

USER MANUAL

ROOM CONTROLLER
EVOLUTION
SERIES AHU-xxxSx1



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AHU room controller

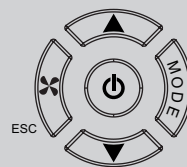
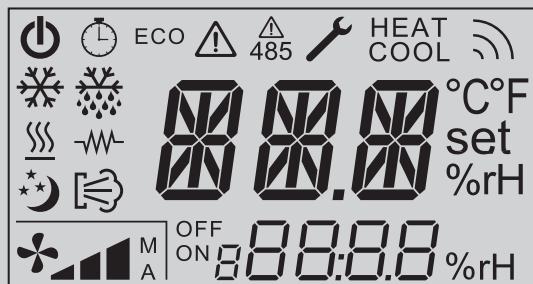
1. Technical features

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


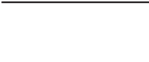




2. Code selection

Room controller: AHU	-	X	X	X	S	X	1
Version:		0					
1 digital output + 3 analogue outputs + 3 analogue inputs		1					
2 digital outputs + 2 analogue outputs + 3 analogue inputs		2					
3 digital outputs + 1 analogue output + 3 analogue inputs		3					
3 digital outputs + 2 analogue outputs + 2 analogue inputs		4					
5 digital outputs + 0 analogue outputs + 3 analogue inputs							
Communications:			S				
Without bus			M				
Modbus							
Clock:				S			
Without clock				C			
With clock							
Internal sensor:						T	
Temperature						H	
Temperature + humidity							

3. Display, keypad and icons



	Display A
	Display B
	On/Off
	Timer extension on
	Clock setting
ECO	Economy or boost function on
	General alarm
	Communications alarm
	Parameters menu
HEAT COOL	Work season
	Max fan working hours overtaken alarm
	Cooling or free cooling on
	Battery frost protection or heat exchanger frost protection on
	Condensate alarm
	Dehumidification on
	Air change request
	Humidification on
	Heating or free heating on
	Electric resistance on
	Holiday function
	Free cooling or free heating on
	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)
	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
	Speed type key and ESC operation in navigation
	Manual season or occupation change key or operating mode (see “ <i>MODE button functionality</i> ” 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    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    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, *195=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, *195=1*,

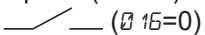
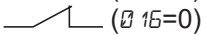
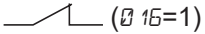
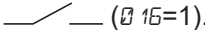
if the unit has not been switched off manually (via modbus or timer), it can be restarted with any source. But if the unit has been switched off manually, it can only be restarted manually.

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” (*195=2* (DI1))

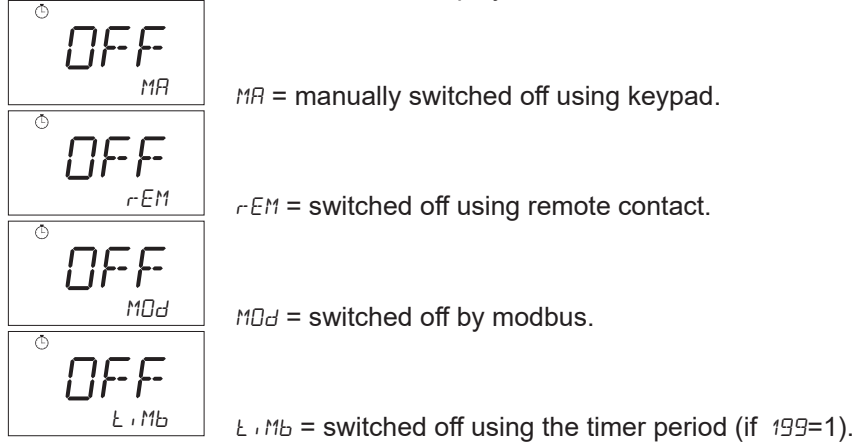
or $\text{D}17=2$ (DI2) or $\text{D}19=9$ (AI1 used as DI) or $\text{D}21=9$ (AI2 used as DI) or $\text{D}23=9$ (AI3 used as DI)).

Example for digital input 1 ($\text{D}15=2$):

Unit ON=  ($\text{D}15=0$)
 Unit OFF=  ($\text{D}15=0$)
 Unit ON=  ($\text{D}15=1$)
 Unit OFF=  ($\text{D}15=1$).

To switch the unit on/off using the timer periods, configure the $\text{P}99=1$ 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.







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 $\text{S}7$ setpoint (for the 2-pipe operation in heating mode), $\text{S}8$ (for the 2-pipe operation in cooling mode) or $\text{S}9$ (for the 4-pipe functionality) if $\text{C}4=0$ or a change of $\pm x^\circ\text{C}$ from the setpoint if $\text{C}4=1$ 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 $\text{C}4=1$ (COMFORT function activated), a change of $\pm x^\circ\text{C}$ from the setpoint is defined by the parameter $\text{C}5$.



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 manually regulated ($\text{C}9=0$)

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  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  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  button to change the setting. The value is automatically saved. To exit the menu, wait for 4 seconds or press the  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  button, *no* 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  button to change the setting. The value is automatically saved.
To exit the menu, wait for 4 seconds or press the  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  button,
no flashes on display B (for control without the timer periods) or
LMb 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  button,
no 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  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  button.



Non-quick access to the functions using the keypad


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


Parameter	Description	Default	Min	Max
MOE	Timer extension noDC=timer extension off DC=with timer extension (for the duration corresponding to the parameter 19B -The economy/boost function and the non-occupied/holiday function are excluded if 199=0 -the appliance stays switched on if 199=1).	noDC	noDC	DC
MOd	Operating mode with 199=0: noRM=operation without timer periods L, Mb=operation using the timer periods HOLY=non-occupied/holiday operation	noRM	noRM, L, Mb, HOLY	
	Operating mode with 199=1: noRM=operation using the 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  button to quit without saving the changes.

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

If the timer extension is on, the  icon flashes for the time set in parameter 19B.



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  and  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 L, Mb=operation using the timer periods HOLY=non-occupied/holiday operation	noRM	noRM, L, Mb, HOLY	
	Operating mode with 199=1: noRM=operation using the 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  button to quit without saving the changes.



To exit the menu, press the  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  and  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

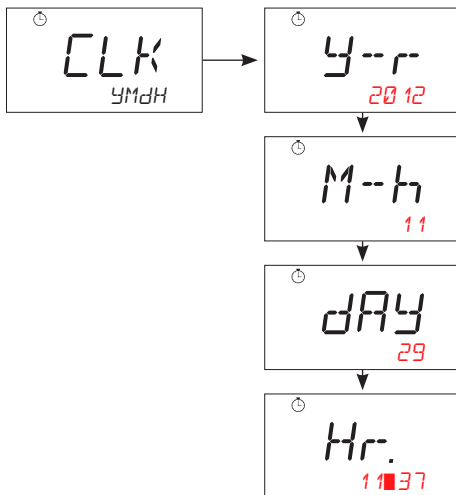
Press the  or  button to select a parameter and the  button to enter change mode; display B flashes with the current parameter value.

Then press the  or  button to change the value.

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

To exit the menu, press the  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  button to quit without saving the changes.

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

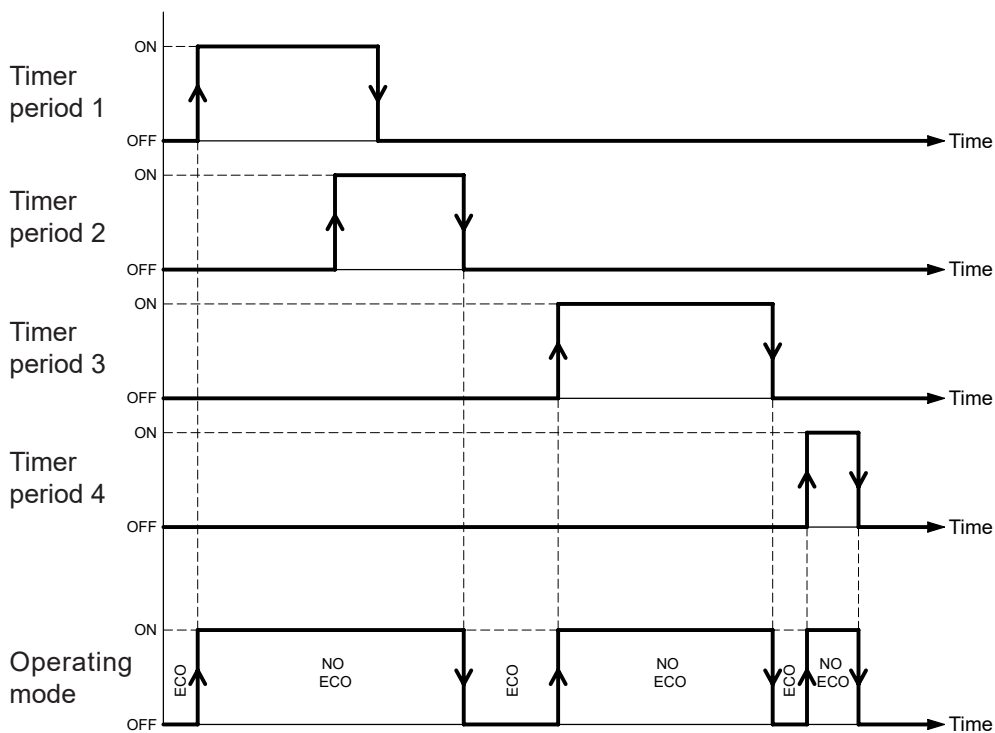
Note: setting parameter $197=1$ for the European zone or $197=2$ for the USA zone, the unit is able to automatically update for daylight savings time. If parameter $197=0$ (other regions), the automatic update for daylight savings time is disabled.

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 ($199=1$).

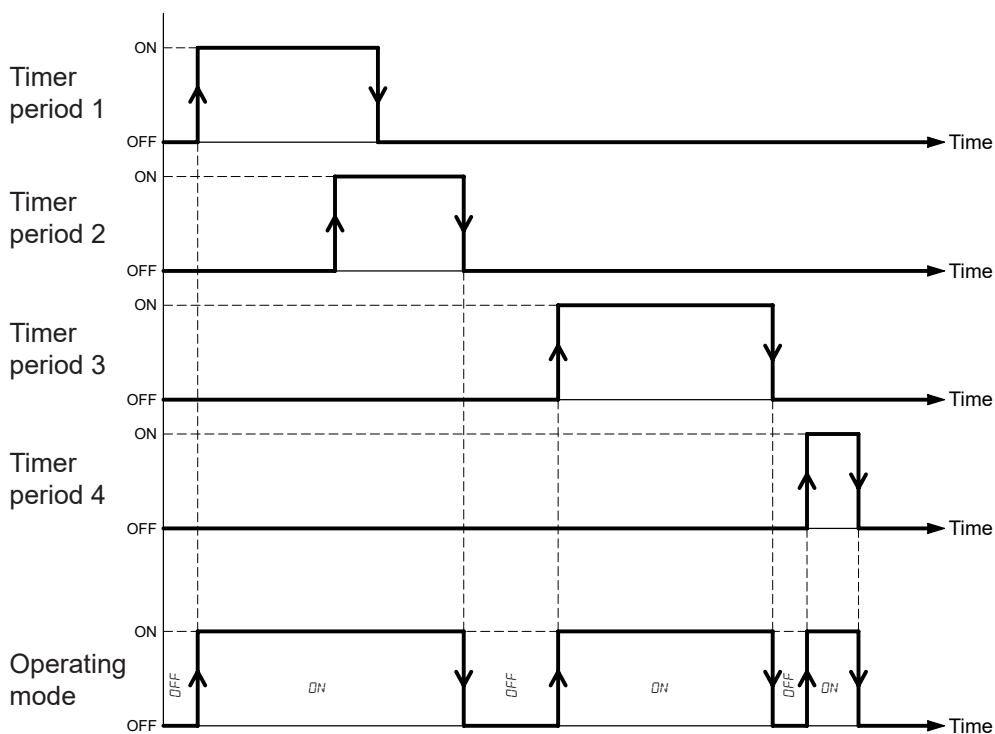
It is possible to use up to 4 time zones per day.

- 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.

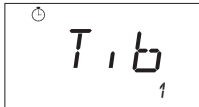
Press the button, the timer period end time stops flashing and is saved to the memory. The minutes field of the end of the selected timer period starts flashing.

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 button to return to the timer period selection menu:



Press the 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		
T, b	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:




Mo	Mo
Tu	Tu
We	We
Th	Th
Fr	Fr
Sa	Sa
Su	Su
	MF
	SS

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  button to cancel.

Parameter	Description	Min	Max
CTb	Copy periods (Mo Tu We Th Fr Sa Su)	Mo	SS
Mo	Monday		
Tu	Tuesday		
We	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 ($\varnothing 14=0$) or 4-pipe fixed point ($\varnothing 14=3$),
- 2-pipe compensated ($\varnothing 14=1$) or 4-pipe compensated ($\varnothing 14=4$),
- cascade ($\varnothing 14=2$).

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: $\varnothing 19\neq 1$ and $\varnothing 21\neq 1$ and $\varnothing 23\neq 1$ and $105=0$ Remote: $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3) and $105=100$
	Supply	$\varnothing 19=2$ (AI1) or $\varnothing 21=2$ (AI2) or $\varnothing 23=2$ (AI3)
2 or 4-tube compensation (*)	Room	Internal: $\varnothing 19\neq 1$ and $\varnothing 21\neq 1$ and $\varnothing 23\neq 1$ and $105=0$ Remote: $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3) and $105=100$
	Supply	$\varnothing 19=2$ (AI1) or $\varnothing 21=2$ (AI2) or $\varnothing 23=2$ (AI3)
Cascade	Room + Supply	Room with internal sensor: $\varnothing 19\neq 1$ and $\varnothing 21\neq 1$ and $\varnothing 23\neq 1$ and $105=0$
		Room with remote sensor: $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3) and $105=100$
		Supply: $\varnothing 19=2$ (AI1) or $\varnothing 21=2$ (AI2) or $\varnothing 23=2$ (AI3)

(*) Set an external sensor to carry out compensation: $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (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 105) 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 $\varnothing 19=1$ (sensor connected to input AI1 defined as the remote control sensor):

- parameter $105 = 0$ -> the internal sensor is only taken into account if a remote sensor has been defined,
- parameter $105 = 100$ -> the remote sensor is only taken into account, while the internal sensor is excluded.
- parameter $105 = 25$ -> 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 ($\varnothing 19=1$ and/or $\varnothing 21=1$ and/or $\varnothing 23=1$), 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 ($\varnothing 19\neq 1$ and $\varnothing 21\neq 1$ and $\varnothing 23\neq 1$), the internal sensor is used as the control sensor even if 105 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: $\varnothing 19=2$ (AI1) or $\varnothing 21=2$ (AI2) or $\varnothing 23=2$ (AI3).

9. Operating setpoint, ECONOMY/BOOST, HOLIDAY MODES

If one of the digital contacts is configured as a “non-occupied/holiday” remote contact $\text{D}15=3$ (D11) or $\text{D}17=3$ (D12) or an analogue input is configured as a “non-occupied/holiday” contact $\text{A}19=10$ (AI1) or $\text{A}21=10$ (AI3) or $\text{A}23=10$ (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 ($\text{D}14=0, 1$):

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 ($\text{D}14=2, 3, 4$):

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 $\text{D}15=4$ (D11) or $\text{D}17=4$ (D12) or an analogue input is configured as an economy/boost contact $\text{A}19=11$ (AI1) or $\text{A}21=11$ (AI3) or $\text{A}23=11$ (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 ($\text{D}14=0, 1$):

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 ($\text{D}14=2, 3, 4$):

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.

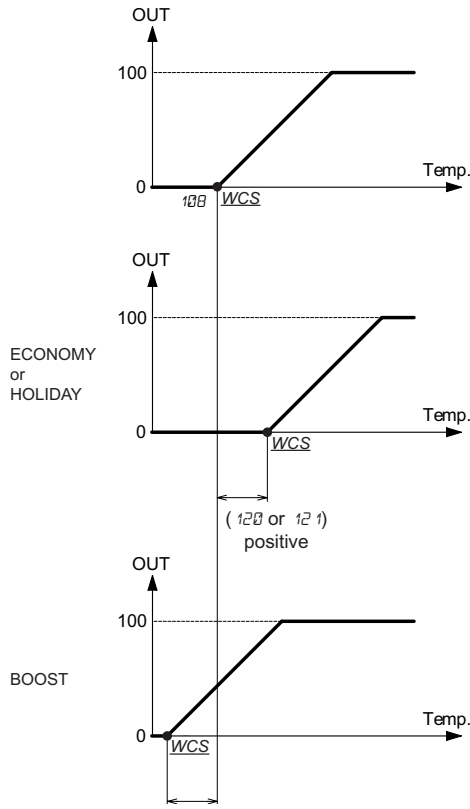
If $120 > 0$, the economy mode is taken into account:

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.

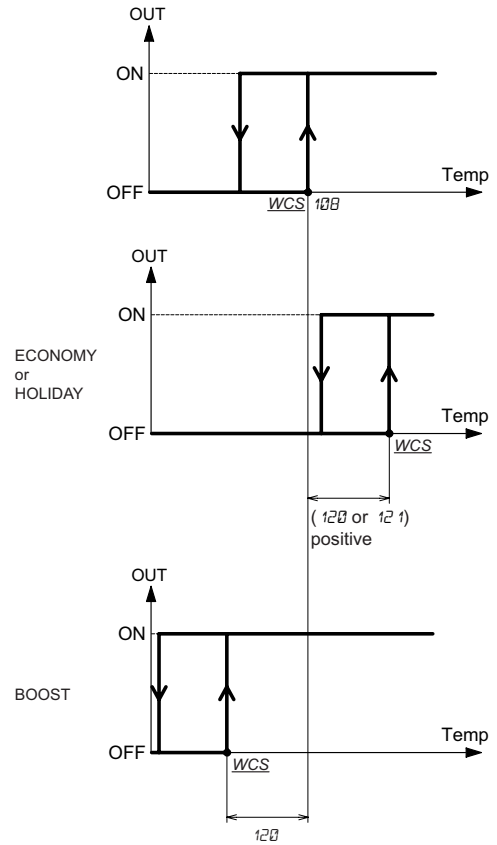
The “non-occupied/holiday” mode has priority over the economy mode when both modes are activated.

2-pipe graph (analogue output, cooling mode)



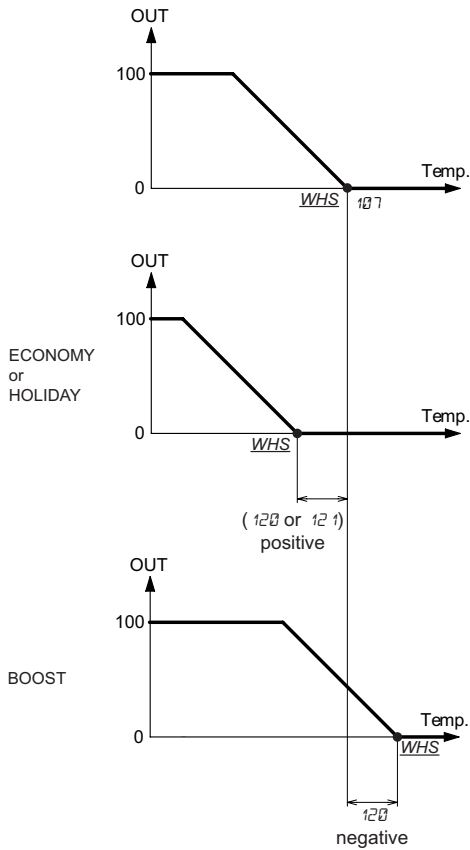
108: 2-pipe cooling setpoint
WCS: activation point, cooling mode

2-pipe graph (digital output, cooling mode)



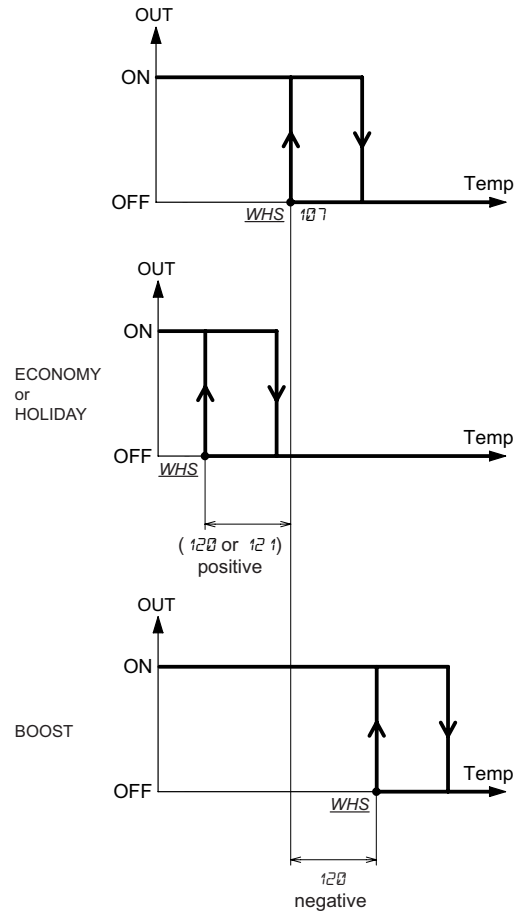
108: 2-pipe cooling setpoint
WCS: activation point, cooling mode

2-pipe graph (analogue output, heating mode)



