Note1)	121	50 [9]	10 [2]	140 [25]	R/W
9171	**DO_HYST** → Hysteresis for on/off output (Δ°C [Δ°F]) (Note1)	122	10 [18]	5 [10]	20 [36]	R/W
9172	**DEAD_ZONE** → Neutral zone for 4-pipe systems (Δ°C [Δ°F]) (Note1)	123	10 [18]	5 [10]	50 [90]	R/W
9173	**DIFF_INSERT_HEATING** → Differential addition of heating in summer season (mid-season) (Δ°C [Δ°F]) (Note1)	124	30 [54]	5 [10]	100 [180]	R/W
9174	**AUTHORIZE_LIM_SUPPLY_LOW** → Activation of minimum supply limit for fixed-point control 0=not enabled 1=enabled in cooling mode 2=enabled in heating mode 3=enabled in heating and cooling modes	125	0	0	3	R/W
9175	**SET_LIM_LOW** → Minimum low supply limit setpoint (°C [°F]) (Note1)	126	100 [50]	60 [43]	128	R/W
9176	**AUTHORIZE_LIM_SUPPLY_HIGH** → Activation of maximum supply limit for fixed-point control 0=not enabled 1=enabled in cooling mode 2=enabled in heating mode 3=enabled in heating and cooling modes	127	0	0	3	R/W
9177	**SET_LIM_HIGH** → High supply limit setpoint (°C [°F]) (Note1)	128	400 [86]	126	500 [122]	R/W
9178	PROP_BAND_LIM → Proportional band for the limit (Δ°C [Δ°F]) (Note1)	129	20 [36]	10 [18]	200 [360]	R/W
9179	**AUTHORIZE_SETPOINT_COMPENSATION** → Activation of compensation for operations with 014=1 or 4 0=not enabled 1=enabled in cooling mode 2=enabled in heating mode 3=enabled in heating and cooling modes	130	0	0	3	R/W
9180	**TEMP_EXT_MIN_COMP_HEATING** → Minimum external temperature for winter compensation (°C [°F]) (Note1)	131	-100 [14]	-100 [14]	I32	R/W
9181	**TEMP_EXT_MAX_COMP_HEATING** → Maximum external temperature for winter compensation (°C [°F]) (Note1)	132	200 [68]	I31	50.0 [122]	R/W
9182	**SET_TEXT_MIN_COMP_HEATING** → Compensation setpoint corresponding to the minimum external temperature for winter compensation (°C [°F]) (Note1)	133	600 [140]	50 [41]	800 [176]	R/W

Register	Description		Default	Min	Max	R/W
9183	**SET_TEXT_MAX_COMP_HEATING** → Compensation setpoint corresponding to the maximum external temperature for winter compensation (°C [°F]) (Note1)	134	300 [86]	50 [41]	800 [176]	R/W
9184	**TEMP_EXT_MIN_COMP_COOLING** → Minimum external temperature for summer compensation (°C [°F]) (Note1)	135	220 [72]	-100 [14]	I36	R/W
9185	**TEMP_EXT_MAX_COMP_COOLING** → Maximum external temperature for summer compensation (°C [°F]) (Note1)	136	350 [95]	I35	500 [122]	R/W
9186	**SET_TEXT_MIN_COMP_COOLING** → Compensation setpoint corresponding to the minimum external temperature for summer compensation (°C [°F]) (Note1)	137	190 [66]	50 [41]	800 [176]	R/W
9187	**SET_TEXT_MAX_COMP_COOLING** → Compensation setpoint corresponding to the maximum external temperature for summer compensation (°C [°F]) (Note1)	138	160 [61]	50 [41]	800 [176]	R/W
9188	**AUTHORIZE_DEHUMIDIFICATION** → Activation of dehumidification 0=not enabled 1=enabled with built-in humidity sensor 2=enabled with remote humidity sensor 3=enabled with built-in humidity sensor in cooling only 4=enabled with remote humidity sensor in cooling only	139	0	0	4	R/W
9189	**AUTHORIZE_HUMIDIFICATION** → Activation of humidification 0=not enabled 1=enabled with built-in humidity sensor 2=enabled with remote humidity sensor	140	0	0	2	R/W
9190	**DEAD_ZONE_HUM** → Neutral zone humidity (Note2)	141	60	40	200	R/W
9191	**SETPOINT_HUMIDITY** → Humidity setpoint (Note2)	142	500	0	1000	R/W
9192	**PROP_BAND_HUMIDITY** → Proportional band for humidity (Note2)	143	50	20	1000	R/W
9193	**INTEGRAL_TIME_HUMIDITY** → Integral time for humidity (s)	144	0	0	999	R/W
9194	**AUTHORIZE_LOW_LIM_SUPPLY_HUM** → Activation of low limit supply for humidity 0=not enabled 1=enabled	145	0	0	1	R/W
9195	**SET_LIM_LOW_HUM** → Low limit supply humidity setpoint (%r.h.) (Note2)	146	200	100	500	R/W
9196	**AUTHORIZE_HIGH_LIM_SUPPLY_HUM** → Activation of high limit supply for humidity 0=not enabled 1=enabled	147	0	0	1	R/W
9197	**SET_LIM_HIGH_HUM** → High limit supply humidity setpoint (%r.h.) (Note2)	148	750	500	900	R/W
9198	**PROP_BAND_LIM_HUM** → Proportional band for the humidity limit (%r.h.) (Note2)	149	50	30	300	R/W
9199	**MIN_VOLT_SUPPLY_FAN** → Minimum supply fan voltage (Note3)	150	0	0	151	R/W
9200	**MAX_VOLT_SUPPLY_FAN** → Maximum supply fan voltage (Note3)	151	100	150	100	R/W
9201	**MIN_VOLT_EXTRACT_FAN** → Minimum extractor fan voltage (Note3)	152	0	0	153	R/W
9202	**MAX_VOLT_EXTRACT_FAN** → Maximum extractor fan voltage (Note3)	153	100	152	100	R/W
9203	**SPEED_1_MODULATING** → Speed 1 of the modulating fans (%)	154	10	0	100	R/W
9204	**SPEED_2_MODULATING** → Speed 2 of the modulating fans (%)	155	65	0	100	R/W
9205	**SPEED_3_MODULATING** → Speed 3 of the modulating fans (%)	156	100	0	100	R/W
9206	**ISTERESIS_FAN** → Fan hysteresis (with fan control in temperature) (Δ°C [Δ°F]) (Note1)	157	10 [18]	10 [18]	50 [90]	R/W
9207	**STEP_START_MOD_FAN** → Step activation of modulating fans (%)	158	10	0	100	R/W
9208	**DELAY_START_REG** → Startup regulation delay (s)	159	0	0	600	R/W
9209	**DELAY_STOP_FAN** → Stop delay of ventilation (s)	160	30	0	600	R/W
9210	**SETPOINT_PRESSURE** → Pressure (Pa)/flow rate (m^3/h) setpoint	161	1500	0	5000	R/W
9211	**PROP_BAND_PRESSURE** → Proportional band for pressure (Pa) /flow rate (m^3/h)	162	300	1	5000	R/W
9212	**INTEGRAL_TIME_PRESSURE** → Integral time for pressure (s)	163	0	0	999	R/W
9213	**MIN_OPENING_POS_DAMPER** → Minimum modulating damper opening (%)	164	10	0	165	R/W
9214	**MAX_OPENING_POS_DAMPER** → Maximum modulating damper opening (%)	165	100	164	100	R/W
9215	**DAMPER_STOP_DELAY** → Stop delay of damper (s)	166	0	0	600	R/W
9216	**SETPOINT_AIR** → Air exchange setpoint	167	1000	0	2000	R/W
9217	**PROP_BAND_AIR** → Air exchange proportional band	168	200	50	2000	R/W
9218	**INTEGRAL_TIME_AIR** → Integral time for air exchange	169	0	0	999	R/W