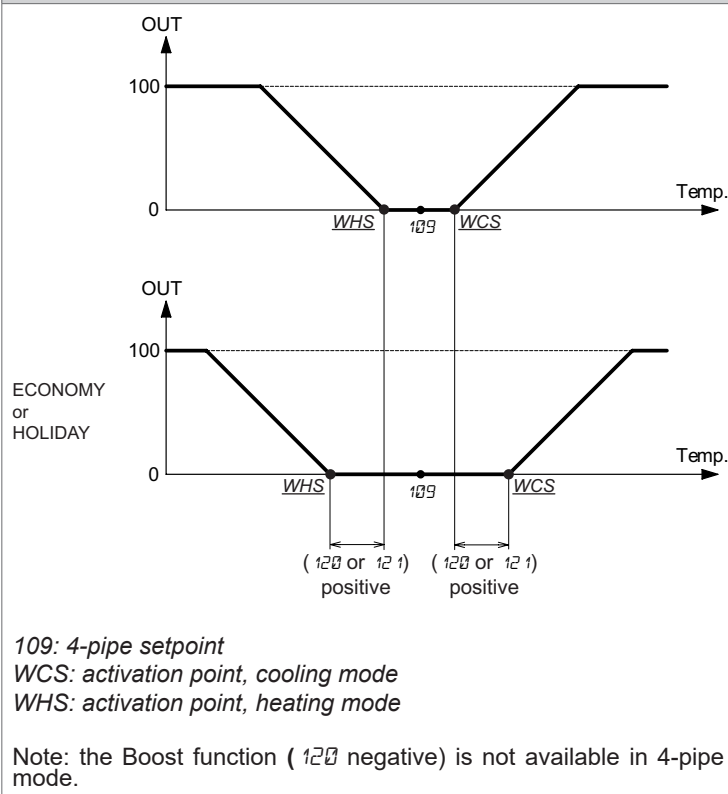
107: 2-pipe heating setpoint
WHS: activation point, heating mode

2-pipe graph (digital output, heating mode)



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

4-pipe graph (analogue outputs)



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 ($Mod=L, Mb$) 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 005.
- 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, 139 1 or 2
	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	$\emptyset 30=4$ (AO1) or $\emptyset 31=4$ (AO2) or $\emptyset 32=4$ (AO3)
Cooling valve on/off	$\emptyset 25=5$ (DO1) or $\emptyset 26=5$ (DO2) or $\emptyset 27=5$ (DO3) or $\emptyset 28=5$ (DO4) or $\emptyset 29=5$ (DO5)
Modulating mixed-use valve	$\emptyset 30=5$ (AO1) or $\emptyset 31=5$ (AO2) or $\emptyset 32=5$ (AO3)
Mixed-use valve on/off	$\emptyset 25=6$ (DO1) or $\emptyset 26=6$ (DO2) or $\emptyset 27=6$ (DO3) or $\emptyset 28=6$ (DO4) or $\emptyset 29=6$ (DO5)
Modulating post-heating resistance	$\emptyset 30=8$ (AO1) or $\emptyset 31=8$ (AO2) or $\emptyset 32=8$ (AO3)
Modulating post-heating valve	$\emptyset 30=7$ (AO1) or $\emptyset 31=7$ (AO2) or $\emptyset 32=7$ (AO3)
Post-heating resistance on/off	$\emptyset 25=9$ (DO1) or $\emptyset 26=9$ (DO2) or $\emptyset 27=9$ (DO3) or $\emptyset 28=9$ (DO4) or $\emptyset 29=9$ (DO5)
Post-heating valve on/off	$\emptyset 25=8$ (DO1) or $\emptyset 26=8$ (DO2) or $\emptyset 27=8$ (DO3) or $\emptyset 28=8$ (DO4) or $\emptyset 29=8$ (DO5)
Modulating humidifier	$\emptyset 30=10$ (AO1) or $\emptyset 31=10$ (AO2) or $\emptyset 32=10$ (AO3)
Humidifier on/off	$\emptyset 25=16$ (DO1) or $\emptyset 26=16$ (DO2) or $\emptyset 27=16$ (DO3) or $\emptyset 28=16$ (DO4) or $\emptyset 29=16$ (DO5)
Dehumidification through cooling battery	$\emptyset 30=4$ (AO1) or $\emptyset 31=4$ (AO2) or $\emptyset 32=4$ (AO3)
Modulating dehumidifier	$\emptyset 30=11$ (AO1) or $\emptyset 31=11$ (AO2) or $\emptyset 32=11$ (AO3)
Dehumidifier on/off	$\emptyset 25=17$ (DO1) or $\emptyset 26=17$ (DO2) or $\emptyset 27=17$ (DO3) or $\emptyset 28=17$ (DO4) or $\emptyset 29=17$ (DO5)

11. Logic of heating and cooling batteries

The operating mode of the heating and cooling battery is based on the following parameters:

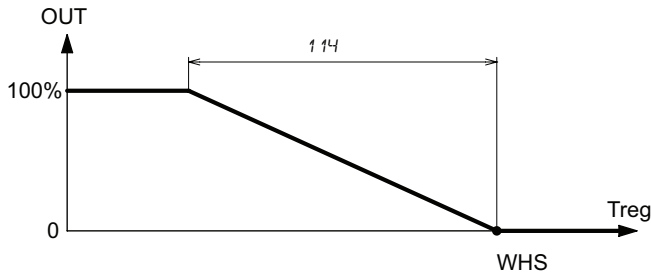
- 014 : type of controller selected,
- 002 : type of heating battery,
- 003 : type of cooling battery.

• 2-pipe HEATING controller ($\text{014}=0$ 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 ($\text{014}=0$) or calculated setpoint based on compensation ($\text{014}=1$)

OUT: modulating output:

- modulating valve if $\text{002}=2$ and $\text{030}=3$ (AO1) or $\text{031}=3$ (AO2) or $\text{032}=3$ (AO3).
- modulating electrical resistance if $\text{002}=1$ and $\text{030}=6$ (AO1) or $\text{031}=6$ (AO2) or $\text{032}=6$ (AO3).
- modulating mixed-use valve if $\text{002}=2$ and $\text{003}=1$ and $\text{030}=5$ (AO1) or $\text{031}=5$ (AO2) or $\text{032}=5$ (AO3).

114 : proportional heating band.

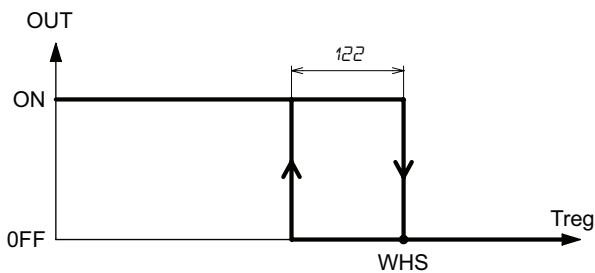
If the operating temperature drops below *WHS*, the valve starts to open or the modulating electrical resistance starts to be modulated. The W icon is displayed if a valve is controlled, the -W- icon for modulating heating heater.

The modulating valve or electrical resistance can be controlled with PI action if the integral heating time 115 does not equal 0 or, with proportional action only if $\text{115}=0$.

The W (or -W-) 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 ($\text{014}=0$) or calculated setpoint based on compensation (if $\text{014}=1$)

OUT: output on/off:

- on/off valve if $\text{002}=4$ and $\text{025}=4$ (DO1) or $\text{026}=4$ (DO2) or $\text{027}=4$ (DO3) or $\text{028}=4$ (DO4) or $\text{029}=4$ (DO5).
- electrical resistance on/off if $\text{002}=3$, $\text{025}=7$ (DO1) or $\text{026}=7$ (DO2) or $\text{027}=7$ (DO3) or $\text{028}=7$ (DO4) or $\text{029}=7$ (DO5)
- mixed-use valve on/off if $\text{002}=4$, $\text{003}=2$, $\text{025}=6$ (DO1) or $\text{026}=6$ (DO2) or $\text{027}=6$ (DO3) or $\text{028}=6$ (DO4) or $\text{029}=6$ (DO5).

122 : hysteresis for on/off output.

If $Treg < (WHS - 122)$, the valve (or the electrical resistance) is activated. The W (or -W-) icon is displayed.

If $Treg \geq WHS$, the valve (or electrical resistance) is deactivated. The W (or -W-) icon is switched off.

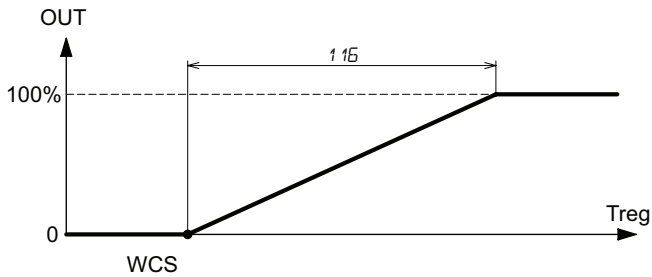
Note: In case the winter compensation is used ($\text{130}=2$ or 3), you must pair an external sensor with an analogue input $\text{019}=3$ (AO1) or $\text{021}=3$ (AO2) or $\text{023}=3$ (AO3).

• 2-pipe HEATING control ($\varnothing 14=0$ or 1) without mid-season mode ($\varnothing 13=0$)

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 ($\varnothing 14=0$) or calculated setpoint based on compensation (if $\varnothing 14=1$)

OUT: modulating output:

- modulating valve if $\varnothing 03=1$ and $\varnothing 30=4$ (AO1) or $\varnothing 31=4$ (AO2) or $\varnothing 32=4$ (AO3).
- modulating mixed-use valve if $\varnothing 02=2$ and $\varnothing 03=1$ and $\varnothing 30=5$ (AO1) or $\varnothing 31=5$ (AO2) or $\varnothing 32=5$ (AO3).

116: proportional cooling band.

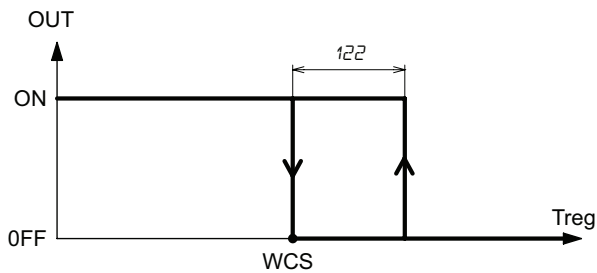
If the operating temperature rises above WCS, the modulating valve starts to open. The ❄️ icon is displayed.

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 ($\varnothing 14=0$) or calculated setpoint based on compensation (if $\varnothing 14=1$)

OUT: output on/off:

- on/off valve if $\varnothing 03=2$ and $\varnothing 25=5$ (DO1) or $\varnothing 26=5$ (DO2) or $\varnothing 27=5$ (DO3) or $\varnothing 28=5$ (DO4) or $\varnothing 29=5$ (DO5).
- mixed-use valve on/off if $\varnothing 02=4$, $\varnothing 03=2$, $\varnothing 25=6$ (DO1) or $\varnothing 26=6$ (DO2) or $\varnothing 27=6$ (DO3) or $\varnothing 28=6$ (DO4) or $\varnothing 29=6$ (DO5).

122: hysteresis for on/off output.

If $Treg > (WCS + 122)$, the valve is activated. The ❄️ icon is displayed.

If $Treg \leq WCS$, the valve is disabled and the ❄️ icon is switched off.

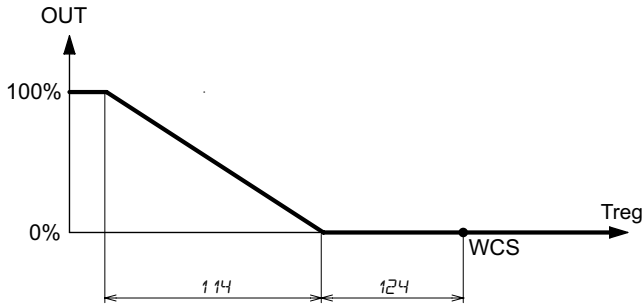
Note: In case the winter compensation is used ($130=1$ or 3), you must pair an external sensor with an analogue input $\varnothing 19=3$ (AO1) or $\varnothing 21=3$ (AO2) or $\varnothing 23=3$ (AO3).

• **2-pipe COOLING control ($\varnothing 14=0$ or 1) with mid-season mode ($\varnothing 13=1$)**

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 = $\varnothing 108$ if the controller is set at a fixed point ($\varnothing 14=0$) or calculated setpoint based on compensation (if $\varnothing 14=1$)

124 : differential activation of heating in the summer season

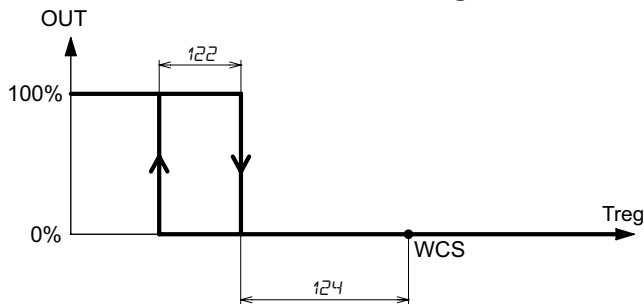
114 : proportional band of heating controller

OUT: modulating electrical resistance if $\varnothing 002=1$ and $\varnothing 030=6$ (AO1) or $\varnothing 031=6$ (AO2) or $\varnothing 032=6$ (AO3).

If $Treg < WCS - 124$, the modulating electrical resistance is directed to heat, the $\neg W$ 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 = $\varnothing 108$ if the controller is set at a fixed point ($\varnothing 14=0$) or calculated setpoint based on compensation (if $\varnothing 14=1$)

124 : differential activation of heating in the summer season

122 : hysteresis for on/off output

OUT: electrical resistance on/off if $\varnothing 002=3$, $\varnothing 025=7$ (DO1) or $\varnothing 026=7$ (DO2) or $\varnothing 027=7$ (DO3) or $\varnothing 028=7$ (DO4) or $\varnothing 029=7$ (DO5).

If $Treg < (WCS - 124 - 122)$, the electrical resistance is activated. The $\neg W$ icon is displayed.

If $Treg \geq (WCS - 124)$, the electrical resistance is disabled and the $\neg W$ 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 $\varnothing 19=3$ (AO1) or $\varnothing 21=3$ (AO2) or $\varnothing 23=3$ (AO3).

• 4-pipe controller (14=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 14=3 or the calculated winter compensation setpoint if 14=4 and 130=2 or 3, the neutral zone 123.

Based on the controller selection, 2 setpoints are calculated:

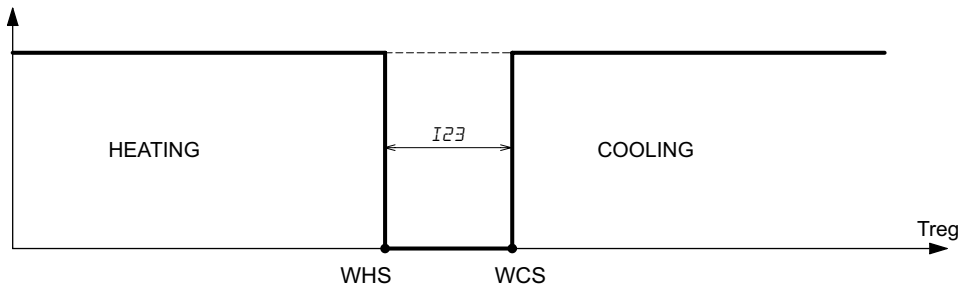
if 14=3:

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

if 14=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.

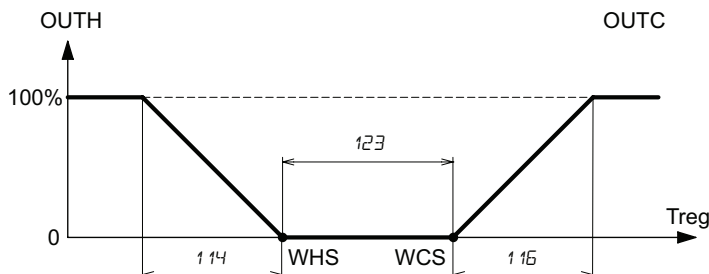


Note: When the unit is turned on, if the temperature Treg is in the neutral zone, the season is considered to be heating.

The mid-season activation parameter 113 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.



115: 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 electrical resistance.

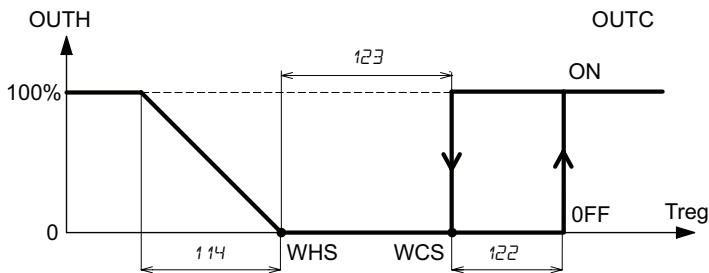
The valve or electrical resistance element can be controlled with PI action if the integral heating time 115 does not equal 0 or, with proportional action only if 115=0.

The  (or ) icon switches off if the heating or modulating valve (or the electrical resistance) closes (or is no longer powered) when $Treg \geq WHS$.

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 $Treg \leq WCS$.

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 $\sim W$ 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 $115=0$.

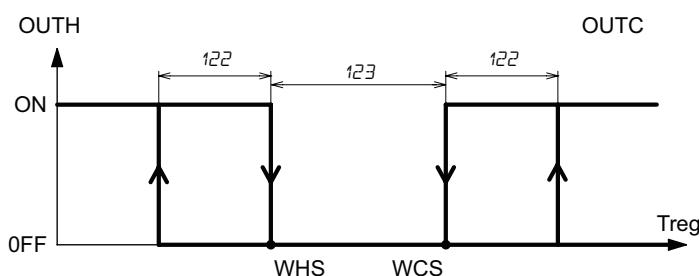
The ❄️ (or $\sim W$) icon switches off if the modulating valve (or the electrical resistance) closes (or is no longer powered) when $Treg \geq WHS$.

If $Treg > (WCS + 122)$, the cooling valve is activated. The ❄️ icon is displayed.

If $Treg \leq WCS$, 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:

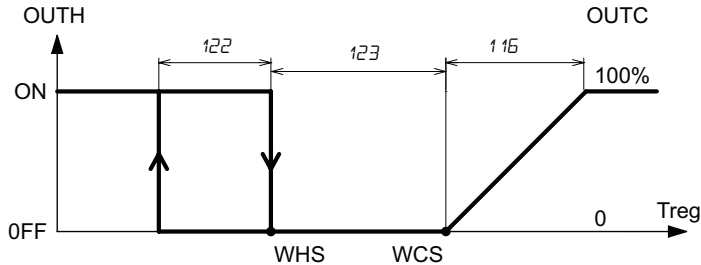
- on/off valve if $003=2$ and $025=5$ (DO1) or $026=5$ (DO2) or $027=5$ (DO3) or $028=5$ (DO4) or $029=5$ (DO5).

If $T_{reg} < (WHS - 122)$, the heating valve (or electrical resistance) is activated. The \heating (or \heating) icon is displayed.
 If $T_{reg} \geq WHS$, the heating valve (or electrical resistance) is disabled. The \heating (or \heating) icon is switched off.

If $T_{reg} > (WCS + 123)$, the cooling valve is activated. The \cooling icon is displayed.
 If $T_{reg} \leq WCS$, the cooling valve is deactivated and the \cooling 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.

115: 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 $T_{reg} < (WHS - 122)$, the heating valve (or electrical resistance) is activated. The \heating (or \heating) icon is displayed.

If $T_{reg} \geq WHS$, the heating valve (or electrical resistance) is disabled. The \heating (or \heating) icon is switched off.

If the operating temperature rises above WCS , the modulating cooling valve starts to open. The \cooling 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 \cooling icon switches off if the cooling valve closes.

• Cascade control (0 14=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:

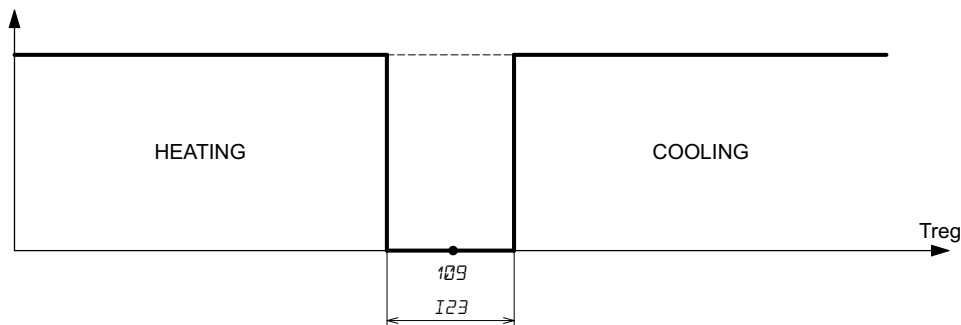
- modulating valve if 003=1 and 030=4 (AO1) or 031=4 (AO2) or 032=4 (AO3).

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 $T_{reg} < 109 - (123/2)$, the operating season is heating, and the “HEAT” icon is displayed.

If $T_{reg} > 109 + (123/2)$, the operating season is cooling, and the “COOL” icon is displayed.



Treg: room sensor

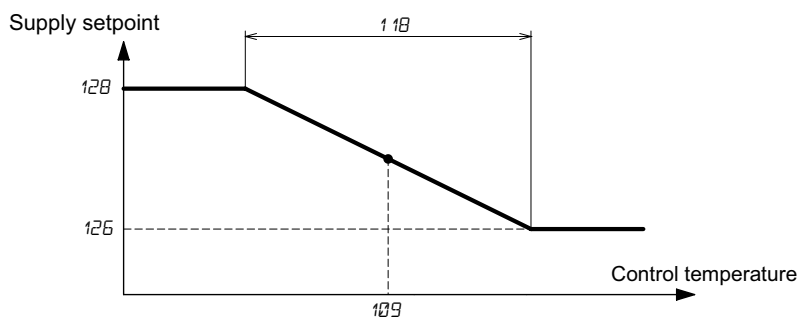
109: 4-pipe setpoint control

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:

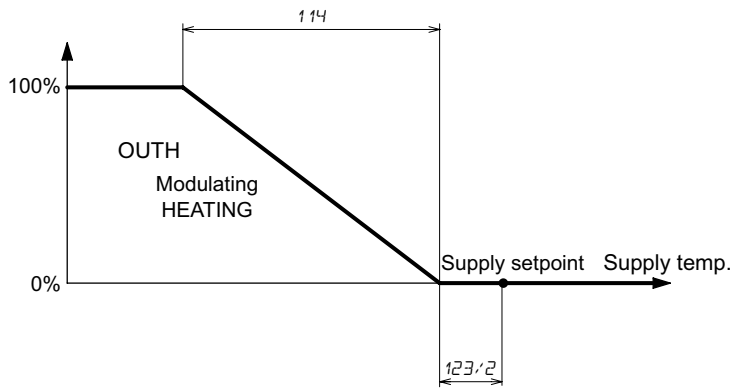
- room temperatures T_{reg} ,
- 4-pipe setpoint control 109
- proportional band for calculating the supply setpoint 118
- integral time for calculating the supply setpoint 119 .



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:

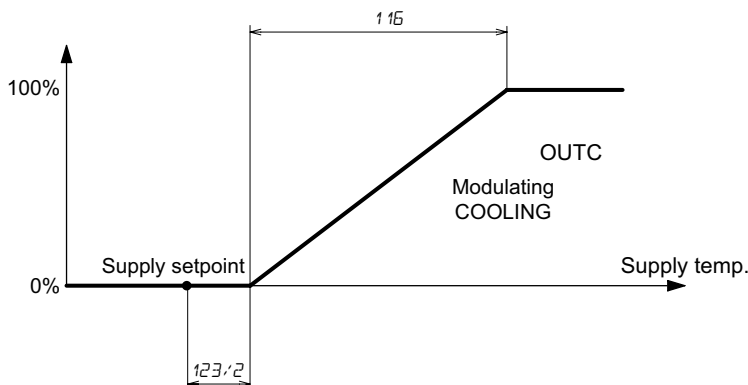
- supply temperature,
- supply set - neutral_zone (123) / 2,
- proportional band for heating supply control 114
- integral control time for heating supply 115.

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 $I\ 15=0$.

Control with a single cooling valve:





115: 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 115
- integral control time for cooling supply 117.

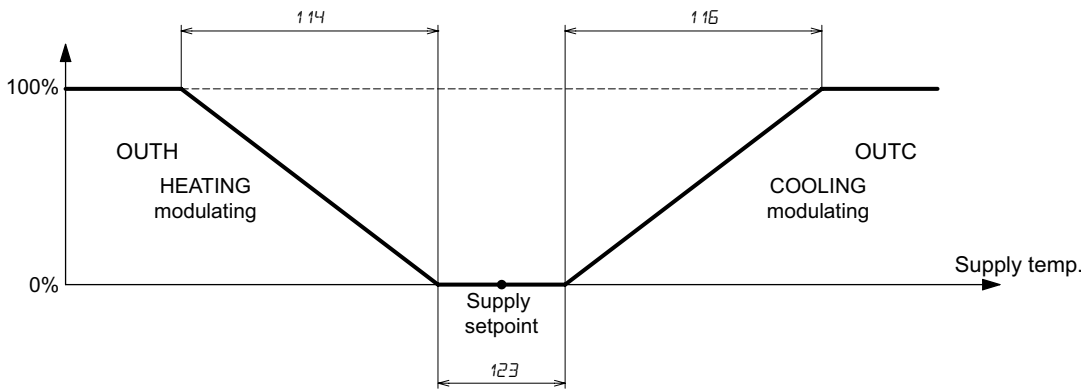
If the temperature of the supply sensor is higher than the supply set + 123 / 2, the cooling output valve is activated, and the  icon is displayed.

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 $I\ 17=0$.

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 \llcorner (or \swarrow) icon is displayed. The cooling valve remains closed and the \star icon remains switched off. The \llcorner (or \swarrow) 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 $115=0$.

If the temperature of the supply sensor is higher than the supply set + $123 / 2$, the cooling output valve is activated, and the \star icon is displayed. The heating valve remains closed and the \llcorner (or \swarrow) icon remains switched off.

The \star 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 configured 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 ($\text{004}=2$), an on/off valve ($\text{004}=4$), a modulating resistance ($\text{004}=1$), or an on/off resistance ($\text{004}=3$).

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: $\text{019}=2$ (AI1) or $\text{021}=2$ (AI2) or $\text{023}=2$ (AI3).

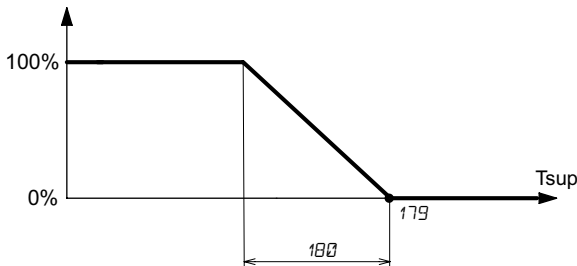
Through the parameter 005 the post-heating battery's operation is selected:

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



T_{sup} : supply temperature: $\text{019}=2$ (AI1) or $\text{021}=2$ (AI2) or $\text{023}=2$ (AI3)

179 : post-heating setpoint

180 : proportional post-heating band

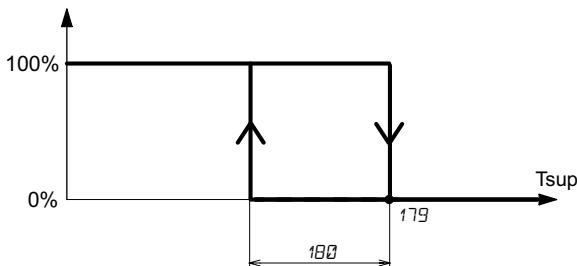
During control, the SSS (or -M-) icon is displayed if the signal applied to the valve (or the modulating resistance) is not equal to 0: $T_{sup} < 179$.

The SSS (or -M-) icon is switched off if the signal applied to the valve (or the modulating resistance) is equal to 0 ($T_{sup} \geq 179$) 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: $\text{004}=4$ and $\text{025}=8$ (DO1) or $\text{026}=8$ (DO2) or $\text{027}=8$ (DO3) or $\text{028}=8$ (DO4) or $\text{029}=8$ (DO5).





- post-heating or additional heating stage with electrical resistance: $\text{004}=3$ and $\text{025}=9$ (DO1) or $\text{026}=9$ (DO2) or $\text{027}=9$ (DO3) or $\text{028}=9$ (DO4) or $\text{029}=9$ (DO5).



T_{sup} : supply temperature: $\text{019}=2$ (AI1) or $\text{021}=2$ (AI2) or $\text{023}=2$ (AI3)

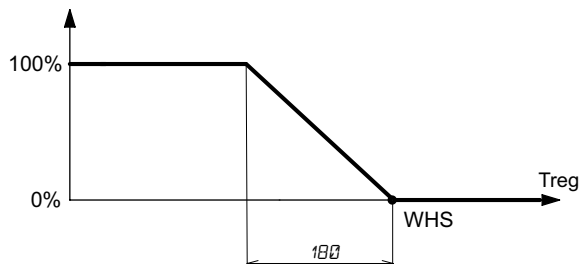
179 : post-heating setpoint

180: proportional post-heating band

If $T_{sup} < 179 - 180$ 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 $T_{sup} \geq 179$ 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

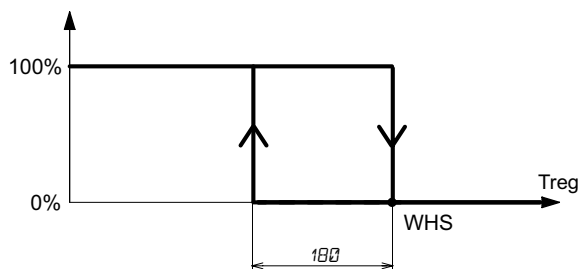
180: proportional post-heating band

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: $T_{sup} < WHS$.

The  (or ) icon switches off if the signal applied to the valve (or the modulating resistance) in integration is equal to 0 ($T_{sup} \geq WHS$) 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 $T_{reg} < WHS - 180$ the heating integration stage is activated, the  (or ) icon is displayed if the integration is a valve (or electrical resistance).

If $T_{reg} \geq WHS$ 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 $125=1$.

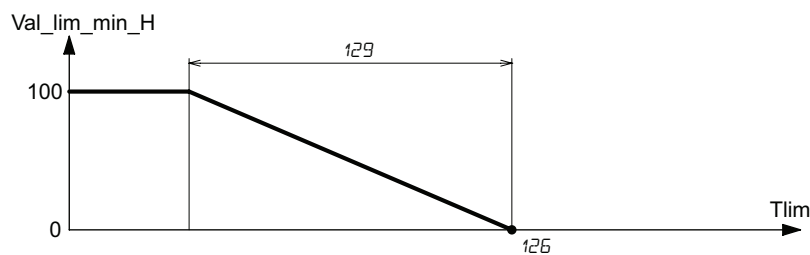
To enable the lower limits in heating mode, set $125=2$.

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

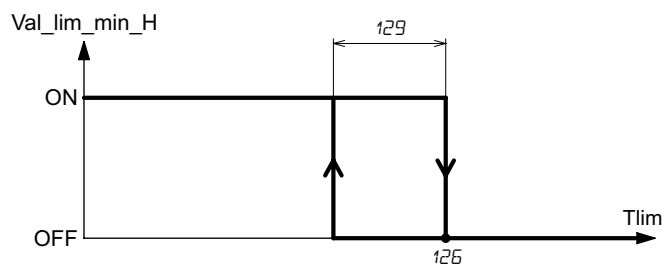
126: setpoint of low limit

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

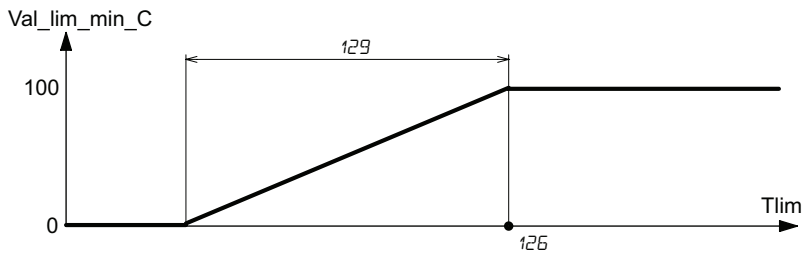
126: setpoint of low limit

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

125: setpoint of low limit

129: proportional limit band

Control without dehumidification ($139=0$):

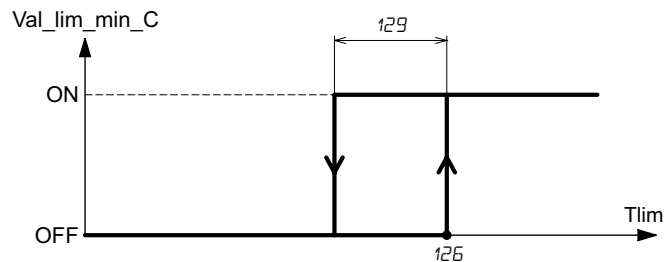
When active, if the supply temperature falls below the minimum supply setpoint 125 , the cooling valve is controlled considering the lowest value between the theoretical output of the cooling control and the theoretical value of the *Val_lim_min_C* limit.

Below 125 the  icon is displayed and on the alarms page, the message *LI-L* is displayed.

Control with dehumidification using the cooling battery ($007=0$ and $139\neq 0$):

In the event that the request for dehumidification has priority over the temperature ($2\ 12=1$), 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

125: setpoint of low limit

129: proportional limit band

When active, if the supply temperature falls below the minimum supply setpoint 125 - (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 $125 - 129$ the  icon is displayed and on the alarms page, the message *LI-L* is displayed.

• Maximum limit:

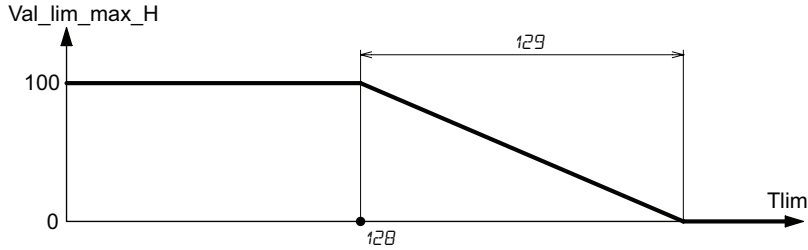
To enable the high limit in cooling mode, set $127=1$.

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

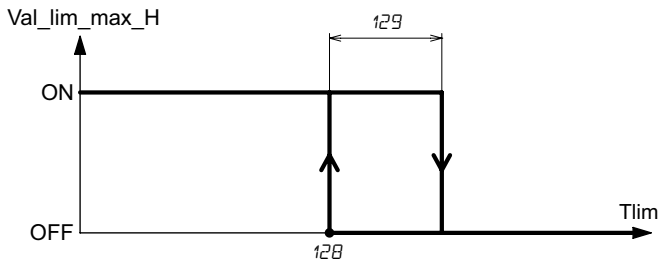
128: setpoint of high limit

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

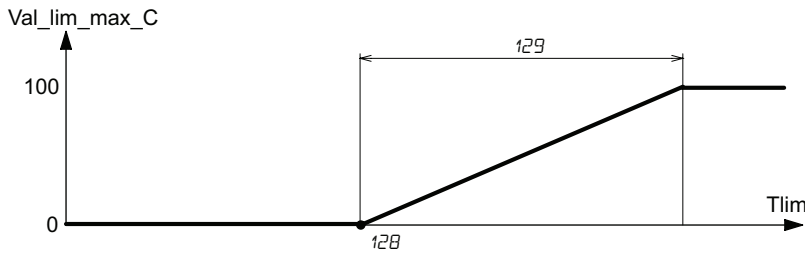
128: setpoint of high limit

129: proportional limit band

When active, if the supply temperature goes above the maximum supply setpoint $128 + (\text{proportional band } 129)$, 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

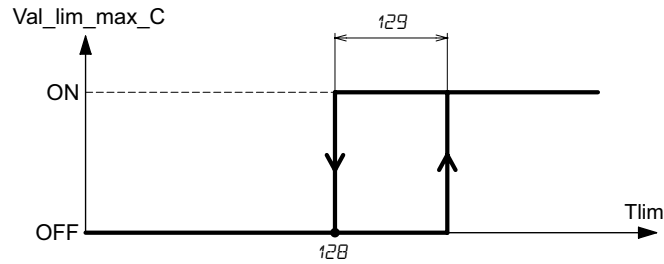
128 : setpoint of high limit

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 $128 + (\text{proportional band } 129)$, 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 $\varnothing 14=0, 1, 3$ 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 $\text{014}=1$ (2-pipe control with external compensation) or $\text{014}=4$ (4-pipe control with external compensation),

- type of compensation:

$\text{030}=1$ for compensation in cooling mode,

$\text{030}=2$ for compensation in heating mode,

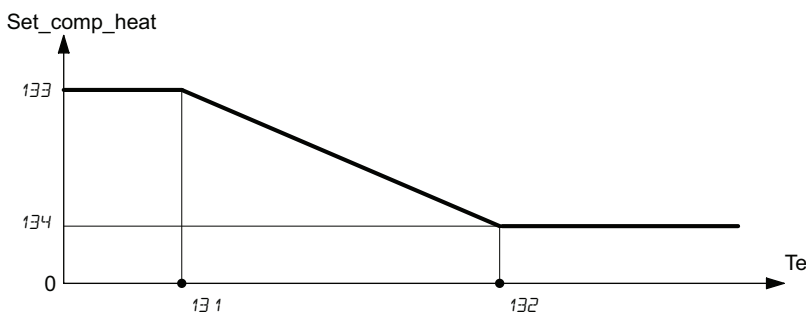
$\text{030}=3$ for compensation in heating and cooling modes,

- a sensor input to connect the external sensor: $\text{019}=3$ for input AI1 or $\text{021}=3$ for input AI2 or $\text{023}=3$ 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 $\text{133} > \text{134}$.



Set_comp_heat: winter compensated setpoint

Te: external temperature

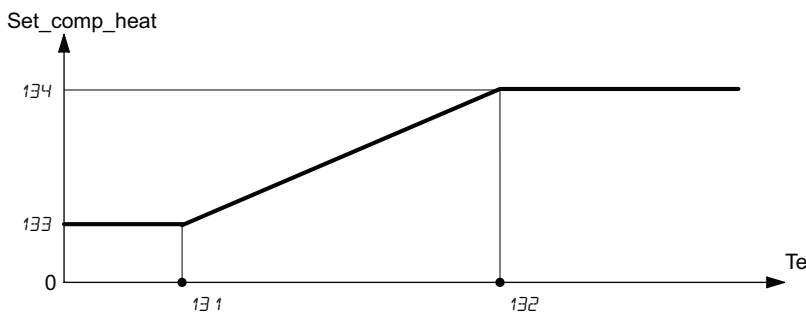
131: minimum external temperature for winter compensation

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 $\text{133} < \text{134}$.



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.

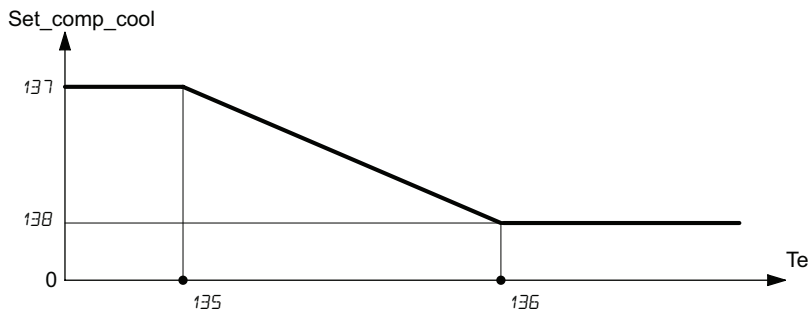
If the external sensor is open, the compensated setpoint corresponds to I33 .

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

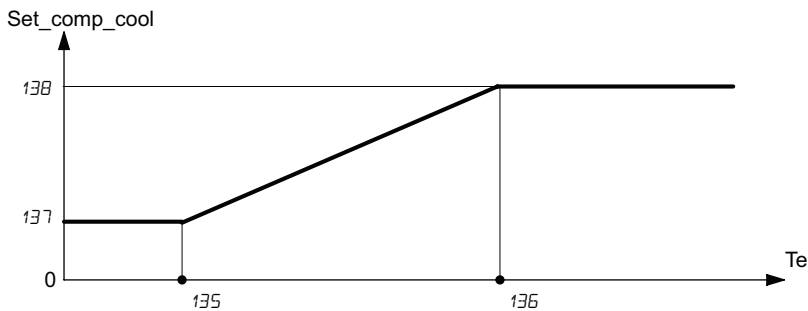
135: minimum external temperature for summer compensation

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 137.

If the external sensor is short-circuited, the compensated summer setpoint corresponds to 138.

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 regulated 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).

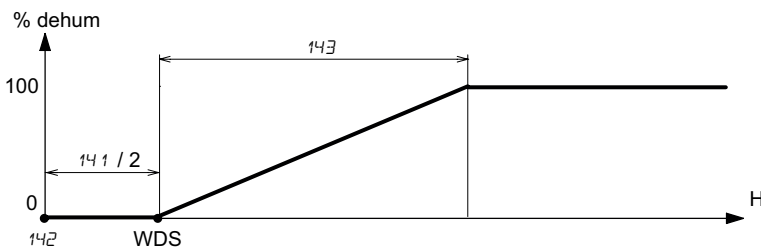
• Use of the cooling battery for dehumidification:

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.

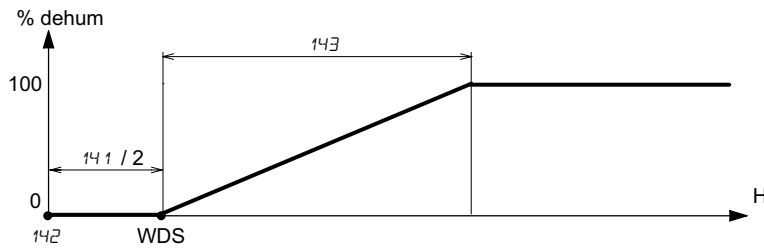
If the cooling request has priority, the ❄️ icon is switched off.

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 .

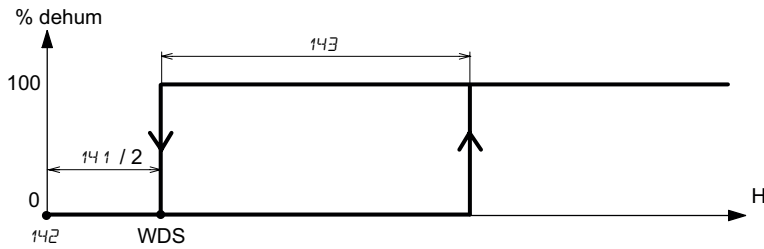
Control is carried out on the dehumidification operating setpoint $WDS = 142 + (141/2)$ and is proportional if $144=0$ or proportional integral if $144 \neq 0$.

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 $\leq WDS$ 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

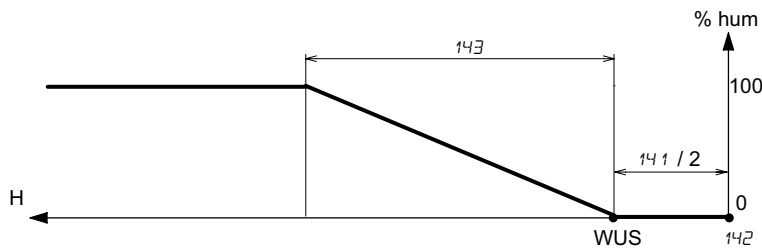
Humidification can be carried out by using:

- 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.