Register	Description		Default	Min	Max	R/W
9219	**AUTHORIZE_FREE_COOL_HEAT**→ Activation of free cooling/heating 0=not enabled 1=free cooling enabled 2=free heating enabled 3=free cooling and heating enabled 4=free cooling in cooling only enabled 5=free heating in heating only enabled 6=free cooling in cooling only and free heating in heating only enabled	170	0	0	6	R/W
9220	**SETPOINT_DIFF_FREE_HEAT_COOL** (°C [°F]) (Note1)→ Differential setpoint for free cooling/heating	171	40 [72]	4 [8]	100 [180]	R/W
9221	**DIFF_FREE_COOL_HEAT** → Free cooling/heating proportional band (°C [°F]) (Note1)	172	20 [36]	4 [8]	100 [180]	R/W
9222	**SETPOINT_DIFF_FREE_COOL_HEAT_MAX** → Maximum differential setpoint for free cooling/heating (°C [°F]) (Note1)	173	100 [180]	50 [90]	200 [360]	R/W
9223	**TEXT_MIN_FREE_COOL** → Minimum external temperature for free cooling (°C [°F]) (Note1)	174	170 [63]	100 [50]	200 [68]	R/W
9224	**TREG_MIN_FREE_COOL** → Minimum control temperature for free cooling (°C [°F]) (Note1)	175	220 [72]	150 [59]	300 [86]	R/W
9225	**TEXT_MAX_FREE_HEAT** → Maximum external temperature for free heating (°C [°F]) (Note1)	176	280 [82]	200 [68]	350 [95]	R/W
9226	**TREG_MAX_FREE_HEAT** → Maximum control temperature for free heating (°C [°F]) (Note1)	177	330 [91]	200 [68]	350 [95]	R/W
9227	**HYST_REG_FREE_HEAT** → Hysteresis for free heating/cooling (°C [°F]) (Note1)	178	10 [18]	5 [10]	100 [180]	R/W
9228	**SET_POST_HEATING** → Post-heating setpoint (Δ°C [Δ°F]) (Note1)	179	240[75]	50 [41]	500 [122]	R/W
9229	**HYST_POST_HEATING** → Post-heating proportional band or hysteresis (Δ°C [Δ°F]) (Note1)	180	20 [36]	5 [10]	50 [90]	R/W
9230	**SET_EXCHANGER** → Differential setpoint for heat exchanger (K) (°C [°F]) (Note1)	181	20 [36]	5[10]	100 [180]	R/W
9231	**HYST_EXCHANGER** → Hysteresis for heat exchanger (K) (°C [°F]) (Note1)	182	5[10]	5[10]	181	R/W
9232	**SPEED_MIN_EXCHANGER** → Minimum speed of modulating rotary heat exchanger	183	0	0	184	R/W
9233	**SPEED_MAX_EXCHANGER** → Maximum speed of modulating rotary heat exchanger	184	100	183	100	R/W
9234	**SET_ANTIFROST_EXCHANGER** → Setpoint for frost protection heat exchanger (°C[°F]) (Note1)	185	50 [41]	40 [39]	100 [50]	R/W
9235	**ACTION_EXCHANGER_FROST** → Action in case of frost protection heat exchanger alarm 0=reduction of the supply fan speed 1=bypass of the heat exchanger 2=activation of pre-heating electrical resistance of the heat exchanger 3=reduction of the supply fan speed and bypass of the heat exchanger 4=reduction of the supply fan speed and activation of pre-heating electrical resistance of the heat exchanger	186	0	0	4	R/W
9236	**SPEED_REDUCTION_EXCHANGER_FROST** → Percentage reduction of supply fan speed relative to the extraction fan (%)	187	10	0	100	R/W
9237	**AUTHORIZE_ANTIFROST_FUNCTION** → Activation of frost protection heat battery 0=frost protection not enabled 1=frost protection enabled	188	0	0	1	R/W
9238	**BASIC_SET_ANTIFROST** → Setpoint for frost protection heat battery (°C [°F]) (Note1)	189	50 [41]	40 [39]	100 [50]	R/W
9239	**HYST_ANTIFROST** → Frost protection heat battery or heat exchanger hysteresis (K) (°C [°F]) (Note1)	190	20[36]	20[36]	100 [180]	R/W
9240	**POS_COOLING_VALVE_ANTIFROST** → Percentage of cooling valve opening in case of frost protection heat battery alarm (%)	191	0	0	100	R/W
9241	**MAX_HOUR_FAN_RUN** → hours counter of on/off or supply fan operation	192	2000	0	9990	R/W