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 ($023=6$).

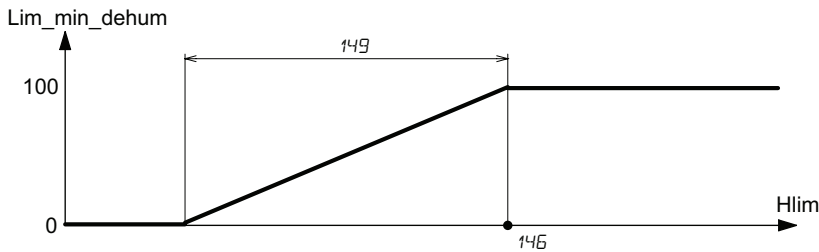
If no humidity supply sensor has been paired with an AI3 input sensor, the limit function is not taken into consideration.

• Low dehumidification limit:

To enable the low limit of dehumidification set the following parameters:

- set the low limit control of humidity $145=1$,
- 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

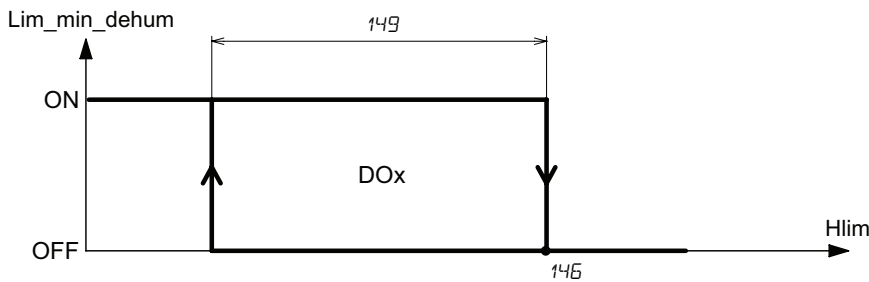
146 : low limit humidity setpoint

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.

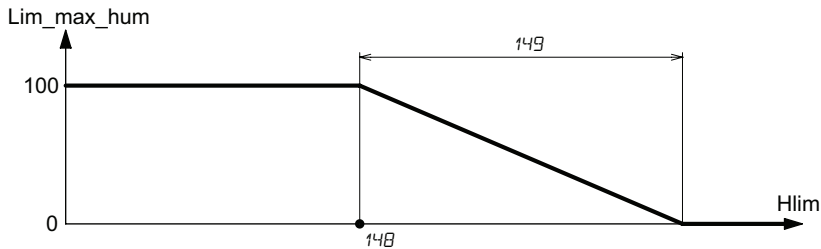
Below $146 - 149$ the  icon is displayed and on the alarms page, the message *LILH* is displayed.

• Upper humidification limit:

To enable the high limit of humidification set the following parameters:

- set high limit control of humidity $147=1$,
- 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

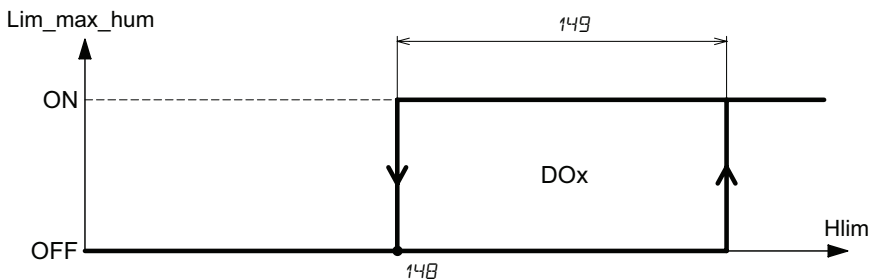
148 : high limit humidity setpoint

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 *L I H H* 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 $148 + (\text{humidity limit proportional band } 149)$, 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 *L I H H* 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.

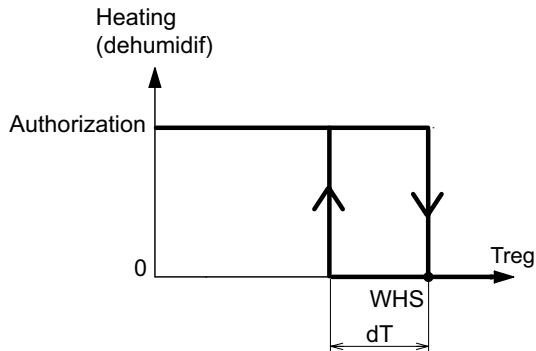
However, simultaneous requests for:

- 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 α :

- $\alpha = 0$ 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:

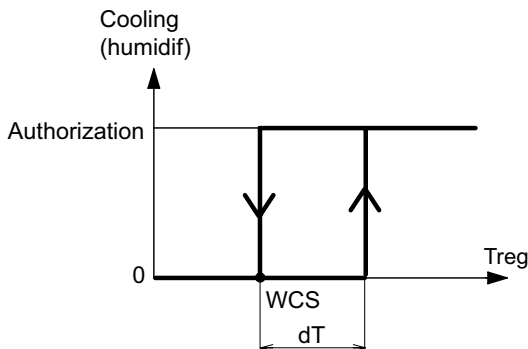


Treg: regulation temperature

WHS: heating operation setpoint

dT: 0.2°C

During dehumidification if $T_{reg} < WHS - dT$, heating regulation is started and dehumidification regulation stopped till WHS is reached again



Treg: regulation temperature

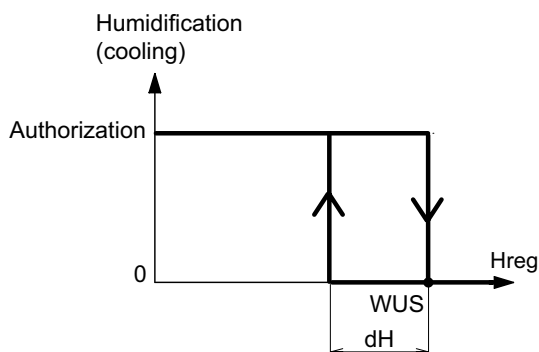
WCS: cooling operation setpoint

dT: 0.2°C

During humidification if $T_{reg} > WCS + dT$, cooling regulation is started and humidity regulation stopped till WCS is reached again.

- $\alpha = 1$ 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:

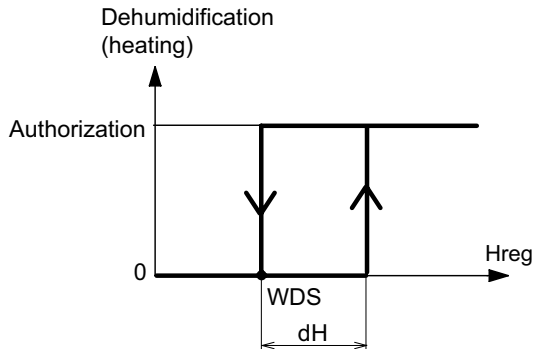


Hreg: regulation humidity

WUS: humidification operation setpoint

dH: 0.2%/r.h

During cooling if $H_{reg} < WUS - dH$, 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 $H_{reg} > WDS + dH$, 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, $\alpha_{12}=0$:

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	<i>Humidifier</i>
Heating achieved	Humidification	OFF	OFF	OFF	<i>ON</i>
Heating achieved	Dehumidification	OFF	007=0: ON (controlled by the dehumidification signal)	ON (controlled by the supply sensor and post-heating sensor179)	<i>OFF</i>
			007=1 or 2: ON (dehumidification using the modulating or on/off dehumidifier)		
Cooling achieved	Humidification	OFF	OFF	OFF	<i>ON</i>
Cooling achieved	Dehumidification	OFF	007=0: ON (controlled by the dehumidification signal)	ON (controlled by the supply sensor and the post setpoint 179)	<i>OFF</i>
			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, $\varrho_{12}=1$:**

Humidity setpoint not reached:

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

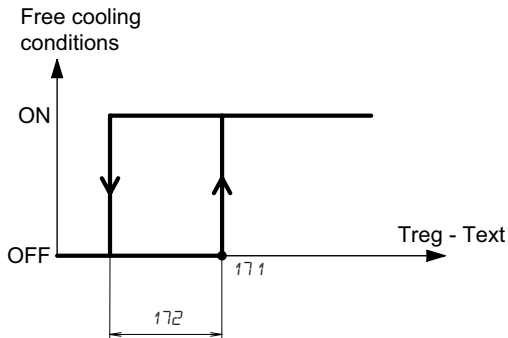
20. Free cooling/heating conditions

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 independently 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 $010 \neq 0$,
- 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

$Text \geq 174$

$Treg \geq 175$

$(Treg - Text) < 173$

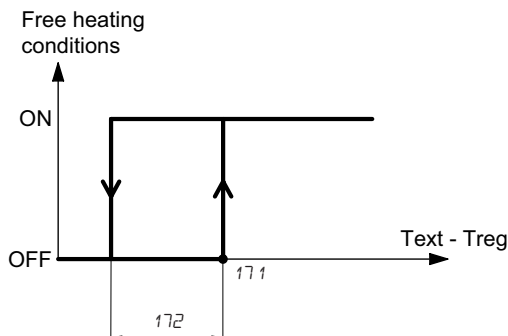
$(Treg - Text) > 171$

If $(Treg - Text) \leq 171 - 172$ 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 independently 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 $010 \neq 0$,
- 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 \leq 176

Treg \leq 177

(Text - Treg) $<$ 173

(Text - Treg) $>$ 171

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

If damper used is on/off regulated type (\varnothing 17=1) or modulated type(\varnothing 17=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 (\varnothing 17=2) or modulated bypass for heat exchanger type(\varnothing 17=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, \varnothing 17=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

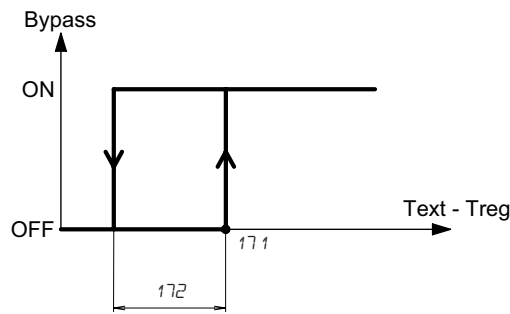
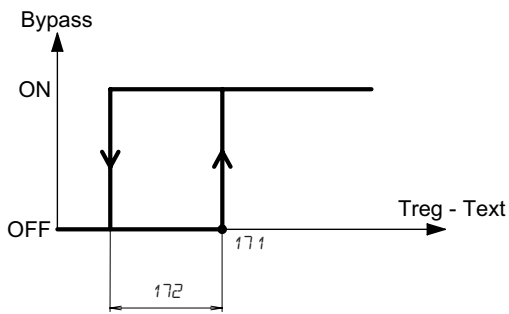
• Operation with on/off bypass damper for cross-flow heat exchanger

if the damper used is bypass for heat exchanger (based only on free heating/cooling, $\text{170}=5$), 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:

- $\text{170}=1$ or 3 (authorization of free cooling regardless the working season), or $\text{170}=4$ or 6 (authorization of free cooling in cooling mode only), or $\text{170}=2$ or 3 (authorization of free heating regardless the working season), or $\text{170}=5$ or 6 (authorization of free heating in heating mode only),
- do the regulation on room sensor (internal or remote sensor) $\text{171}=0$;
in case the remote sensor is used set an analogue input as remote sensor $\text{19}=1$ (AI1) or $\text{21}=1$ (AI2) or $\text{23}=1$ (AI3),
- set an analogue input as external sensor $\text{19}=3$ (AI1) or $\text{21}=3$ (AI2) or $\text{23}=3$ (AI3),
- set a digital output as on/off bypass for heat exchanger (based only on free c/h): $\text{25}=20$ (DO1) or $\text{26}=20$ (DO2) or $\text{27}=20$ (DO3) or $\text{28}=20$ (DO4) or $\text{29}=20$ (DO5), action on damper $\text{11}=1$,
- set the type of heat exchanger to cross-flow heat exchanger $\text{12}=1$.

Free cooling:

Free heating



T_{reg} : 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:

$Text \geq 174$

$T_{reg} \geq 175$

$(T_{reg} - Text) < 173$

If $(T_{reg} - Text) > 171 \rightarrow$ the bypass damper is activated (open).

If $(T_{reg} - Text) \leq 172$ the bypass damper is disabled (closed).

Using the free heating conditions:

$Text \leq 176$

$T_{reg} \leq 177$

$(Text - T_{reg}) < 173$

If $(Text - T_{reg}) > 171$ the bypass damper is activated (open).

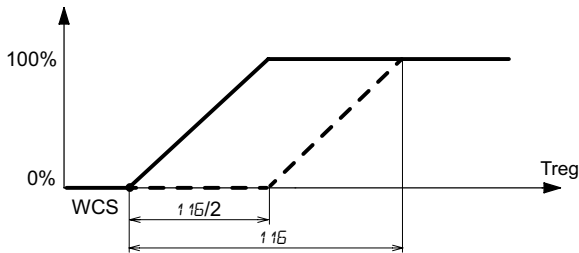
If $(Text - T_{reg}) \leq 172$ the bypass damper is disabled (closed).

• 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

115: cooling proportional band

solid curve: modulating damper output

dashed curve: modulating cooling valve output

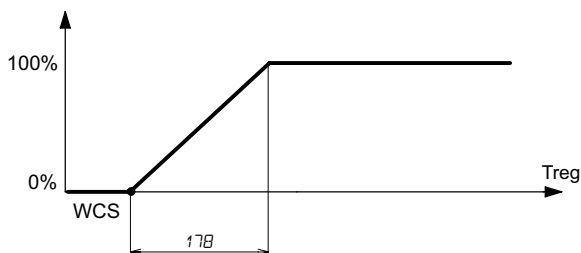
If the control temperature rises above WCS, the modulating damper in the presence of free cooling conditions goes from the minimum opening position (parameter 154) to the maximum opening position (parameter 155) in the band defined by the parameter $115/2$.

The valve changes position from closed to open when Treg change from (WCS + $115/2$) to (WCS + 115).

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

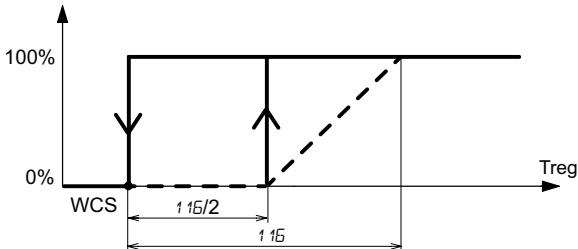
178 Hysteresis regulation free heating/cooling

If temperature of regulation sensor rises above WCS, the modulating damper in the presence of free cooling conditions goes from the minimum opening position (parameter 154) to the maximum opening position (parameter 155) 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

115: cooling proportional band

solid curve: on/off damper output

dashed curve: modulating cooling valve output

In the presence of free cooling conditions:

If $Treg > (WCS + 115/2)$ the on/off damper controlled by the free cooling is activated.

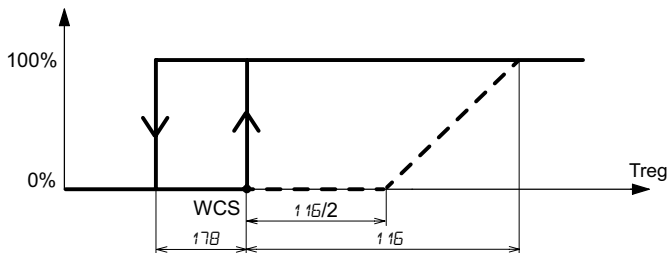
If $Treg \leq WCS$ the on/off damper controlled by the cooling is disabled.

The valve changes position from closed to open when $Treg$ change from $(WCS + 115/2)$ to $(WCS + 115)$.

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

115: cooling proportional band

170 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.

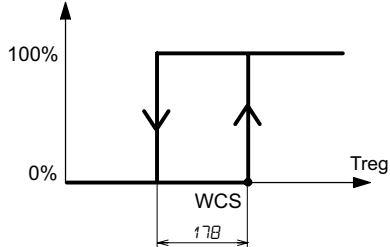
If $Treg \leq (WCS - 170)$ the on/off bypass damper regulated on free cooling is deactivated.

The valve changes position from closed to open when $Treg$ change from $(WCS + 115/2)$ to $(WCS + 115)$.

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

170 Hysteresis regulation free heating/cooling

With free cooling conditions:

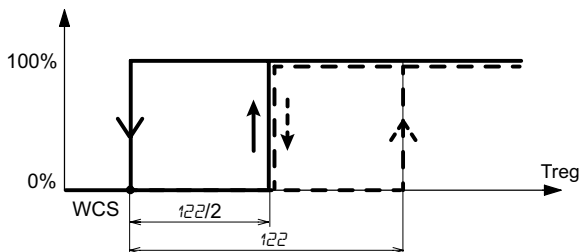
If $Treg > WCS$ the on/off bypass damper regulated on free cooling is activated.

If $Treg \leq (WCS - 170)$ 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 $Treg \leq WCS$ the damper is deactivated.

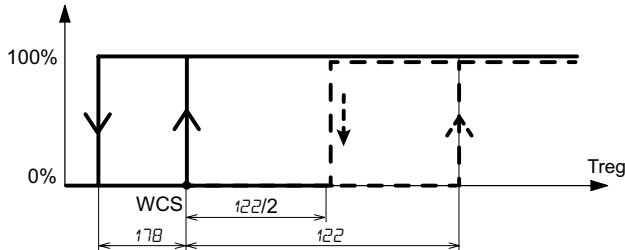
if $Treg > (WCS + 122)$ the cooling valve is activated.

if $Treg \leq (WCS + 122/2)$ 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

170 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 $Treg \leq (WCS - 170)$ the damper is deactivated.

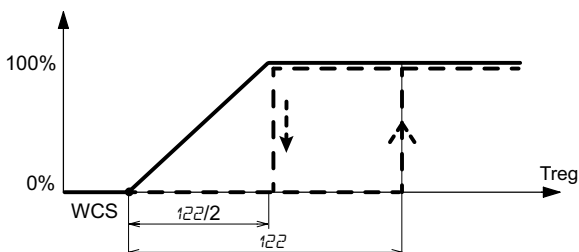
if $Treg > (WCS + 122)$ the cooling valve is activated.

if $Treg \leq (WCS + 122/2)$ 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 (parameter 154) to the maximum opening position (parameter 155) in the band defined by

the parameter $\Delta T/2$.

if $T_{reg} > (WCS + \Delta T/2)$ the cooling valve is activated.

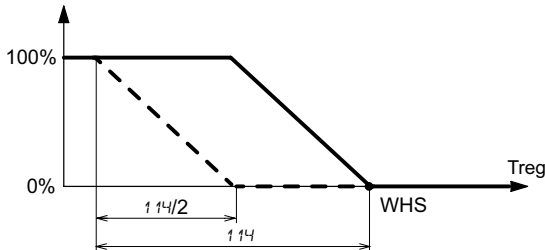
if $T_{reg} \leq (WCS + \Delta T/2)$ the cooling valve is deactivated.

• 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

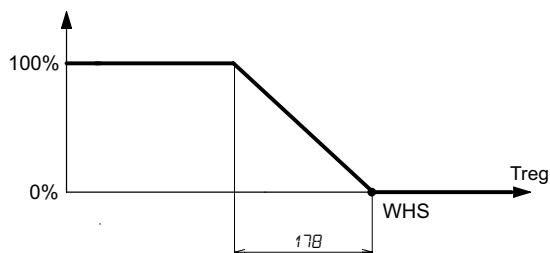
If the control temperature drops below *WHS*, the modulating damper in the presence of free heating conditions goes from the minimum opening position (parameter 154) to the maximum opening position (parameter 155) in the band defined by the parameter $114/2$.

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

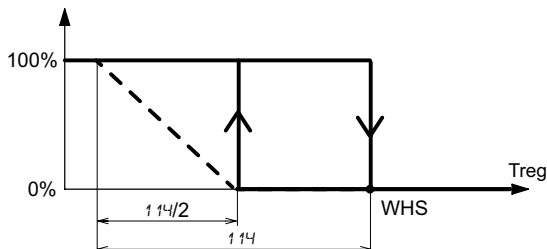
170 hysteresis regulation free heating/cooling

If the control temperature drops below *WHS*, the modulating bypass damper in the presence of free heating conditions goes from the minimum opening position (parameter 154) to the maximum opening position (parameter 155) in the band defined by the parameter 170 .

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.

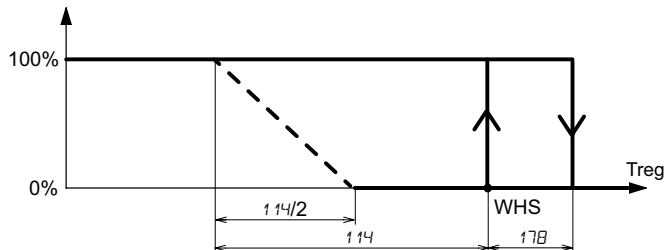
If $Treg \geq WHS$ the damper is disabled.

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

170 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.

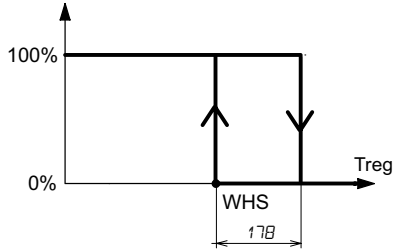
If $Treg \geq (WHS + 170)$ the damper is disabled.

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

170 Hysteresis regulation free heating/cooling

In the presence of free heating conditions:

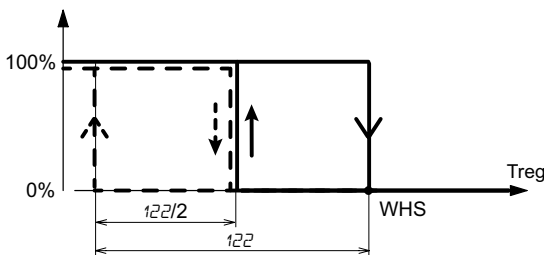
If $Treg < WHS$ the on/off damper is activated.

If $Treg \geq (WHS + 170)$ 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 $Treg \geq WHS$ the damper is disabled.

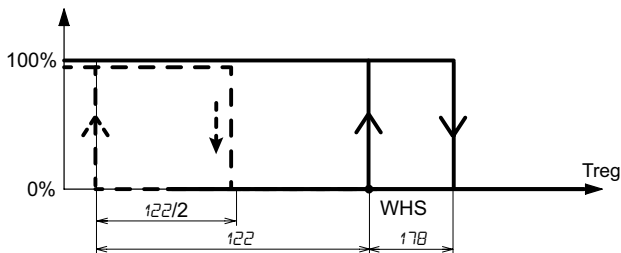
If $Treg < (WHS - 122)$ the on/off valve is activated.

If $Treg \geq (WHS - 122/2)$ 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)



T_{reg} : control temperature

WHS: heating operation setpoint

122 : hysteresis for on/off output

170 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 $T_{reg} < WHS$ the on/off damper is activated.

If $T_{reg} \geq (WHS + 170)$ the damper is disabled.

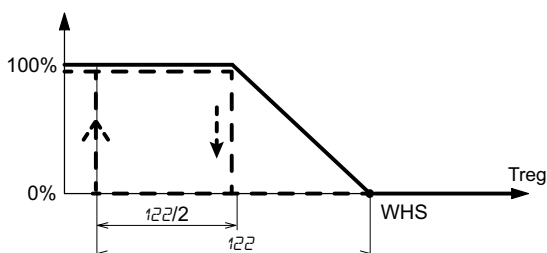
If $T_{reg} < (WHS - 122)$ the valve is activated.

If $T_{reg} \geq (WHS - 122/2)$ 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)



T_{reg} : 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 154) to the maximum opening position (parameter 155) in the band defined by the parameter 122/2.

If $T_{reg} < (WHS - 122)$ the on/off valve is activated.

If $T_{reg} \geq (WHS - 122/2)$ the on/off valve is disabled.

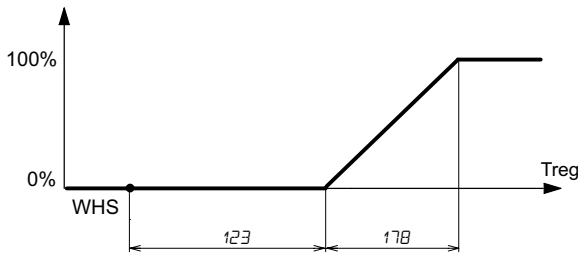
• Free cooling in winter:

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:

- $178=1$ 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 (parameter 154) to the maximum opening position (parameter 155) 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),

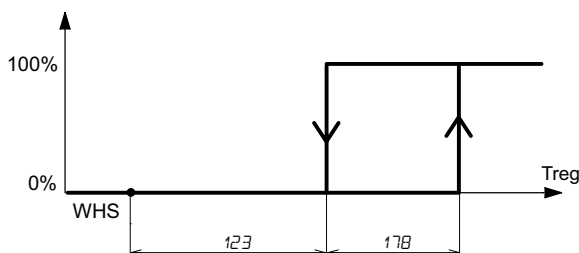
or modulating electrical resistance $002=1$ and $030=6$ (AO1) or $031=6$ (AO2) or $032=6$ (AO3).

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:

- $178=1$ 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 $T_{reg} > (WHS + 123 + 178)$ the on/off damper is activated.

If $T_{reg} \leq (WHS + 123)$ 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:

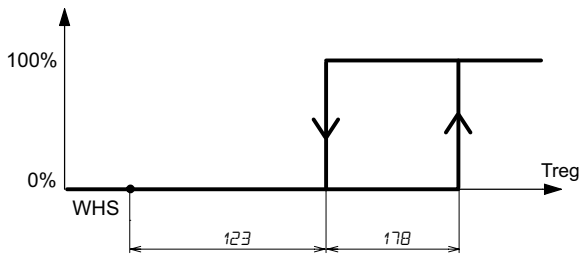
- 178=1 or 3 (authorization of free cooling regardless the season),

- 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

123: neutral zone

178 hysteresis regulation free heating/cooling

In the presence of free cooling conditions:

If $T_{reg} > (WHS + 123 + 178)$ the on/off bypass damper is activated.

If $T_{reg} \leq (WHS + 123)$ the damper is disabled.

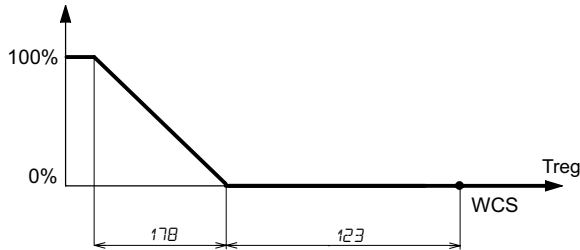
Note: the presence of the heating battery is not mandatory.

• Free heating in the summer:

Operation with modulating damper:

Do following settings:

- $178=2$ 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 (parameter 154) to the maximum opening position (parameter 155) in the band defined by the parameter 178 .

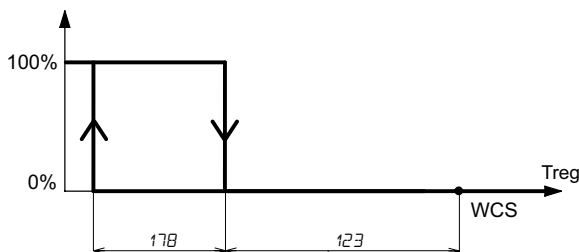
Note: if external modulating damper is used, the presence of the cooling battery is mandatory:

- 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:

- $178=2$ 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 $Treg \geq (WCS - 123)$ the damper is disabled.

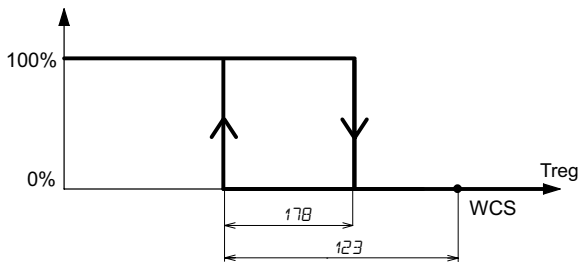
Note: the presence of the cooling battery is mandatory:

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

Operation with on/off bypass:

Do following settings:

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



Treg: control temperature

WCS: cooling operation setpoint

123: neutral zone

178 hysteresis regulation free heating/cooling

In the presence of free heating conditions:

If $T_{reg} < (WCS - 123)$ the on/off bypass damper is activated.

If $T_{reg} \geq (WCS - 123 + 178)$ 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).

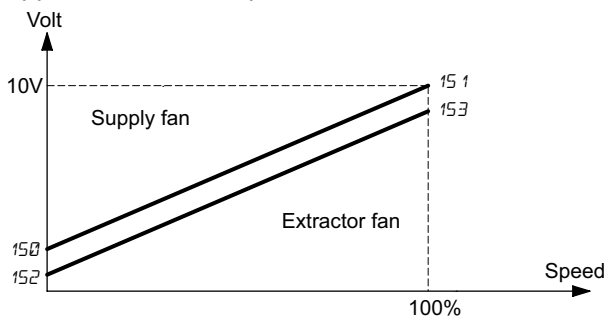
If you need a digital output to enable the supply or extractor fan, set 025=19 (DO1) or 026=19 (DO2) or 027=19 (DO3) or 028=19 (DO4) or 029=19 (DO5).

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:



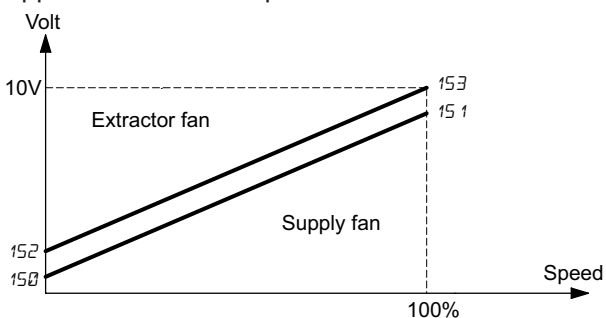
150: minimum supply fan voltage

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 CO₂,
 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 CO₂,
 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  button and the  icon is displayed together with the indicator of the fan operating mode on display B.

Press the  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  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 CO₂ (009=1):

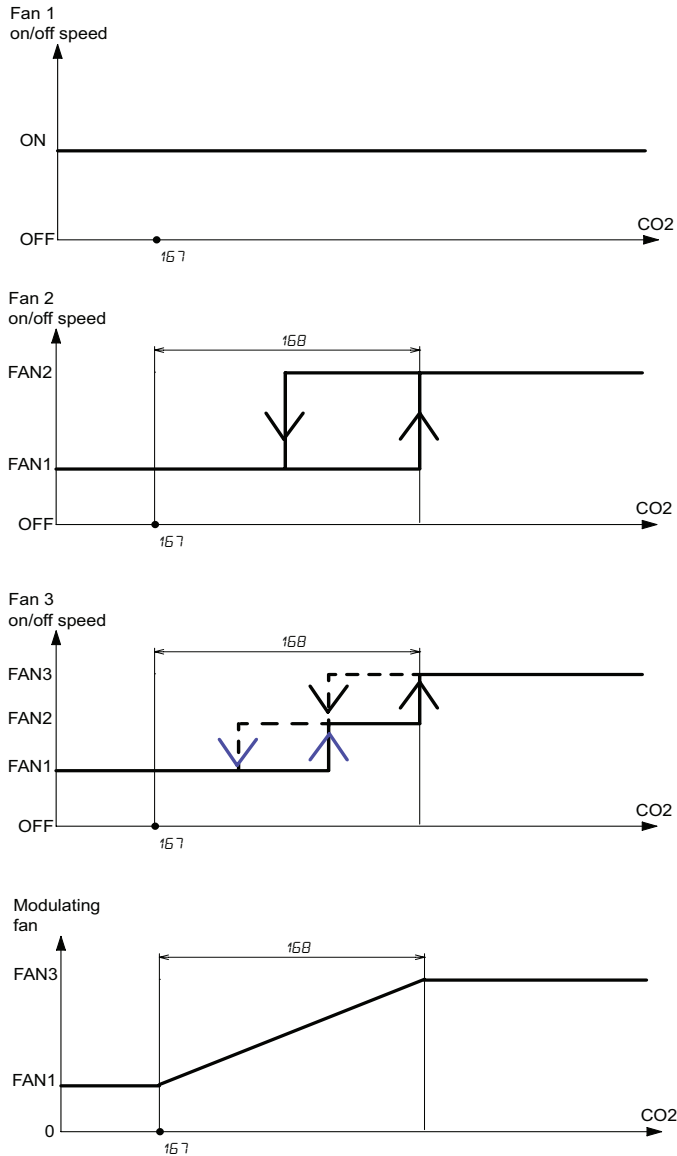
In some situations in which rooms are crowded, it is necessary to regulate the air quality to ensure the air is renewed when the CO₂ concentration exceeds a given threshold.

To control the speed of the fan based on the CO₂, 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 (205=0 and 207=2000) with the unit of measurement (208=0).

Then define the parameters of the PI controller for reduction of CO₂ (157: setpoint 158: proportional band and 159: integral time).

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



157 air exchange setpoint

158 air exchange proportional band

VEL1: speed 1 = $[(154 / 100) \times (151 - 150)] + 150$ for the supply and $[(154 / 100) \times (153 - 152)] + 152$ for the extraction.

VEL2: speed 2 = $[(155 / 100) \times (151 - 150)] + 150$ for the supply and $[(155 / 100) \times (153 - 152)] + 152$ for the extraction.

VEL3: speed 3 = $[(156 / 100) \times (151 - 150)] + 150$ for the supply and $[(156 / 100) \times (153 - 152)] + 152$ for the extraction.

For the two-speed fan:

if CO₂ <= 157 speed 1 is ON, and if CO₂ increases when CO₂ > (157 + 158), speed 2 is ON,

if CO₂ decreases and CO₂ <= (157 + 158/2), speed 1 is ON,

For the three-speed fan:

if CO₂ <= 157 speed 1 is ON,

if CO₂ increases and CO₂ >= (157 + (158*(2/3))) and CO₂ < (157 + 158), speed 2 is ON,

if CO₂ > (157 + 158), speed 3 is ON,

if CO₂ decreases and CO₂ <= (157 + (158*(2/3))) and CO₂ > (157 + (158*(1/3))), speed 2 is ON,

if $CO_2 \leq (157 + (150*(1/3)))$, speed 1 is ON.

For the modulating fan:

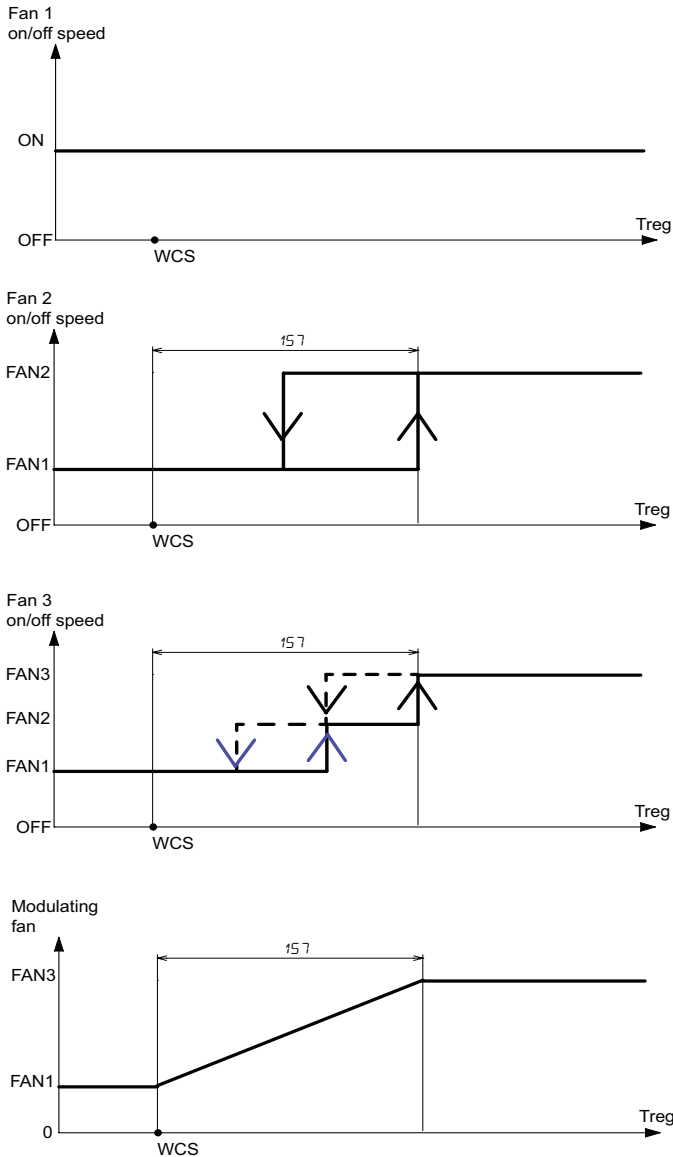
If $CO_2 > 157$ the speed is modulated between speeds 1 and 3.

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:



T_{reg} : temperature of the control sensor

WCS : cooling operation setpoint

157 proportional band of the fan

VEL1: speed 1 = $[(154 / 100) \times (151 - 150)] + 150$ for the supply and $[(154 / 100) \times (153 - 152)] + 152$ for the extraction.

VEL2: speed 2 = $[(155 / 100) \times (151 - 150)] + 150$ for the supply and $[(155 / 100) \times (153 - 152)] + 152$ for the extraction.

VEL3: speed 3 = $[(156 / 100) \times (151 - 150)] + 150$ for the supply and $[(156 / 100) \times (153 - 152)] + 152$ for the extraction.

For the two-speed fan:

if $T_{reg} \leq WCS$, speed 1 is ON and if T_{reg} increases when $T_{reg} > (WCS + 157)$, speed 2 is ON,
if T_{reg} decreases and $T_{reg} \leq (WCS + 157/2)$, speed 1 is ON,

For the three-speed fan:

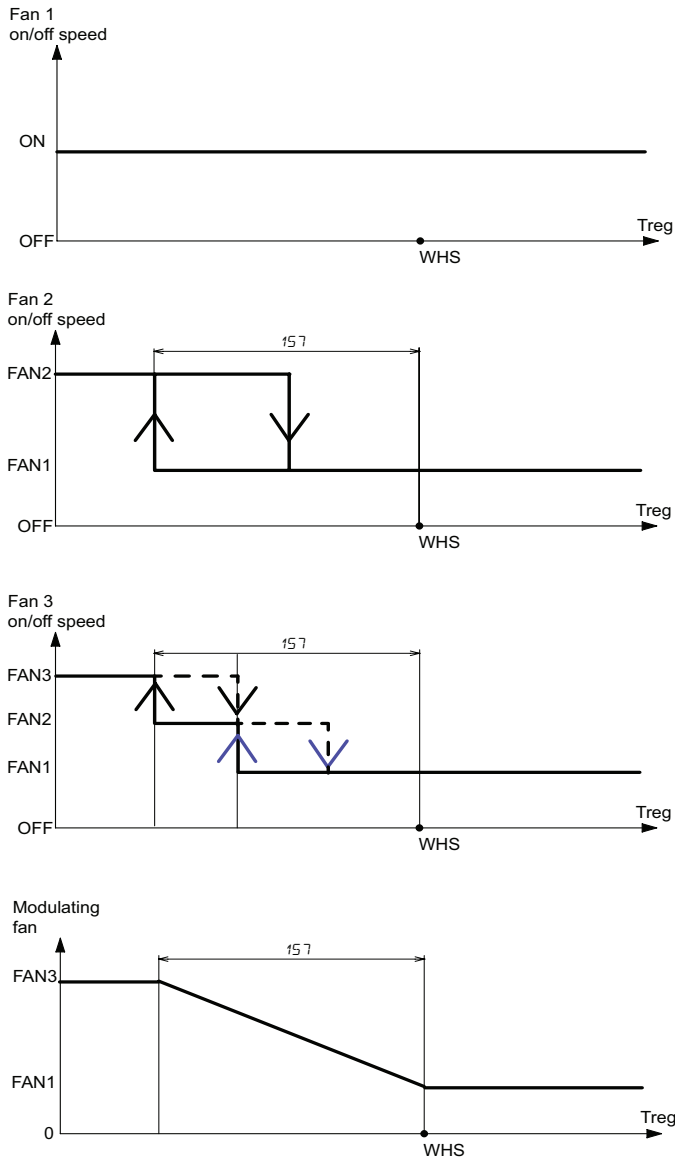
if $T_{reg} \leq WCS$, speed 1 is ON,
if T_{reg} increases and $T_{reg} \geq (WCS + (157*(2/3)))$ and $T_{reg} < (WCS + 157)$, speed 2 is ON,
if $T_{reg} > (WCS + 157)$, speed 3 is ON,

if T_{reg} decreases and $T_{reg} \leq (WCS + (15.7 \cdot (2/3)))$ and $T_{reg} > (WCS + (15.7 \cdot (1/3)))$, speed 2 is ON,
 if $T_{reg} \leq (WCS + (15.7 \cdot (1/3)))$, speed 1 is ON.

For the modulating fan:

If $T_{reg} > WCS$, the speed is modulated between 1 and 3.

- Winter control:



Treg: temperature of the control sensor

WCS: heating operation setpoint

15.7 proportional band of the fan

VEL1: speed 1 = $[(15.4 / 100) \times (15.1 - 15.0)] + 15.0$ for the supply and $[(15.4 / 100) \times (15.3 - 15.2)] + 15.2$ for the extraction.

VEL2: speed 2 = $[(15.5 / 100) \times (15.1 - 15.0)] + 15.0$ for the supply and $[(15.5 / 100) \times (15.3 - 15.2)] + 15.2$ for the extraction.

VEL3: speed 3 = $[(15.6 / 100) \times (15.1 - 15.0)] + 15.0$ for the supply and $[(15.6 / 100) \times (15.3 - 15.2)] + 15.2$ for the extraction.

For the two-speed fan:

if $T_{reg} \geq WHS$, speed 1 is ON and if T_{reg} decreases when $T_{reg} < (WHS - 15.7)$, speed 2 is ON,

if T_{reg} increases and $T_{reg} \geq (WHS - 15.7/2)$, speed 1 is ON,

For the three-speed fan:

if $T_{reg} \geq WHS$, speed 1 is ON,

if T_{reg} decreases and $T_{reg} \leq (WHS - (15.7 \cdot (2/3)))$ and $T_{reg} > (WHS - 15.7)$, speed 2 is ON,

if $T_{reg} < (WHS - 15.7)$, speed 3 is ON,

if T_{reg} increases and $T_{reg} \geq (WHS - (15.7 \cdot (2/3)))$ and $T_{reg} < (WHS - (15.7 \cdot (1/3)))$, speed 2 is ON,

if $T_{reg} \geq (WHS - (15.7 \cdot (1/3)))$, speed 1 is ON.