Register	Description		Default	Min	Max	R/W
9242	**VISU_TYPE_FIST_DISP** → Value displayed on display A 0=internal sensor temperature 1=external sensor temperature **AI1** 2=external sensor temperature **AI2** 3=external sensor temperature **AI3** 4=control temperature (see *"8. Control sensors" page 16* 5=internal humidity reading (for **AHU-xxxSH1** models only) 6=operating temperature setpoint (see *"9. Operating setpoint, economy/ BOOST, holiday modes" page 17*) 7=supply setpoint calculated in cascade control mode 8=operating humidity setpoint 9=value of output 0..10 V **AO1** (V) 10=value of output 0..10 V **AO2** (V) 11=value of output 0..10 V **AO3** (V)	193	0	0	11	R/W
9243	**VISU_TYPE_SECOND_DISP** → Value displayed on display B 0=internal sensor temperature 1=external sensor temperature **AI1** 2=external sensor temperature **AI2** 3=external sensor temperature **AI3** 4=control temperature (see *"8. Control sensors" page 16* 5=internal humidity reading (for **AHU-xxxSH1** models only) 6=operating temperature setpoint (see *"9. Operating setpoint, economy/ BOOST, holiday modes" page 17*) 7=supply setpoint calculated in cascade control mode 8=operating humidity setpoint 9=value of output 0..10 V **AO1** (V) 10=value of output 0..10 V **AO2** (V) 11=value of output 0..10 V **AO3** (V) 12=current hour:minutes 13=total hours of fan operation 14=value of input **AI3** configured as 0...10 V input 15=display B off 16=flow rate (m^3/hour)	194	12	0	16	R/W
9244	**FUNCTION_RIGHT_KEY** → MODE button functionality 0=local change of season if a season change contact is not used. 1=timer extension. 2=operating mode (normal, using the time periods or "non-occupied holiday")	195	1	0	2	R/W
9245	**UNIT_C_F** → Unit of measurement (0=°C, 1=°F) (Note1)	196	0	0	1	R/W
9246	**DAYLIGHT_SAVING_TIME** → Change to/from daylight savings time 0=no automatic update of summertime change 1=automatic summertime change in Europe 2=automatic summertime change in the USA	197	1	0	2	R/W
9247	**TIME_TIMER_PROLUNG** → Duration of extension timer (minutes)	198	60	1	480	R/W
9248	**TIME_BAND_FUNCTION** → Timer periods operation 0=timer periods for normal/economy-boost operation 1=timer periods to switch on/off the appliance	199	0	0	1	R/W
9249	**MODBUS_BAUD** → Baud rate of the Modbus (1=2400, 2=4800, 3=9600, 4=19200, 5=38400 bit/s) (for **AHU-xMxSx1** models only)	200	4	1	5	R/W
9250	**MODBUS_PARITY** → Parity of the modbus (0=none, 1=odd, 2=even) (for **AHU-xMxSx1** models only)	201	2	0	2	R/W
9251	**MODBUS_ADDRESS** → Appliance address on the Modbus network (1…247) (for **AHU-xMxSx1** models only)	202	1	1	247	R/W
9252	**CANCEL_HOURS_FAN_RUN** → Reset hours counter for hours of operation of the fan	203	0	0	1	R/W
9253	**COMFORT_FUNCTION** → COMFORT function 0=current setpoint, modified via quick access 1=setpoint offset, modified via quick access	204	0	0	1	R/W
9254	**OFFSET_RANGE** → Setpoint offset range applied in the comfort function (Δ°C [Δ°F]) (Note1)	205	30 [5]	0[0]	100 [18]	R/W
9255	**RANGE_MIN_VOLT_INPUT** → Low scale for input 0...10 V	206	0	0	207	R/W
9256	**RANGE_MAX_VOLT_INPUT** → High scale for input 0...10 V	207	2000	206	9999	R/W
9257	**UNIT_VOLT_INPUT** → Unit of measurement of display B for input 0...10 V 0=ppm 1=% R.H. 2=no unit	208	0	0	2	R/W
9258	**COR_AI3_VOLT_INPUT** → Correction of input 0...10 V **AI3**	209	0	-980	980	R/W

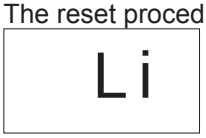
Register	Description		Default	Min	Max	R/W
9259	**PRIORITY_MANUAL_OFF** → Manual switch-off priority 0=manual on/off has not priority 1=manual on/off has priority	210	0	0	1	R/W
9260	**LIMIT_MANUAL_SPEED** → Manual speed limit	211	50	15	100	R/W
9261	**PRIORITY_TEMP_HUM** → Temperature/humidity control priority 0=temperatura priority 1=humidity priority	212	0	0	1	R/W
9262	**OFFSET_SETPOINT** → Setpoint offset in the comfort function (Δ°C [Δ°F]) (Note1)		0 [0]	-205	205	R/W
9263	**MODE_FASCE** → Selecting the operating mode 0=without time periods 1=with time periods 2=holidays		0	0	2	R/W
9264	**MANUAL_OCCUPANCY**→ Forced control as if in a timer period interval 0=no forced control 1=for a duration corresponding to the parameter 198		0	0	1	R/W
9265	**STA_MANUAL**→ Selecting the 2-pipe operating season 0=winter 1=summer		0	0	1	R/W
9266	**FAN_SPEED_MODE** → Selecting the fan speed manually 0=manual speed 1 1=manual speed 2 2=manual speed 3		0	0	2	R/W
9267	**ON_OFF_VIA_MODBUS** → On/off via Modbus 0= OFF, 1= ON		1	0	1	R/W
9268	**YEAR_SET** → Year to set		2012	2012	2100	R/W
9269	**MONTH_SET** → Month to set		1	1	12	R/W
9270	**DAY_SET** → Day to set		1	1	31	R/W
9271	**HOUR_SET** → Hour to set		0	0	23	R/W
9272	**MIN_SET** → Minute to set		0	0	59	R/W
9273	**ABI_CLOCK_SET_FROM_MODBUS** → To update the clock via Modbus, first set the year, month, day, hour, minutes in the registers 9268 to 9272. Then set the register 9273 to 1. The settings made are then automatically loaded into the appliance clock and register 9273 resets to 0.		0	0	1	R/W
9274	**RESET_PARAM_TO_DEFAULT** → set the parameter to 1 to reload the default values. The parameter resets to 0 once the procedure has terminated successfully		0	0	1	R/W
9275	**LOCK_KEYBOARD** → Block keyboard 0=keypad unlocked 1=keypad locked		0	0	1	R/W
from 9276 to 9287	Reserved addresses				R	R/W
9285	Major release of firmware			0	9	R
9286	Minor release of firmware			0	9	R
9287	Build release of firmware			0	9	R
9288	**FLOW_RATE** → Flow coefficient k (Note4) 0=control in constant pressure otherwise control in constant flow rate	213	0	0	1000	R/W

To obtain the address of any register, subtract 1 from the register number indicated in the table: example: the address of the Modbus variable SUN_HOUR_ON_1 is 9000 - 1 = 8999.

Note 1: Set all temperature parameters using the same unit defined by the UNIT_C_F register (parameter 196).
In °C, the values are displayed multiplied by 10.
In °F, the values of the parameters 101, 103, 104, 105, 114, 116, 118, 122, 123, 124, 129, 157, 171, 172, 173, 178, 180, 181, 182, 190, are displayed multiplied by 10.
Note 2: The value displayed corresponds to the value in %r.h. multiplied by 10 (example: value of 50 = 5%r.h.)
Note 3: The value displayed corresponds with the value in Volts, multiplied by 10 (example: value of 80 = 8.0 V)
Note 4: Parameter available for software version upper or equal to 1.1.6

• Default parameters reset via MODBUS

The initial (default) configuration of the parameters can be reloaded as follows:
Set the register 9274 (RESET_PARAM_TO_DEFAULT) to 1.
The reset procedure starts. The display reports the following messages:



Loading of default parameters

Default parameters loaded

When the default parameters are loaded, the controller returns to control mode and the register RESET_PARAM_TO_DEFAULT in address 9274 resets to 0.

• Clock setting via MODBUS

To set the clock via the Modbus, proceed as follows:
- set the variables of registers 9268 to 9272 (from “YEAR_SET” to “MIN_SET”).
- set the variable of 9273 (**ABI_CLOCK_SET_FROM_MODBUS** -> activation of clock update) to 1.
Once the clock has been updated, the variable resets to 0 automatically.

• MODBUS communications alarm

If there are frequent parity or checksum errors relating to messages received, the alarm is signalled on the display and the ⚠485 icon flashes. Contact technical service.

• MODBUS connection diagram

These diagrams are valid for **AHU-xMxSx1** models only.

The RS485-MODBUS line has a long main bus to which the appliances are connected directly (max 32 appliances).

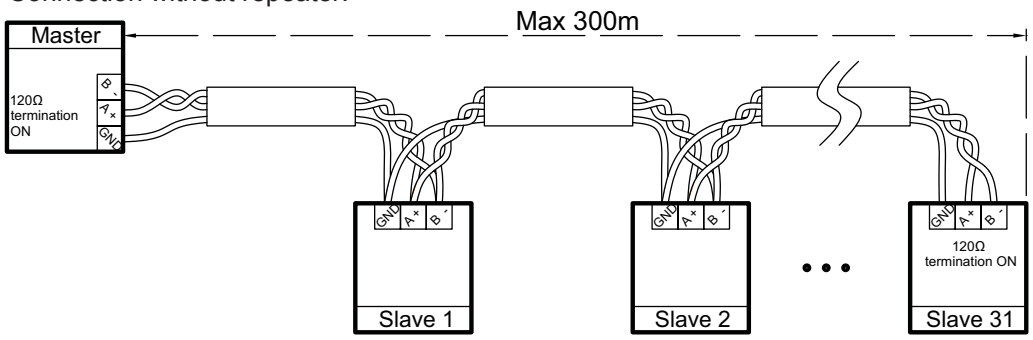
Use cables with a braided pair + 1 ground wire + shield.
Use the braided pair to connect **A+** and **B-** and the single wire for **GND** which must be connected to each device.
Connect the shield to ground at a single point, preferably near the master.
The cable must be of type MODBUS RS485 data transmission.
The ends of the cable must be connected with a 120 ohm termination resistance.
To fit the 120 ohm to the regulator, see *"41. Jumper configuration" page 137*.

The maximum length of the bus depends on the baud rate and the cable itself.
For a baud rate of 9600, the cable (AVG26 type) can be up to 1000 m long.

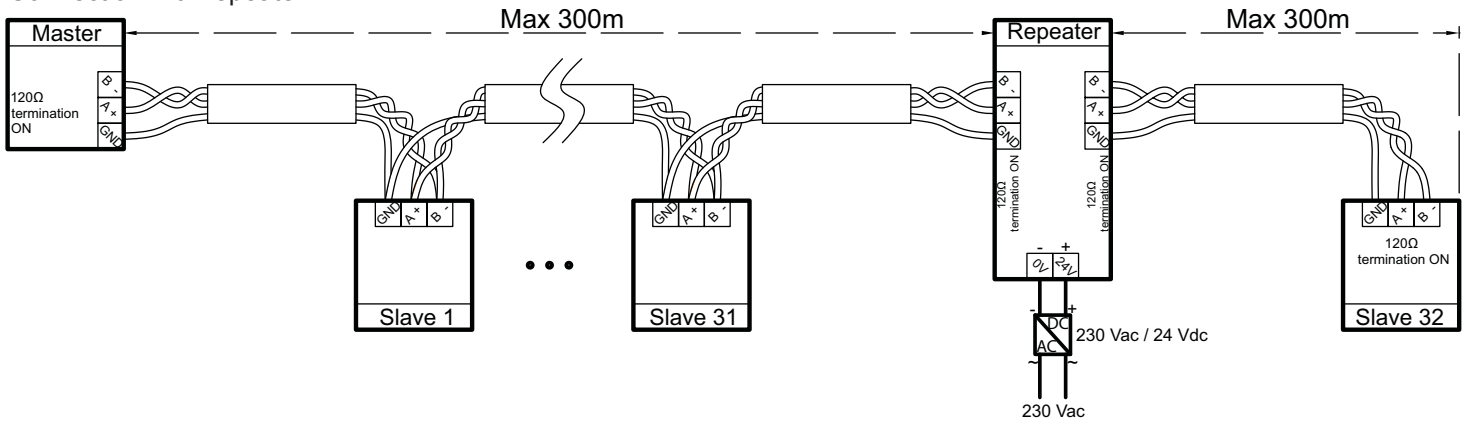
Any branch lines must be short, at most 20 m long. If you use a multi-port tap for n branches, each branch can be up to 40 m divided by n.

To increase the number of devices on the line or increase the length of the cables, you must install a signal repeater.
Add a signal repeater for every group of 32 appliances connected.