For the modulating fan:

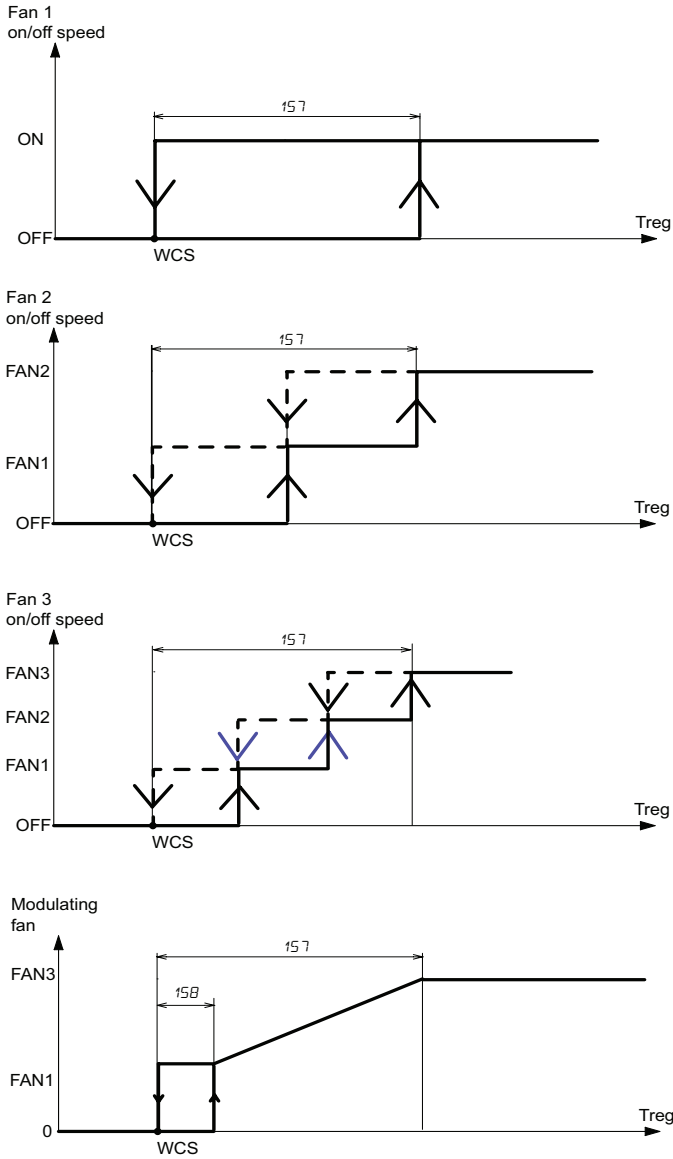
If $T_{reg} < WHS$, the speed is modulated between 1 and 3.

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 150 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

150: step enabling for supply fan

VEL1: speed 1 = $[(154 / 100) \times (151 - 150)] + 150$ for the supply and $[(154 / 100) \times (153 - 152)] + 152$ for the extraction.

VEL2: speed 2 = $[(155 / 100) \times (151 - 150)] + 150$ for the supply and $[(155 / 100) \times (153 - 152)] + 152$ for the extraction.

VEL3: speed 3 = $[(156 / 100) \times (151 - 150)] + 150$ for the supply and $[(156 / 100) \times (153 - 152)] + 152$ 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,

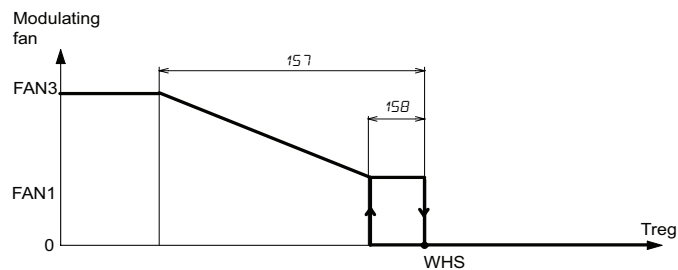
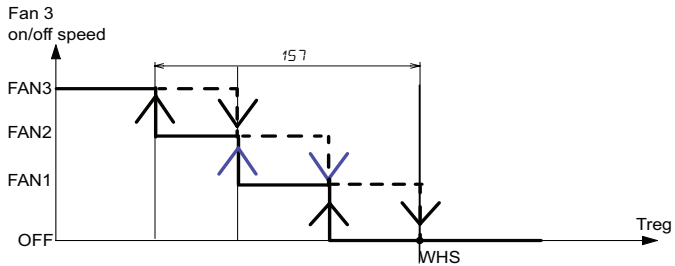
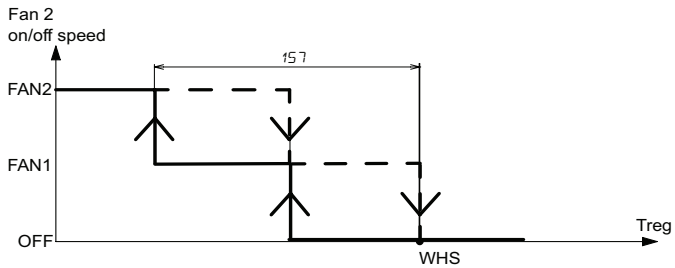
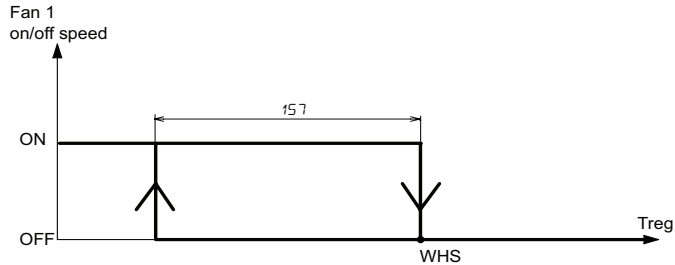
if Treg increases and Treg > (WCS + (157*(1/3))) and Treg < (WCS + (157*(2/3))), speed 1 is ON,

if T_{reg} increases and $T_{reg} > (WCS + (157 \cdot (2/3)))$ and $T_{reg} < (WCS + 157)$, speed 2 is ON,
 If $T_{reg} > (WCS + 157)$, speed 3 is ON,
 if T_{reg} decreases and $T_{reg} < (WCS + (157 \cdot (2/3)))$ and $T_{reg} > (WCS + (157 \cdot (1/3)))$, speed 2 is ON,
 if T_{reg} decreases and $T_{reg} < (WCS + (157 \cdot (1/3)))$ and $T_{reg} > WCS$, speed 1 is ON,
 if $T_{reg} < WCS$, the fan is off

For the modulating fan:

if $T_{reg} < WCS$, the fan is off,
 If $T_{reg} > (WCS + 15B)$, the speed starts at a speed between speeds 1 and 3.
 The speed is modulated up to speed 3 if T_{reg} continues to increase.
 If T_{reg} decreases and $T_{reg} < WCS$, the fan is off.

- Winter control:



T_{reg} : temperature of the control sensor

WHS: heating operation setpoint

157: proportional band of the fan

15B: step enabling for supply fan

VEL1: speed 1 = $[(154 / 100) \times (151 - 150)] + 150$ for the supply and $[(154 / 100) \times (153 - 152)] + 152$ for the extraction.

VEL2: speed 2 = $[(155 / 100) \times (151 - 150)] + 150$ for the supply and $[(155 / 100) \times (153 - 152)] + 152$ for the extraction.

VEL3: speed 3 = $[(156 / 100) \times (151 - 150)] + 150$ for the supply and $[(156 / 100) \times (153 - 152)] + 152$ for the extraction.

For the two-speed fan:

if $T_{reg} > WHS$, the fan is off
 if T_{reg} decreases and $T_{reg} < (WHS - (157/2))$ and $T_{reg} > (WHS - 157)$, speed 1 is ON,
 If $T_{reg} < (WHS - 157)$, speed 2 is ON,
 if T_{reg} increases and $T_{reg} \geq (WHS - (157/2))$ and $T_{reg} < WHS$, speed 1 is ON,
 if $T_{reg} > WHS$, the fan is off

For the three-speed fan:

if $T_{reg} > W_{HS}$, the fan is off,

if T_{reg} decreases and $T_{reg} < (W_{HS} - (157 \cdot (1/3)))$ and $T_{reg} > (W_{HS} - (157 \cdot (2/3)))$, speed 1 is ON,

if T_{reg} decreases and $T_{reg} < (W_{HS} - (157 \cdot (2/3)))$ and $T_{reg} > (W_{HS} - 157)$, speed 2 is ON,

If $T_{reg} < (W_{HS} - 157)$ speed 3 is ON,

if T_{reg} increases and $T_{reg} > (W_{HS} - (157 \cdot (2/3)))$ and $T_{reg} < (W_{HS} - (157 \cdot (1/3)))$, speed 2 is ON,

if T_{reg} increases and $T_{reg} > (W_{HS} - (157 \cdot (1/3)))$ and $T_{reg} < W_{HS}$, speed 1 is ON,

if $T_{reg} > W_{HS}$, the fan is off

For the modulating fan:

if $T_{reg} < W_{HS}$, the fan is off,

If $T_{reg} < (W_{HS} - 158)$, the speed starts at a speed between 1 and 3.

The speed is modulated up to speed 3 if T_{reg} continues to decrease.

If T_{reg} increases and $T_{reg} > W_{HS}$, 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 ($213 \neq 0$).

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 differential 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);

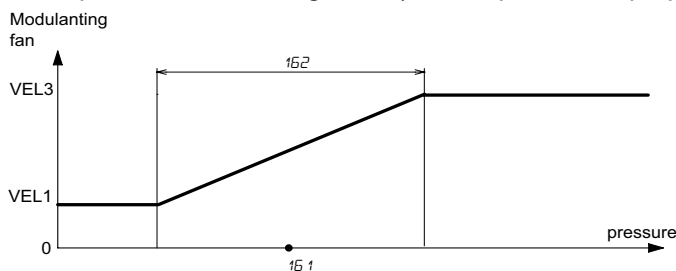
If required on plant select output for supply fan 030=1 or 031=1 or 032=1;

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 (151: setpoint, 152: proportional band, 153: integral time).



pressure: differential pressure detected by the transmitter

151: setpoint

152: proportional band

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

Based on parameter $\varrho 13$ regulation can be performed at constant pressure ($\varrho 13=0$) or at constant flow rate ($\varrho 13\neq 0$). In case of constant flow rate regulation, flow rate is calculated based on formula $F = k \sqrt{dp}$ with F =flow rate (m³/hour)
 k =parameter $\varrho 13$,
 dp differential pressure (Pa) of differential pressure transducer connected to analogue input AI3.

To regulate with constant pressure set $\varrho 13=0$, for constant flow rate set $\varrho 13$ to the flow rate coefficient required.

Then do other settings:

008=4 (modulating fan);

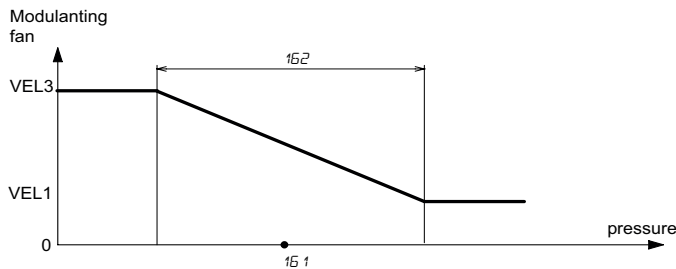
If required on plant select output for supply fan 030=1 or 031=1 or 032=1;

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 205=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 (151: setpoint, 152: proportional band, 153: integral time).



pressure: differential pressure detected by the pressure transmitter

151: setpoint

152: 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 dehumidification).

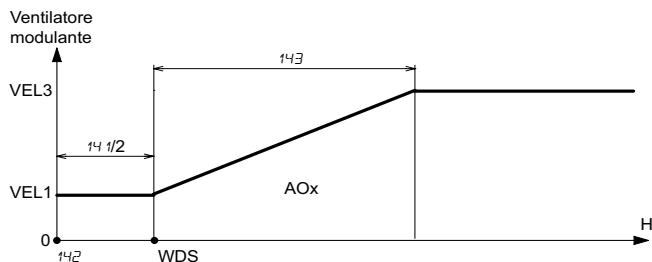
Set parameter 139 to select the type of humidity sensor used for dehumidification:

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. (205=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 dehumidification setpoint

142: humidity setpoint



141: neutral zone humidity

143: proportional band humidity

Speeds 1 and 3 of supply fan are defined based on parameters 150, 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) (*)	<p>Damper is open when air handling unit is switched on and closed with delay 166 after ventilation is OFF.</p> <p>Select the output for damper 025=12 (DO1) or 026=12 (DO2) or 027=12 (DO3) or 028=12 (DO4) or 029=12 (DO5)</p>
External damper regulated	<p>It can be regulated based on CO₂, on free cooling and/or heating, on free cooling and/or heating + CO₂, or on humidity.</p> <p>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)</p> <p>Regulation on CO₂: 011=0 (regulation on CO₂) 023=5 (input AI3 0..10V CO₂) and put jumper JP1 on position "3-2" Set regulation parameters from 167 to 169 (setpoint, proportional band and integral time CO₂)</p> <p>Regulation on free cooling/heating: 011=1 (regulation on free cooling/heating) Activate free cooling and/or heating with parameter 170 Set parameters of free cooling and/or heating from 171 to 178 (see "35. Configuration of installer parameters (level 2 password)" page 121)</p> <p>Regulation on free cooling/heating and CO₂: 011=2 (regulation on free cooling/heating and CO₂) Activate free cooling and/or heating with parameter 170 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 CO₂) Set regulation parameters from 167 to 169 (setpoint, proportional band and integral time CO₂)</p> <p>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,</p>
Bypass for heat exchanger	<p>It is regulated based on free cooling and/or heating based on cooling and/or heating request</p> <p>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)</p>

Bypass for cross-flow heat exchanger (based on free cooling/heating only)	<p>It is regulated based on free cooling and/or heating without considering cooling and/or heating request</p> <p>$\varnothing 11=1$ (regulation on free cooling/heating) $\varnothing 12=1$ (cross-flow heat exchanger) Select output for bypass of cross-flow heat exchanger (based on free cooling/heating only) $\varnothing 25=20$ (DO1) or $\varnothing 26=20$ (DO2) or $\varnothing 27=20$ (DO3) or $\varnothing 28=20$ (DO4) or $\varnothing 29=20$ (DO5)</p>
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(* external damper not regulated can be used together with other type of damper defined by parameter $\varnothing 10$ ($\varnothing 10=1$ 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 $\varnothing 10=1$, or as bypass damper for heat exchanger $\varnothing 10=2$, or as bypass damper for cross-flow heat exchanger (based on free cooling/heating only) $\varnothing 10=5$.

Set type of regulation on damper $\varnothing 11=1$ (regulation based on free cooling/heating with cooling/heating request).

Define which output is the external regulated damper: $\varnothing 25=11$ (DO1) or $\varnothing 26=11$ (DO2) or $\varnothing 27=11$ (DO3) or $\varnothing 28=11$ (DO4) or $\varnothing 29=11$ (DO5). or the bypass for heat exchanger $\varnothing 25=13$ (DO1) or $\varnothing 26=13$ (DO2) or $\varnothing 27=13$ (DO3) or $\varnothing 28=13$ (DO4) or $\varnothing 29=13$ (DO5) or the bypass for cross-flow heat exchanger (based on free cooling/heating only) $\varnothing 25=20$ (DO1) or $\varnothing 26=20$ (DO2) or $\varnothing 27=20$ (DO3) or $\varnothing 28=20$ (DO4) or $\varnothing 29=20$ (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 CO₂ concentration exceeds a given threshold. A on/off damper can be used.

In order to carry out this operation, set $\varnothing 23=5$ (AI3 input for 0..10 V CO₂ 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 ($\varnothing 25=0$ and $\varnothing 27=2000$) with the unit of measurement ppm ($\varnothing 28=0$)

Select type of damper $\varnothing 10=1$ (external damper regulated).

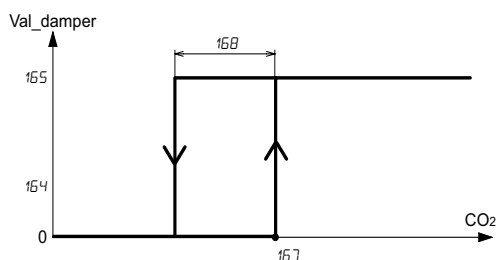
Select type of regulation on damper $\varnothing 11=0$ (regulation on CO₂).

Defines which output is the external damper regulated: $\varnothing 25=11$ (DO1) or $\varnothing 26=11$ (DO2) or $\varnothing 27=11$ (DO3) or $\varnothing 28=11$ (DO4)

Set.

Define the parameters for reduction of the CO₂ concentration (157 : setpoint, 158 : proportional band).


The damper is regulated as following graph:




Val_damper: theoretical value of the damper control

157: air exchange setpoint

158: air exchange proportional band

If the concentration value of CO₂ > (air exchange setpoint 157) corresponding digital output is activated, icon  is switched on.

If the concentration value of CO₂ <= (air exchange setpoint 157 - proportional band 158), 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 CO₂

The regulation corresponds to paragraph "Regulation of on/off damper based on air quality" page 79 for CO₂ 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 activate 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. (*205*=0 and *207*=100) with unit set to %r.H. (*208*=1),

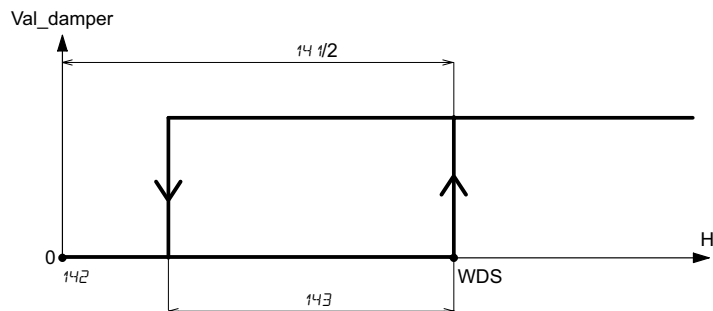
select the type of regulated damper *010*=1 (external regulated on/off damper),

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.

Modulating type damper	Regulation type and settings
External regulated damper	<p>It can be regulated based on CO₂, free cooling and/or heating, free cooling and/or heating + CO₂, or humidity</p> <p>010 = 3 (external modulating damper). Select output for modulating damper 030=9 (AO1) or 031=9 (AO2) or 032=9 (AO3).</p>
	<p>Regulation on CO₂: 011=0 (regulation based on CO₂) 023=5 (input AI3 0..10V CO₂) Set regulation parameters from 157 to 159 (setpoint, proportional band and integral time CO₂)</p>
	<p>Regulation on free cooling/heating: 011=1 (regulation based on free cooling/heating) Activate free cooling and/or heating with parameter 170 Set parameters of free cooling and/or heating from 171 to 178 (see <u>"35. Configuration of installer parameters (level 2 password)" page 121</u>)</p>
	<p>Regulation on free cooling/heating and CO₂: 011=2 (azione basata sul free cooling/heating e CO₂) Attivare il free cooling e/o heating con il parametro 170 Set parameters of free cooling and/or heating from 171 to 178 (see <u>"35. Configuration of installer parameters (level 2 password)" page 121</u>) 023=5 (input AI3 0..10V CO₂) Set regulation parameters from 157 to 159 (setpoint, proportional band and integral time CO₂)</p>
	<p>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.</p>
Bypass for heat exchanger	<p>it is regulated based on free cooling and/or free heating and on cooling/heating request</p> <p>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).</p>

(*) 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 $\varnothing 10=3$ (modulating damper) or $\varnothing 10=4$ (modulating bypass damper for heat exchanger). Select the minimum opening position (parameter 154) and the maximum opening position (parameter 155) of the damper. Select the regulation type of damper $\varnothing 11=1$ (control based on the cooling/heating request with free cooling/heating conditions). Define which analogue output is the modulating damper: $\varnothing 30=9$ (AO1) or $\varnothing 31=9$ (AO2) or $\varnothing 32=9$ (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 CO₂

In rooms where a lot of people are present, it is necessary to regulate the air quality to ensure fresh air when the CO₂ 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 $\varnothing 23=5$ (AI3 input for 0..10 V CO₂ input) and position the JP1 jumper in the “3-2” position. The input sensor AI3 is automatically configured as input 0..10 V for CO₂, and the corresponding scale is set at 0..2000 ppm ($\varnothing 25=0$ and $\varnothing 27=2000$) with the unit of measurement ppm ($\varnothing 28=0$).

Select the type of modulating damper $\varnothing 10=3$ (modulating damper).

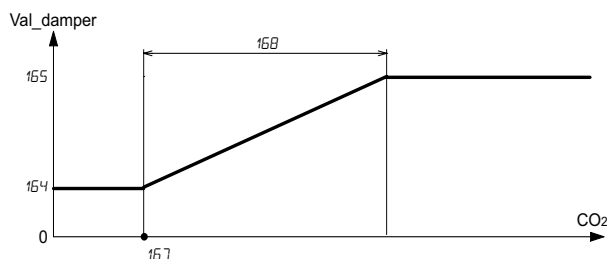
Select the minimum opening position (parameter 154) and the maximum opening position (parameter 155) of the damper.

Select the type of damper regulation $\varnothing 11=0$ (regulation based on CO₂).

Define which analogue output is the modulating damper: $\varnothing 30=9$ (AO1) or $\varnothing 31=9$ (AO2) or $\varnothing 32=9$ (AO3).

Define the parameters of the PI controller for the reduction of the CO₂ concentration (157 : setpoint, 158 : proportional band, 159 : 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



154: minimum modulating damper opening

155: maximum modulating damper opening

157: air exchange setpoint

158: air exchange proportional band

The percentage output of the PI controller is applied between the minimum and maximum opening positions of the damper 154 and 155 .

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 CO₂

The regulation corresponds to paragraph [“Regulation of modulating damper based on CO₂” page 82](#) for CO₂ 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 $\varnothing 23=5$ (AI3 input for 0..10 V CO₂ input) and position the JP1 jumper in the “3-2” position. The input sensor AI3 is automatically configured as input 0..10 V for CO₂, and the corresponding scale is set at 0..2000 ppm ($\varnothing 25=0$ and $\varnothing 27=2000$) with the unit of measurement ppm ($\varnothing 28=0$).