Connection without repeater:



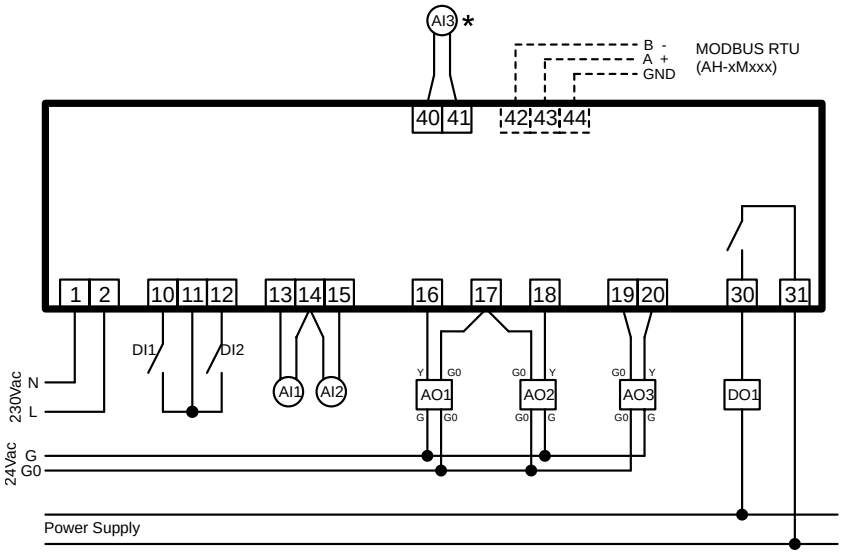
Connection with repeater:

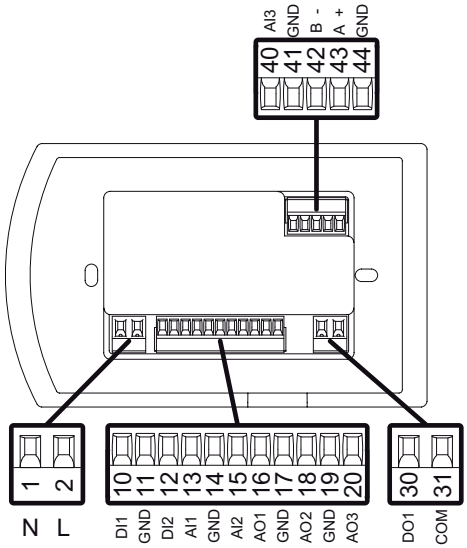


43. Electrical connections

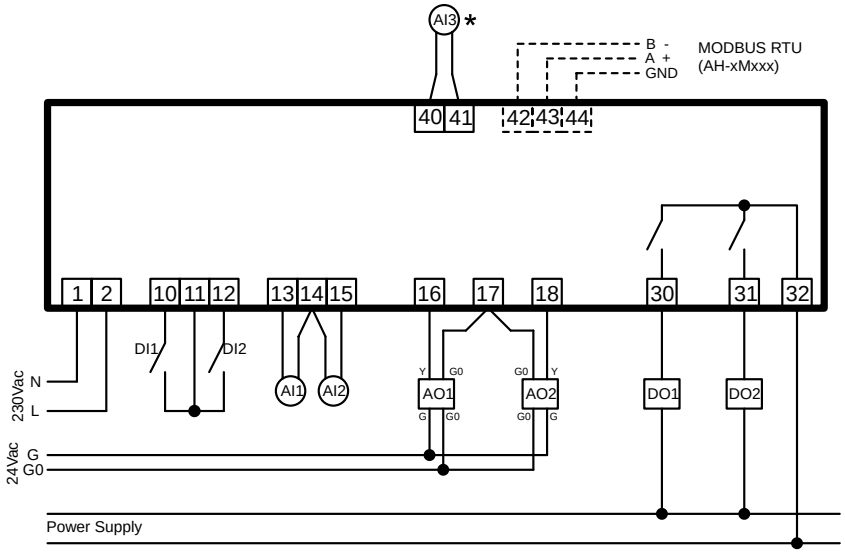
The installation and maintenance operations must be carried out by qualified personnel, with the appliance disconnected from the power supply and from external loads. AB Industrietechnik shall not be responsible for any damage caused by inadequate installation and/or from the unauthorised opening or removal of safety devices.

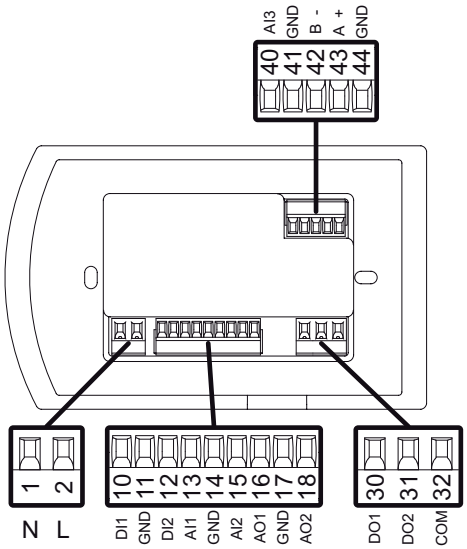
Connection of AHU-0xxSx1 version



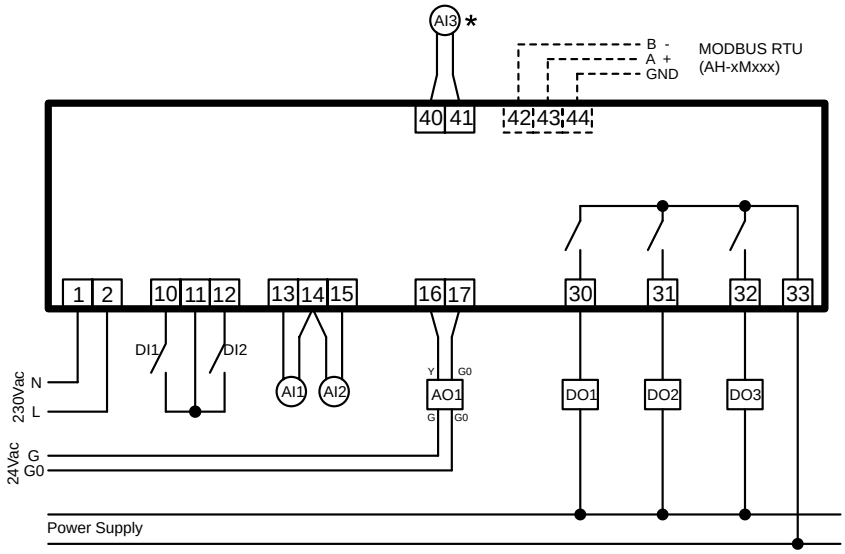


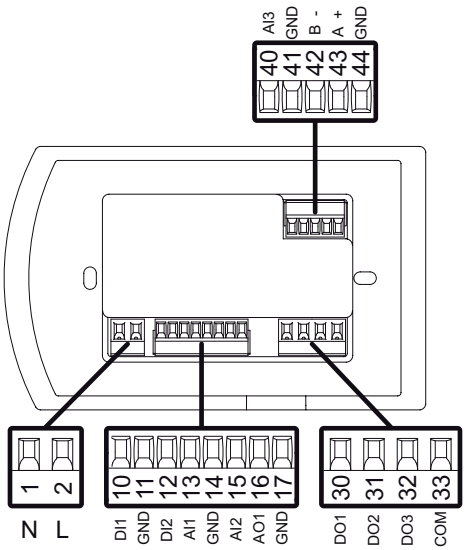
Connection of AHU-1xxSx1 version



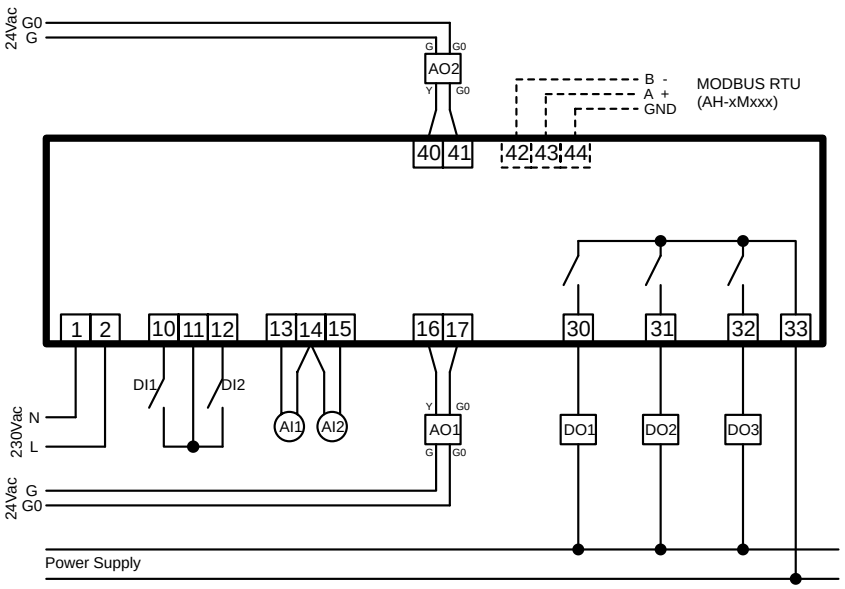


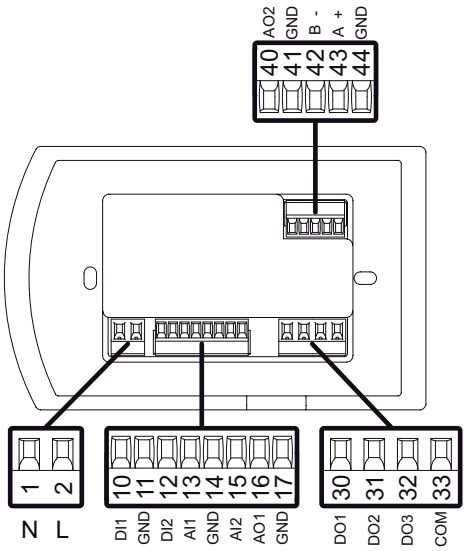
Connection of AHU-2xxSx1 version



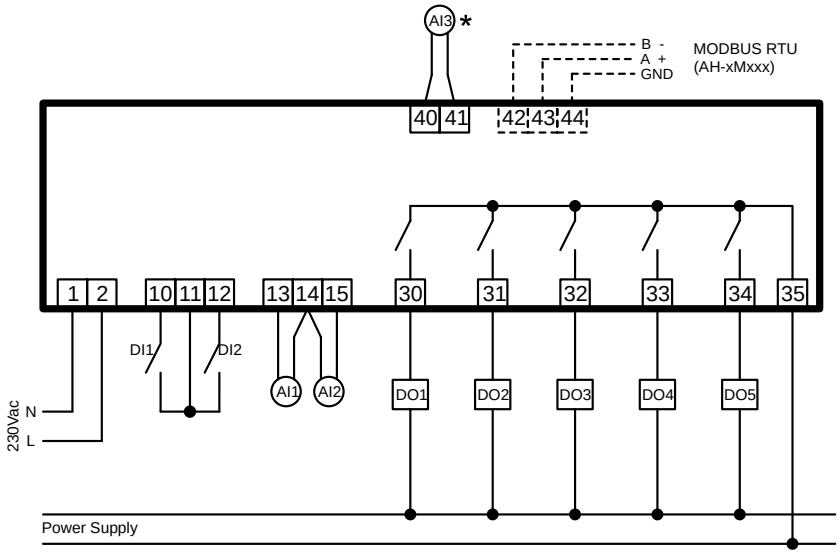


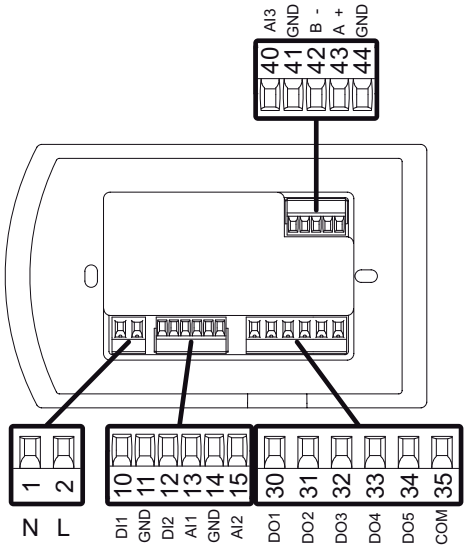
Connection of AHU-3xxSx1 version





Connection of AHU-4xxSx1 version





*If the air quality sensor with 0...10 V output is used, connect as per figure 2.
In other cases (temperature sensor), make the connections as per figure 1.