Select the type of modulating damper $\varnothing 10=3$ (modulating damper).

Select the minimum opening position (parameter 154) and the maximum opening position (parameter 155) of the damper.

Select the type of damper regulation $\varnothing 11=2$ (regulation based on free cooling/heating and CO₂).

Define which analogue output is the modulating damper: $\varnothing 30=9$ (AO1) or $\varnothing 31=9$ (AO2) or $\varnothing 32=9$ (AO3).

Define the parameters of the PI controller for the reduction of the CO₂ concentration (157 : setpoint, 158 : proportional band, 159 : 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. (205=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),

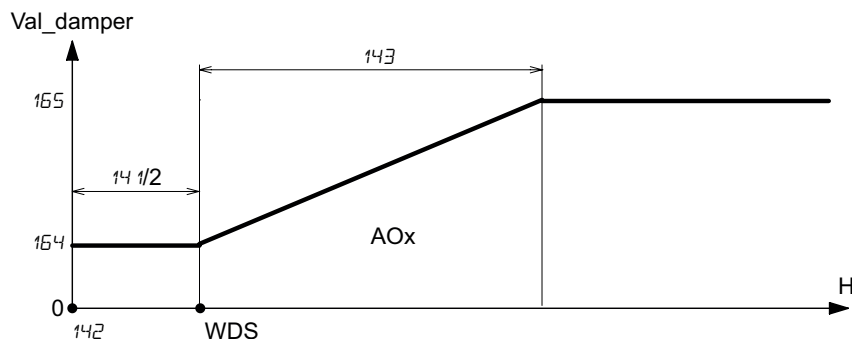
select the minimum opening position (parameter 154) and the maximum opening position (parameter 155) of the damper,

select the type of damper control 011=3 (control based on dehumidification),

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

154: minimum modulating damper opening



155: 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 154 and 155.

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 $\varnothing 12$ the selection can be done:

For cross-flow heat exchanger set $\varnothing 12=1$.

For double battery heat exchanger set $\varnothing 12=2$.

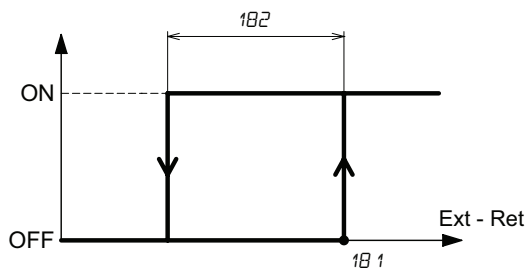
For on/off rotary heat exchanger set $\varnothing 12=3$.

For modulating rotary heat exchanger set $\varnothing 12=4$.

For no heat exchanger set $\varnothing 12=0$.

• 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

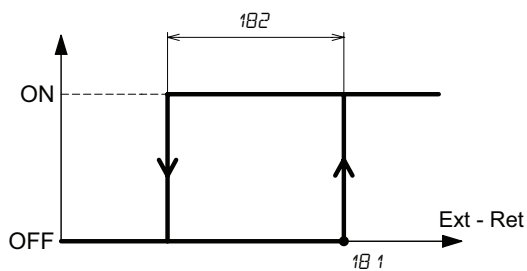
1B1: setpoint of heat exchanger

1B2: differential of heat exchanger

If $Ret - Ext > \text{heat exchanger setpoint } 1B1$, the heat exchanger is authorized to run if necessary.

If $Ret - Ext \leq (\text{heat exchanger setpoint } 1B1 - \text{heat exchanger differential } 1B2)$ 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

1B1: setpoint del recuperatore

1B2: differenziale del recuperatore

If $Ext - Ret > \text{heat exchanger setpoint } 1B1$, the heat exchanger is authorized to run if necessary.

If $Ext - Ret \leq (\text{heat exchanger setpoint } 1B1 - \text{heat exchanger differential } 1B2)$ 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	<p>Activation:</p> <ul style="list-style-type: none"> - 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 (*) <p>Parameter setting and operating:</p> <p>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 parameter 170. 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 <u>"35. Configuration of installer parameters (level 2 password)" page 121</u>) For operating mode of Bypass damper see paragraph <u>"21. Regulation with free cooling, free heating" page 53</u></p>
On/off (based on free cooling/heating only)	<p>Activation:</p> <ul style="list-style-type: none"> - 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 (*) <p>Parameter setting and operating:</p> <p>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 parameter 170. 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 <u>"35. Configuration of installer parameters (level 2 password)" page 121</u>) For operating of bypass see paragraph <u>"Operation with on/off bypass damper for cross-flow heat exchanger" page 53</u></p>
Modulating	<p>Activation:</p> <ul style="list-style-type: none"> - 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 (*) <p>Parameter setting and operating:</p> <p>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 parameter 170. 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 <u>"35. Configuration of installer parameters (level 2 password)" page 121</u>) For operating mode of Bypass damper see paragraph <u>"21. Regulation with free cooling, free heating" page 53</u></p>

(*) 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 $1B5=1$)

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:

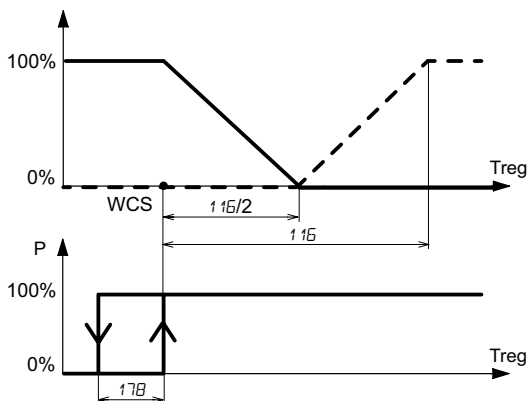
- set type of heat exchanger $\varnothing 12=2$,
- select a digital output for the pump $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\varnothing 10=4$, $\varnothing 11=1$, $\varnothing 30=13$ (AO1) or $\varnothing 31=13$ (AO2) or $\varnothing 32=13$ (AO3).

- modulating cooling valve $\varnothing 03=1$ and $\varnothing 30=4$ (AO1) or $\varnothing 31=4$ (AO2) or $\varnothing 32=4$ (AO3)

- or modulating mixed-use cooling valve $\varnothing 02=2$ $\varnothing 03=1$ and $\varnothing 30=5$ (AO1) or $\varnothing 31=5$ (AO2) or $\varnothing 32=5$ (AO3).



Treg: control temperature

WCS: cooling operation setpoint

115: 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 (parameter 165) to the minimum opening position (parameter 164) in the band defined by 115/2. The cooling valve goes from closed position to open position when Treg changes from (WCS + 115/2) to (WCS + 115).

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:

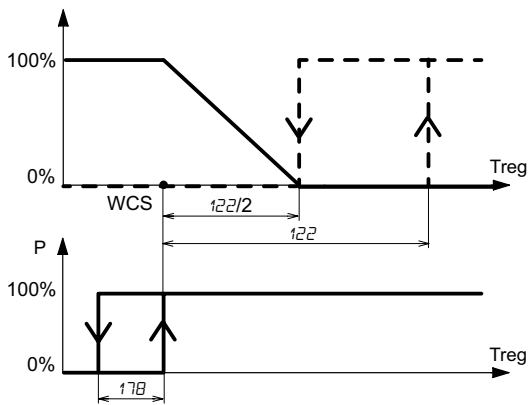
- set type of heat exchanger $\varnothing 12=2$,
- select a digital output for the pump $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\varnothing 10=4$, $\varnothing 11=1$, $\varnothing 30=13$ (AO1) or $\varnothing 31=13$ (AO2) or $\varnothing 32=13$ (AO3).

- on/off cooling valve $\varnothing 03=2$ and $\varnothing 25=5$ (DO1) or $\varnothing 26=5$ (DO2) or $\varnothing 27=5$ (DO3) or $\varnothing 28=5$ (DO4) or $\varnothing 29=5$ (DO5),

- or on/off mixed-use valve in cooling $\varnothing 02=4$, $\varnothing 03=2$ and $\varnothing 25=6$ (DO1) or $\varnothing 26=6$ (DO2) or $\varnothing 27=6$ (DO3) or $\varnothing 28=6$ (DO4) or $\varnothing 29=6$ (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 (parameter 155) to the minimum opening position (parameter 154) in the band defined by 122/2. The cooling valve is activated if $Treg > (WCS + 122)$ and deactivated if $Treg \leq (WCS + 122/2)$. The pump is deactivated if $Treg \leq (WCS - 178)$. The icon ❄️ is switched off.

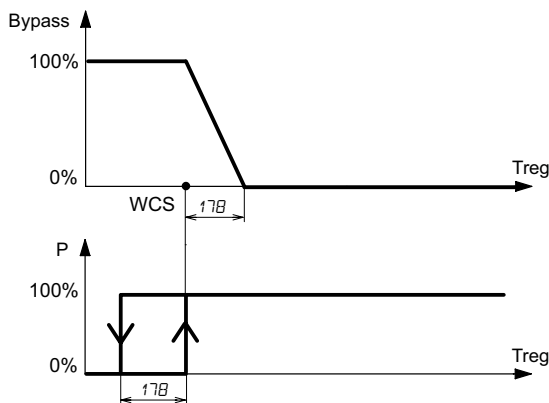
Operation with modulating bypass heat exchanger without cooling valve:

Do following settings:

- set type of heat exchanger $\emptyset 12=2$,
- select a digital output for the pump $\emptyset 25=14$ (DO1) or $\emptyset 26=14$ (DO2) or $\emptyset 27=14$ (DO3) or $\emptyset 28=14$ (DO4) or $\emptyset 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\emptyset \emptyset 1=0$;
- define the return air sensor $\emptyset 19=1$ (AI1) or $\emptyset 21=1$ (AI2) or $\emptyset 23=1$ (AI3)
- define external sensor $\emptyset 19=3$ (AI1) or $\emptyset 21=3$ (AI2) or $\emptyset 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\emptyset 10=4$, $\emptyset 11=1$, $\emptyset 30=13$ (AO1) or $\emptyset 31=13$ (AO2) or $\emptyset 32=13$ (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 (parameter 155) to the minimum opening position (parameter 154) in the band defined by 178.

The pump is deactivated if $Treg \leq (WCS - 178)$. The icon ❄️ is switched off.

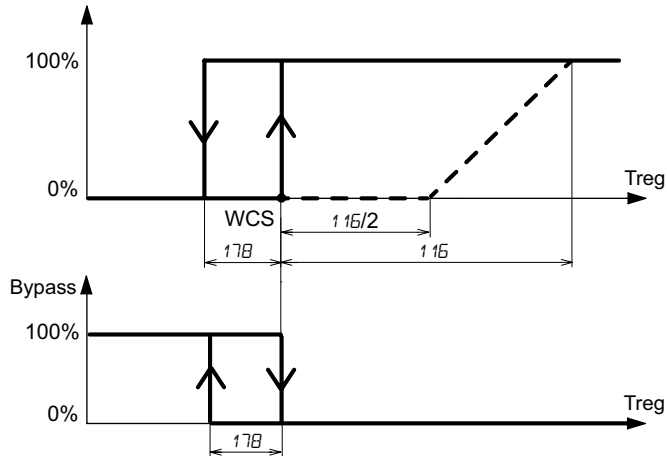
Operation with on/off bypass heat exchanger and cooling modulating valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=2$,
- select a digital output for the pump $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\varnothing 10=2$, $\varnothing 11=1$, $\varnothing 25=13$ (DO1) or $\varnothing 26=13$ (DO2) or $\varnothing 27=13$ (DO3) or $\varnothing 28=13$ (DO4) or $\varnothing 29=13$ (DO5),
- modulating cooling valve $\varnothing 03=1$ and $\varnothing 04=4$ (AO1) or $\varnothing 03=4$ (AO2) or $\varnothing 04=5$ (AO3)
- or modulating mixed-use cooling valve $\varnothing 02=2$ $\varnothing 03=1$ and $\varnothing 04=5$ (AO1) or $\varnothing 03=5$ (AO2) or $\varnothing 04=5$ (AO3).



Treg: control temperature

WCS: cooling operation setpoint

115: 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 $(WCS + 115/2)$ to $(WCS + 115)$.

The pump is deactivated and the bypass damper activated if $Treg \leq (WCS - 178)$. The icon ❄️ is switched off.

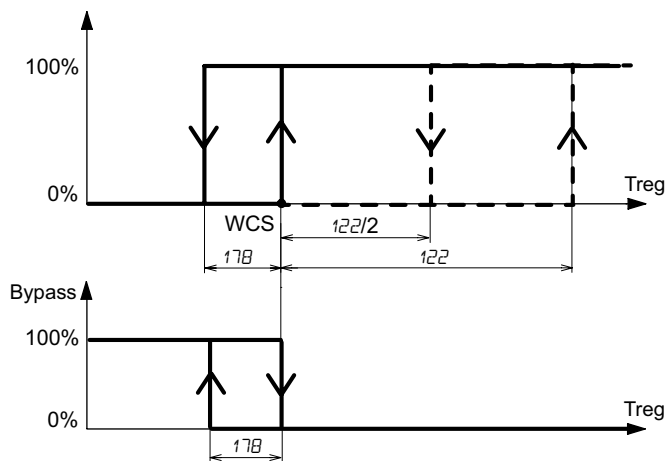
Operation with on/off bypass heat exchanger and on/off cooling valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=2$,
- select a digital output for the pump $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\varnothing 10=2$, $\varnothing 11=1$, $\varnothing 25=13$ (DO1) or $\varnothing 26=13$ (DO2) or $\varnothing 27=13$ (DO3) or $\varnothing 28=13$ (DO4) or $\varnothing 29=13$ (DO5),
- on/off cooling valve $\varnothing 03=2$ and $\varnothing 25=5$ (DO1) or $\varnothing 26=5$ (DO2) or $\varnothing 27=5$ (DO3) or $\varnothing 28=5$ (DO4) or $\varnothing 29=5$ (DO5),
- or on/off mixed-use valve in cooling $\varnothing 02=4$, $\varnothing 03=2$ and $\varnothing 25=6$ (DO1) or $\varnothing 26=6$ (DO2) or $\varnothing 27=6$ (DO3) or $\varnothing 28=6$ (DO4) or $\varnothing 29=6$ (DO5).



Treg: control temperature
WCS: cooling operation setpoint
122: hysteresis for on/off output
17B: 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 $T_{reg} > (WCS + 122)$ and deactivated if $T_{reg} \leq (WCS + 122/2)$. The pump is deactivated and the bypass damper activated if $T_{reg} \leq (WCS - 17B)$. The icon ❄️ is switched off.

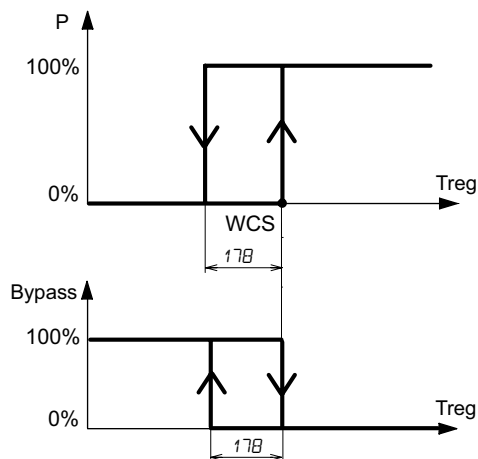
Operation with on/off bypass heat exchanger without cooling valve:

Do following settings:

- set type of heat exchanger $\emptyset 12=2$,
- select a digital output for the pump $\emptyset 25=14$ (DO1) or $\emptyset 26=14$ (DO2) or $\emptyset 27=14$ (DO3) or $\emptyset 28=14$ (DO4) or $\emptyset 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\emptyset 1=0$;
- define the return air sensor $\emptyset 19=1$ (AI1) or $\emptyset 21=1$ (AI2) or $\emptyset 23=1$ (AI3)
- define external sensor $\emptyset 19=3$ (AI1) or $\emptyset 21=3$ (AI2) or $\emptyset 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\emptyset 10=2$, $\emptyset 11=1$, $\emptyset 25=13$ (DO1) or $\emptyset 26=13$ (DO2) or $\emptyset 27=13$ (DO3) or $\emptyset 28=13$ (DO4) or $\emptyset 29=13$ (DO5).



Treg: control temperature
WCS: cooling operation setpoint
17B: 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 $T_{reg} \leq (WCS - 17B)$. The icon ❄️ is switched off.

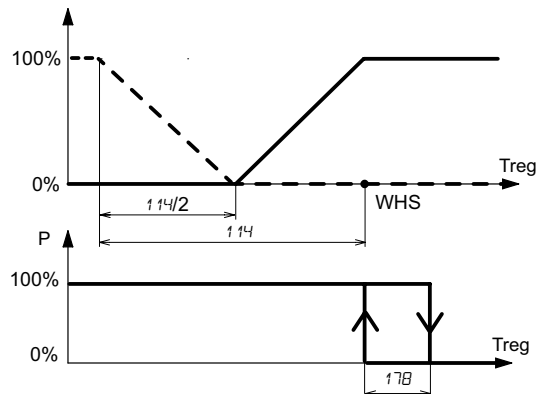
Operation with modulating bypass heat exchanger and modulating heating valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=2$,
- select a digital output for the pump $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\varnothing 10=4$, $\varnothing 11=1$, $\varnothing 30=13$ (AO1) or $\varnothing 31=13$ (AO2) or $\varnothing 32=13$ (AO3),
- modulating heating valve $\varnothing 02=2$ and $\varnothing 30=3$ (AO1) or $\varnothing 31=3$ (AO2) or $\varnothing 32=3$ (AO3)
- or modulating mixed-use valve in heating $\varnothing 02=2$ $\varnothing 03=1$ and $\varnothing 30=5$ (AO1) or $\varnothing 31=5$ (AO2) or $\varnothing 32=5$ (AO3)
- or modulating electrical resistance $\varnothing 02=1$ and $\varnothing 30=6$ (AO1) or $\varnothing 31=6$ (AO2) or $\varnothing 32=6$ (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 (parameter 155) to the minimum opening position (parameter 154) 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 $Treg \geq (WHS + 178)$. The icon  is switched off.

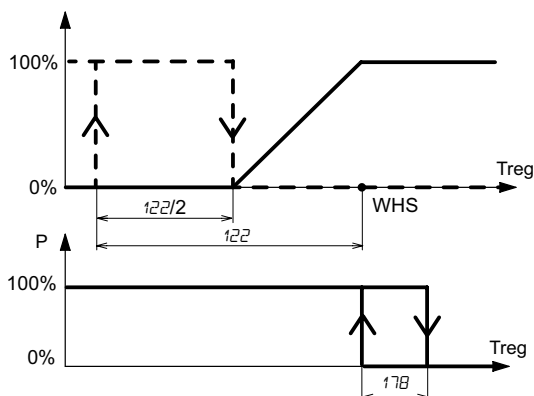
Operation with modulating bypass heat exchanger and on/off heating valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=2$,
- select a digital output for the pump $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\varnothing 10=4$, $\varnothing 11=1$, $\varnothing 30=13$ (AO1) or $\varnothing 31=13$ (AO2) or $\varnothing 32=13$ (AO3),
- heating valve on/off $\varnothing 02=4$ and $\varnothing 25=4$ (DO1) or $\varnothing 26=4$ (DO2) or $\varnothing 27=4$ (DO3) or $\varnothing 28=4$ (DO4) or $\varnothing 29=4$ (DO5)
- or electrical resistance on/off $\varnothing 02=3$ and $\varnothing 25=7$ (DO1) or $\varnothing 26=7$ (DO2) or $\varnothing 27=7$ (DO3) or $\varnothing 28=7$ (DO4) or $\varnothing 29=7$ (DO5)
- or on/off mixed-use valve in heating $\varnothing 02=4$, $\varnothing 03=2$ and $\varnothing 25=6$ (DO1) or $\varnothing 26=6$ (DO2) or $\varnothing 27=6$ (DO3) or $\varnothing 28=6$ (DO4) or $\varnothing 29=6$ (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 (parameter 155) to the minimum opening position (parameter 154) in the band defined by 122/2. The heating valve is activated when $T_{reg} < (WHS - 122)$ and deactivated when $T_{reg} > (WHS - 122)$. The pump is deactivated if $T_{reg} > (WHS + 178)$. The icon  is switched off.

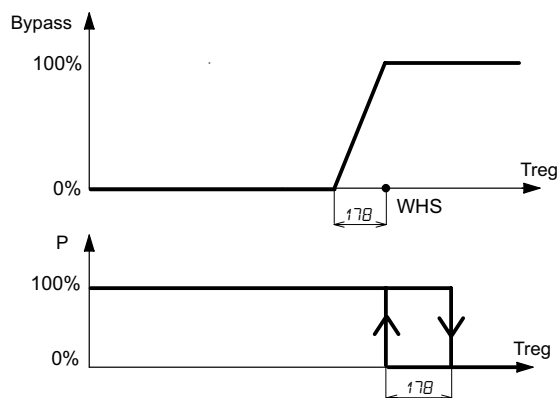
Operation with modulating bypass heat exchanger without heating valve:

Do following settings:

- set type of heat exchanger $\emptyset 12=2$,
- select a digital output for the pump $\emptyset 25=14$ (DO1) or $\emptyset 26=14$ (DO2) or $\emptyset 27=14$ (DO3) or $\emptyset 28=14$ (DO4) or $\emptyset 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\emptyset \emptyset 1=0$;
- define the return air sensor $\emptyset 19=1$ (AI1) or $\emptyset 21=1$ (AI2) or $\emptyset 23=1$ (AI3)
- define external sensor $\emptyset 19=3$ (AI1) or $\emptyset 21=3$ (AI2) or $\emptyset 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\emptyset 10=4$, $\emptyset 11=1$, $\emptyset 30=13$ (AO1) or $\emptyset 31=13$ (AO2) or $\emptyset 32=13$ (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 (parameter 155) to the minimum opening position (parameter 154) in the band defined by 178.