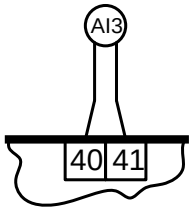


Figure 1

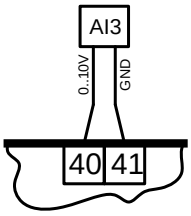
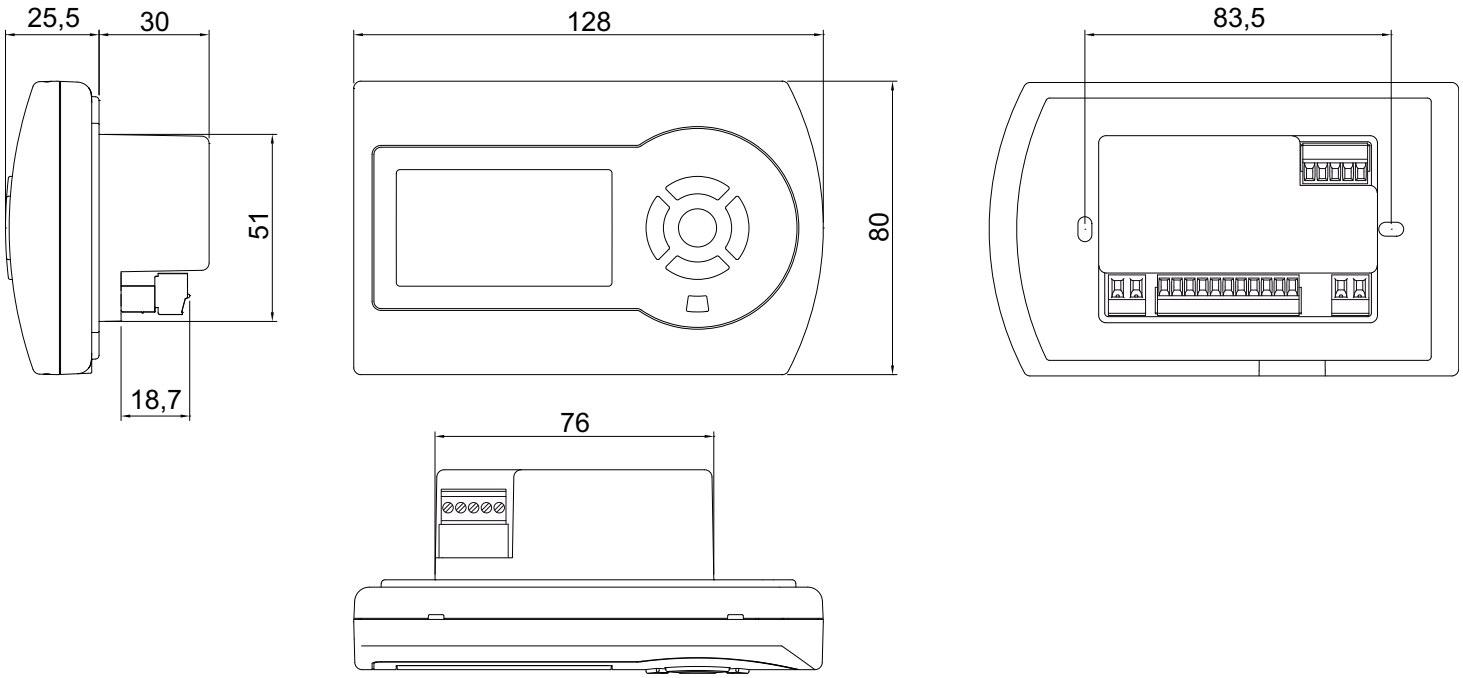


Figure 2

Terminal blocks:

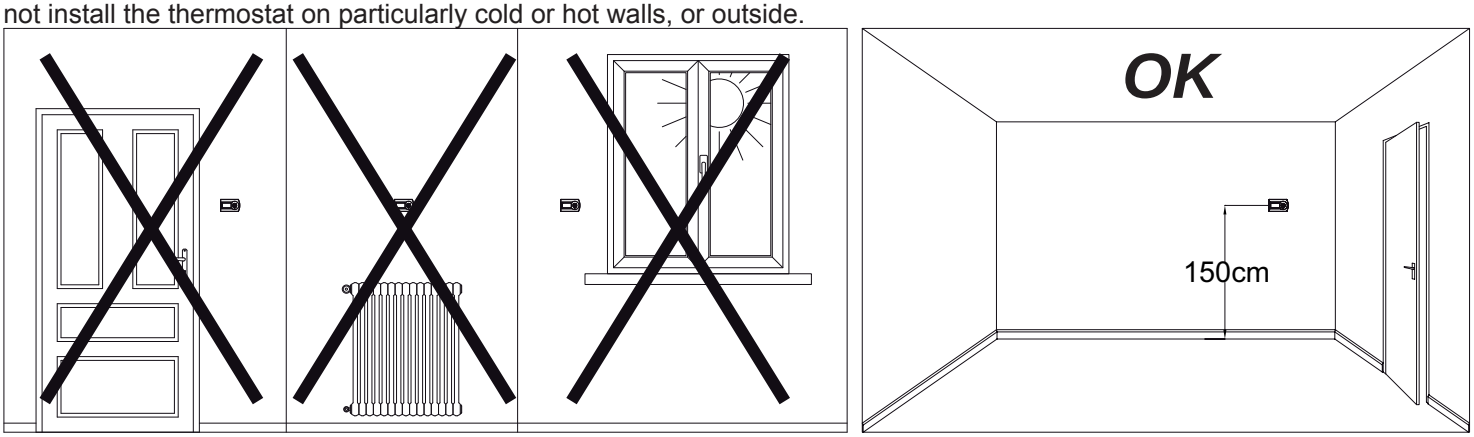
N - **L** = 230 V AC power
DI1 - **DI2** = Digital inputs 1 and 2
AI1 - **AI2** - **AI3** = Analogue inputs 1...3
AO1 - **AO2** - **AO3** = Analogue outputs 1...3
DO1 - **DO2** - **DO3** - **DO4** - **DO5** = Digital outputs 1...5
COM = Common for digital outputs
A + / **B -** = Modbus (only for **AHU-xMxSx1** models)
GND = Common for the digital inputs, analogue inputs, analogue and modbus outputs

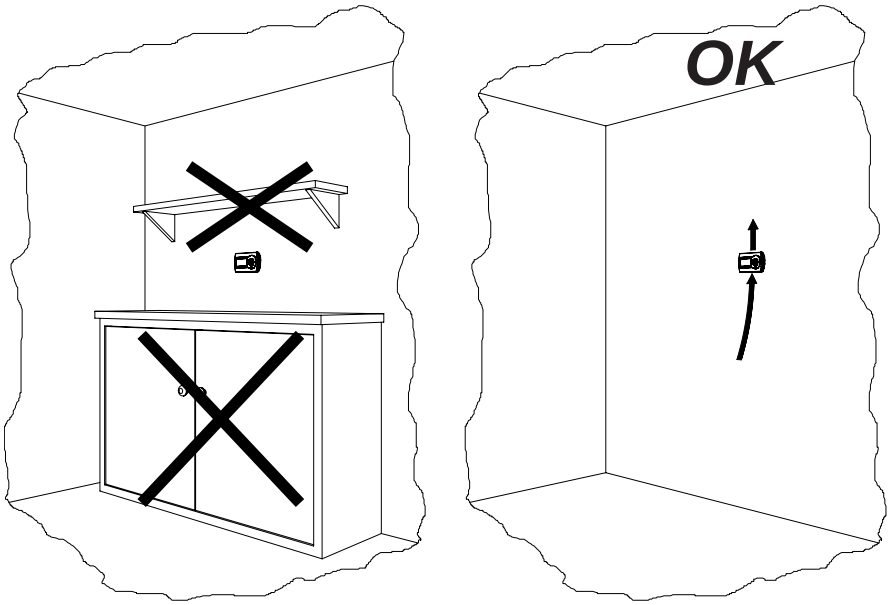
44. Dimensions



45. Mounting instructions

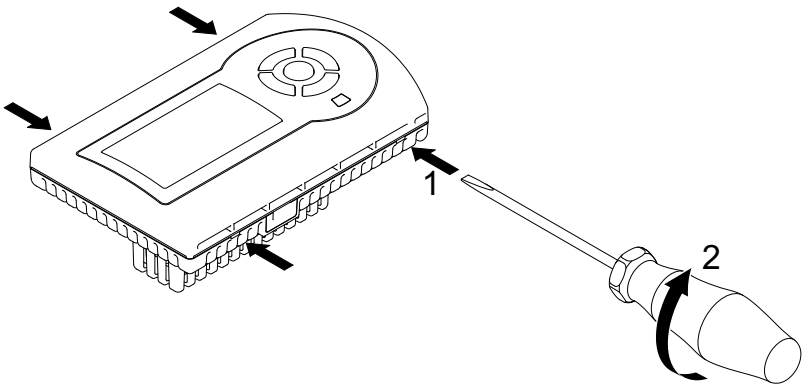
Install the appliance in a location away from sources of heat and away from direct airflow, at around 1.5 m above the floor. Do not install the thermostat on particularly cold or hot walls, or outside.



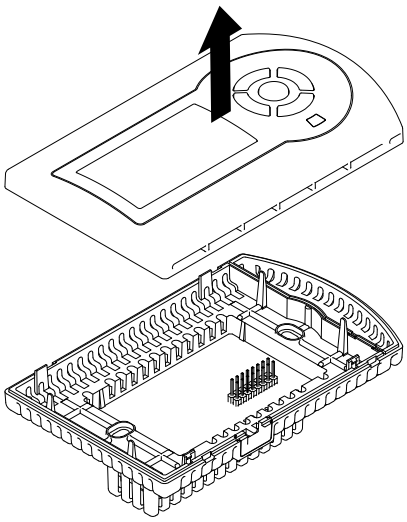


Installs with 3 module flush mounting housing.
E.g.: Bticino 503E (available on request).
Mounting hole centre distance 83.5 mm.

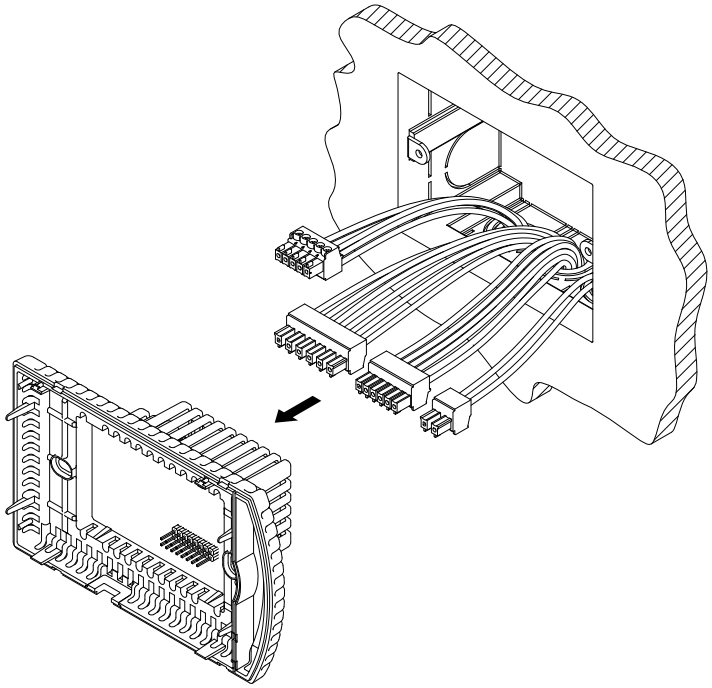
1



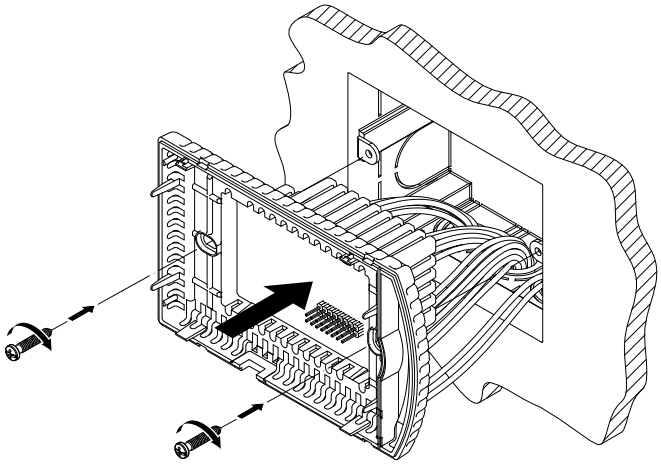
2



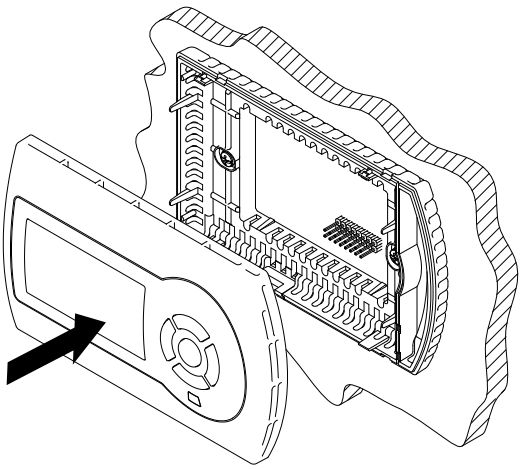
3



4



5



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