The pump is deactivated if $T_{reg} > (WHS + 178)$. The icon  is switched off.

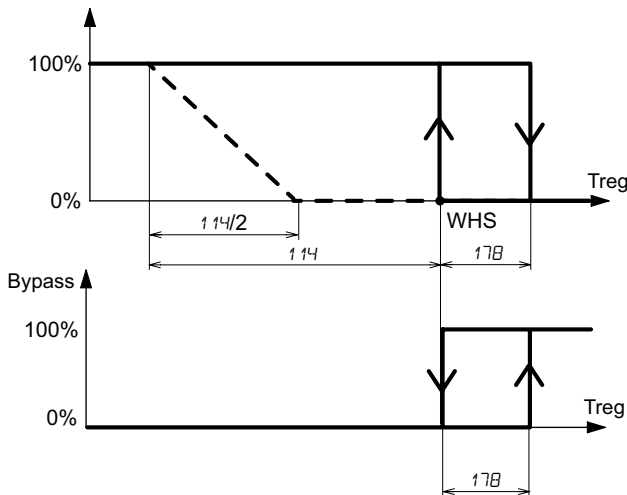
Operation with on/off bypass heat exchanger and heating modulating valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=2$,
- select a digital output for the pump $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\varnothing 10=2$, $\varnothing 11=1$, $\varnothing 25=13$ (DO1) or $\varnothing 26=13$ (DO2) or $\varnothing 27=13$ (DO3) or $\varnothing 28=13$ (DO4) or $\varnothing 29=13$ (DO5),
- modulating heating valve $\varnothing 02=2$ and $\varnothing 30=3$ (AO1) or $\varnothing 31=3$ (AO2) or $\varnothing 32=3$ (AO3)
- or modulating mixed-use valve in heating $\varnothing 02=2$ $\varnothing 03=1$ and $\varnothing 30=5$ (AO1) or $\varnothing 31=5$ (AO2) or $\varnothing 32=5$ (AO3)
- or modulating electrical resistance $\varnothing 02=1$ and $\varnothing 30=6$ (AO1) or $\varnothing 31=6$ (AO2) or $\varnothing 32=6$ (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.

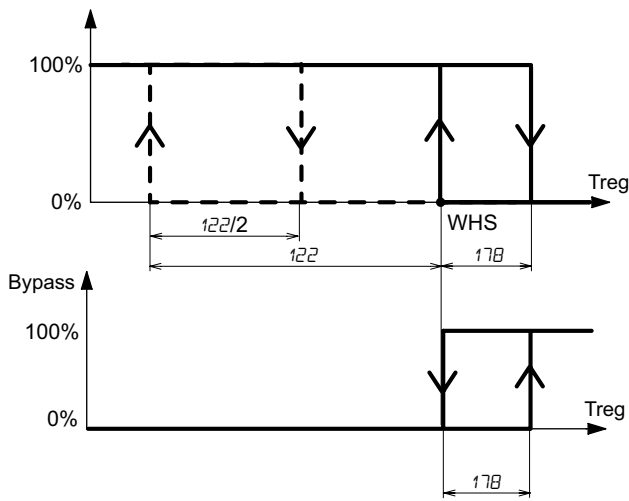
Operation with on/off bypass heat exchanger and heating on/off valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=2$,
- select a digital output for the pump $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\varnothing 10=2$, $\varnothing 11=1$, $\varnothing 25=13$ (DO1) or $\varnothing 26=13$ (DO2) or $\varnothing 27=13$ (DO3) or $\varnothing 28=13$ (DO4) or $\varnothing 29=13$ (DO5),
- heating valve on/off $\varnothing 02=4$ and $\varnothing 25=4$ (DO1) or $\varnothing 26=4$ (DO2) or $\varnothing 27=4$ (DO3) or $\varnothing 28=4$ (DO4) or $\varnothing 29=4$ (DO5)
- or electrical resistance on/off $\varnothing 02=3$ and $\varnothing 25=7$ (DO1) or $\varnothing 26=7$ (DO2) or $\varnothing 27=7$ (DO3) or $\varnothing 28=7$ (DO4) or $\varnothing 29=7$ (DO5)
- or on/off mixed-use valve in heating $\varnothing 02=4$, $\varnothing 03=2$ and $\varnothing 25=6$ (DO1) or $\varnothing 26=6$ (DO2) or $\varnothing 27=6$ (DO3) or $\varnothing 28=6$ (DO4) or $\varnothing 29=6$ (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 $Treg \geq (WHS - 122/2)$.

The pump is deactivated and bypass activated if $Treg \geq (WHS + 178)$. The icon is switched off.

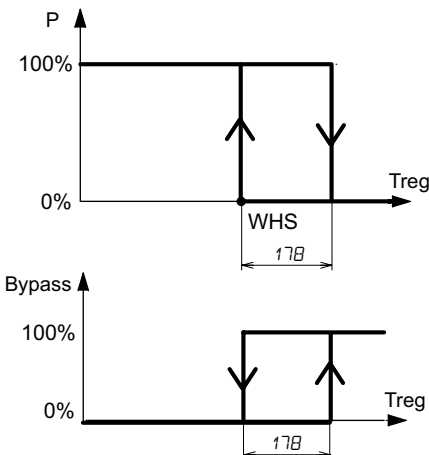
Operation with on/off bypass heat exchanger without heating valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=2$,
- select a digital output for the pump $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\varnothing 10=2$, $\varnothing 11=1$, $\varnothing 25=13$ (DO1) or $\varnothing 26=13$ (DO2) or $\varnothing 27=13$ (DO3) or $\varnothing 28=13$ (DO4) or $\varnothing 29=13$ (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 $Treg \geq (WHS + 178)$. 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:

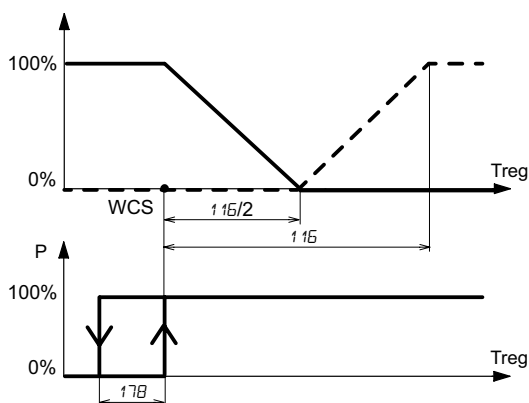
- set type of heat exchanger $\text{012}=3$,
- select a digital output for the rotary on/off heat exchanger $\text{025}=14$ (DO1) or $\text{026}=14$ (DO2) or $\text{027}=14$ (DO3) or $\text{028}=14$ (DO4) or $\text{029}=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\text{001}=0$;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

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\text{010}=4$, $\text{011}=1$, $\text{030}=13$ (AO1) or $\text{031}=13$ (AO2) or $\text{032}=13$ (AO3).

- modulating cooling valve $\text{003}=1$ and $\text{030}=4$ (AO1) or $\text{031}=4$ (AO2) or $\text{032}=4$ (AO3)

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



Treg: control temperature

WCS: cooling operation setpoint

115: 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 (parameter 155) to the minimum opening position (parameter 154) in the band defined by 115/2. The cooling valve goes from closed position to open position when Treg changes from (WCS + 115/2) to (WCS + 115).

The rotary on/off heat exchanger is deactivated if $Treg \leq (WCS - 178)$. The icon ❄️ is switched off.

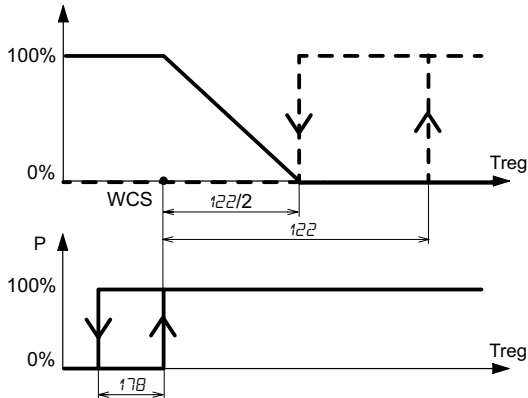
Operation with modulating bypass heat exchanger and on/off cooling valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=3$,
- select a digital output for the rotary on/off heat exchanger $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\varnothing 10=4$, $\varnothing 11=1$, $\varnothing 30=13$ (AO1) or $\varnothing 31=13$ (AO2) or $\varnothing 32=13$ (AO3).
- on/off cooling valve $\varnothing 03=2$ and $\varnothing 25=5$ (DO1) or $\varnothing 26=5$ (DO2) or $\varnothing 27=5$ (DO3) or $\varnothing 28=5$ (DO4) or $\varnothing 29=5$ (DO5), or on/off mixed-use valve in cooling $\varnothing 02=4$, $\varnothing 03=2$ and $\varnothing 25=6$ (DO1) or $\varnothing 26=6$ (DO2) or $\varnothing 27=6$ (DO3) or $\varnothing 28=6$ (DO4) or $\varnothing 29=6$ (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 (parameter 165) 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 $Treg \leq (WCS + 122/2)$.

The rotary on/off heat exchanger is deactivated if $Treg \leq (WCS - 178)$. The icon  is switched off.

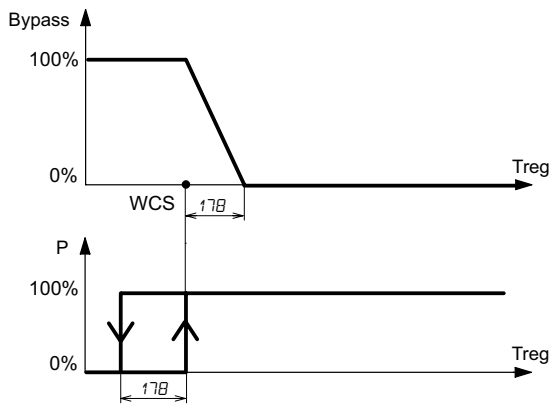
Operation with modulating bypass heat exchanger without cooling valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=3$,
- select a digital output for the rotary on/off heat exchanger $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\varnothing 10=4$, $\varnothing 11=1$, $\varnothing 30=13$ (AO1) or $\varnothing 31=13$ (AO2) or $\varnothing 32=13$ (AO3).



Treg: control temperature
WCS: cooling operation setpoint
17B: 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 (parameter 155) to the minimum opening position (parameter 154) in the band defined by 17B.

The rotary on/off heat exchanger is deactivated if $Treg \leq (WCS - 17B)$. The icon ❄️ is switched off.

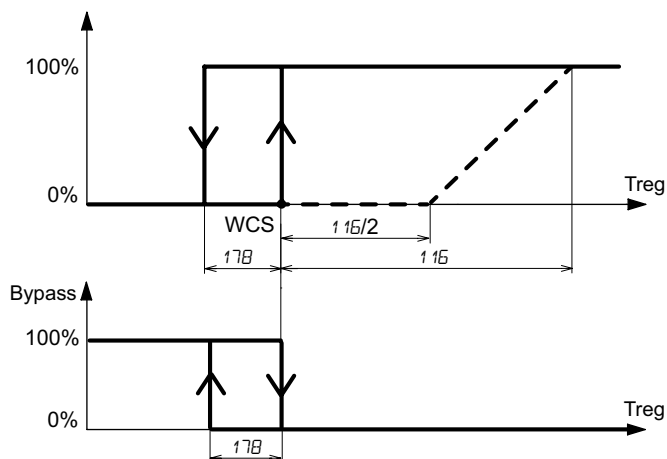
Operation with on/off bypass heat exchanger and cooling modulating valve:

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
115: cooling proportional band
17B: 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 $(WCS + 115/2)$ to $(WCS + 115)$.

The rotary on/off heat exchanger is deactivated and the bypass damper activated if $Treg \leq (WCS - 178)$. The icon ❄️ is switched off.

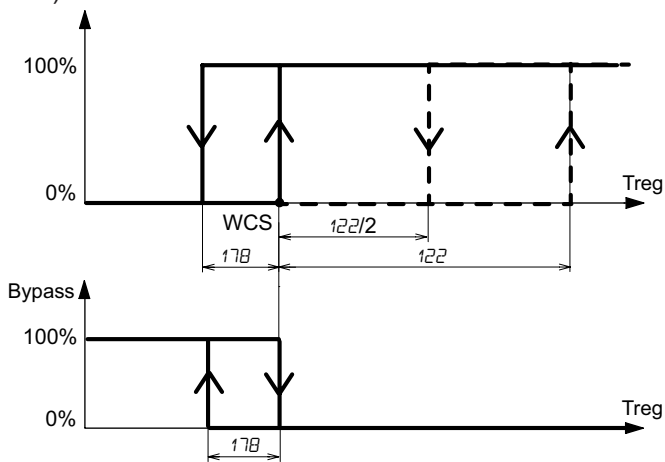
Operation with on/off bypass heat exchanger and on/off cooling valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=3$,
- select a digital output for the rotary on/off heat exchanger $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\varnothing 10=2$, $\varnothing 11=1$, $\varnothing 25=13$ (DO1) or $\varnothing 26=13$ (DO2) or $\varnothing 27=13$ (DO3) or $\varnothing 28=13$ (DO4) or $\varnothing 29=13$ (DO5),
- on/off cooling valve $\varnothing 03=2$ and $\varnothing 25=5$ (DO1) or $\varnothing 26=5$ (DO2) or $\varnothing 27=5$ (DO3) or $\varnothing 28=5$ (DO4) or $\varnothing 29=5$ (DO5),
- or on/off mixed-use valve in cooling $\varnothing 02=4$, $\varnothing 03=2$ and $\varnothing 25=6$ (DO1) or $\varnothing 26=6$ (DO2) or $\varnothing 27=6$ (DO3) or $\varnothing 28=6$ (DO4) or $\varnothing 29=6$ (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 $Treg \leq (WCS + 122/2)$

The rotary on/off heat exchanger is deactivated and the bypass damper activated if $Treg \leq (WCS - 178)$. The icon ❄️ is switched off.

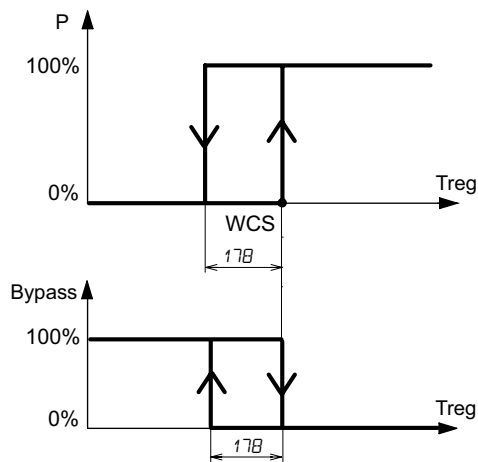
Operation with on/off bypass heat exchanger without cooling valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=3$,
- select a digital output for the rotary on/off heat exchanger $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 1=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\varnothing 10=2$, $\varnothing 11=1$, $\varnothing 25=13$ (DO1) or $\varnothing 26=13$ (DO2) or $\varnothing 27=13$ (DO3) or $\varnothing 28=13$ (DO4) or $\varnothing 29=13$ (DO5).



Treg: control temperature
WCS: cooling operation setpoint
17B: 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 $T_{reg} \leq (WCS - 17B)$. The icon ❄️ is switched off.

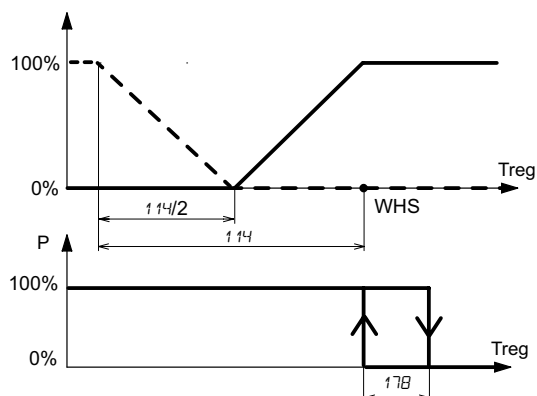
Operation with modulating bypass heat exchanger and modulating heating valve:

Do following settings:

- set type of heat exchanger $\emptyset 12=3$,
- select a digital output for the rotary on/off heat exchanger $\emptyset 25=14$ (DO1) or $\emptyset 26=14$ (DO2) or $\emptyset 27=14$ (DO3) or $\emptyset 28=14$ (DO4) or $\emptyset 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\emptyset 01=0$;
- define the return air sensor $\emptyset 19=1$ (AI1) or $\emptyset 21=1$ (AI2) or $\emptyset 23=1$ (AI3)
- define external sensor $\emptyset 19=3$ (AI1) or $\emptyset 21=3$ (AI2) or $\emptyset 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\emptyset 10=4$, $\emptyset 11=1$, $\emptyset 30=13$ (AO1) or $\emptyset 31=13$ (AO2) or $\emptyset 32=13$ (AO3),
- modulating heating valve $\emptyset 02=2$ and $\emptyset 30=3$ (AO1) or $\emptyset 31=3$ (AO2) or $\emptyset 32=3$ (AO3)
- or modulating mixed-use valve in heating $\emptyset 02=2$ $\emptyset 03=1$ and $\emptyset 30=5$ (AO1) or $\emptyset 31=5$ (AO2) or $\emptyset 32=5$ (AO3)
- or modulating electrical resistance $\emptyset 02=1$ and $\emptyset 30=6$ (AO1) or $\emptyset 31=6$ (AO2) or $\emptyset 32=6$ (AO3)



Treg: control temperature
WHS: heating operation setpoint
114: heating proportional band
17B: 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 (parameter 155) to the minimum opening posi-

tion (parameter 154) 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 $T_{reg} \geq (WHS + 178)$. The icon  is switched off.

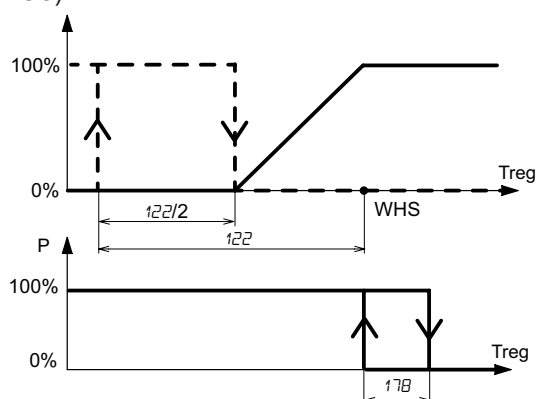
Operation with modulating bypass heat exchanger and on/off heating valve:

Do following settings:

- set type of heat exchanger $\emptyset 12=3$,
- select a digital output for the rotary on/off heat exchanger $\emptyset 25=14$ (DO1) or $\emptyset 26=14$ (DO2) or $\emptyset 27=14$ (DO3) or $\emptyset 28=14$ (DO4) or $\emptyset 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\emptyset 1=0$;
- define the return air sensor $\emptyset 19=1$ (AI1) or $\emptyset 21=1$ (AI2) or $\emptyset 23=1$ (AI3)
- define external sensor $\emptyset 19=3$ (AI1) or $\emptyset 21=3$ (AI2) or $\emptyset 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\emptyset 10=4$, $\emptyset 11=1$, $\emptyset 30=13$ (AO1) or $\emptyset 31=13$ (AO2) or $\emptyset 32=13$ (AO3),
- heating valve on/off $\emptyset 02=4$ and $\emptyset 25=4$ (DO1) or $\emptyset 26=4$ (DO2) or $\emptyset 27=4$ (DO3) or $\emptyset 28=4$ (DO4) or $\emptyset 29=4$ (DO5) or electrical resistance on/off $\emptyset 02=3$ and $\emptyset 25=7$ (DO1) or $\emptyset 26=7$ (DO2) or $\emptyset 27=7$ (DO3) or $\emptyset 28=7$ (DO4) or $\emptyset 29=7$ (DO5) or on/off mixed-use valve in heating $\emptyset 02=4$, $\emptyset 03=2$ and $\emptyset 25=6$ (DO1) or $\emptyset 26=6$ (DO2) or $\emptyset 27=6$ (DO3) or $\emptyset 28=6$ (DO4) or $\emptyset 29=6$ (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 (parameter 155) to the minimum opening position (parameter 154) in the band defined by 122/2. The heating valve is activated when $T_{reg} < (WHS - 122)$ and deactivated when $T_{reg} \geq (WHS - 122/2)$.

The rotary on/off heat exchanger is deactivated if $T_{reg} \geq (WHS + 178)$. The icon  is switched off.

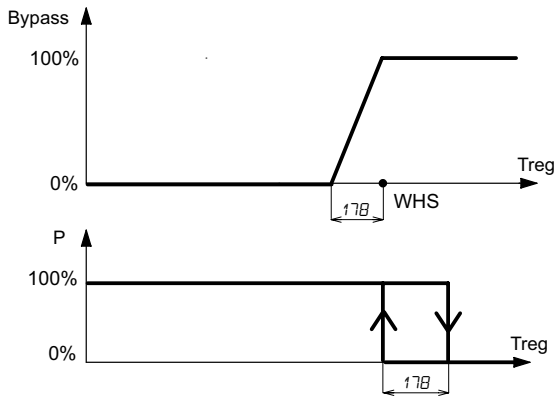
Operation with modulating bypass heat exchanger without heating valve:

Do following settings:

- set type of heat exchanger $\emptyset 12=3$,
- select a digital output for the rotary on/off heat exchanger $\emptyset 25=14$ (DO1) or $\emptyset 26=14$ (DO2) or $\emptyset 27=14$ (DO3) or $\emptyset 28=14$ (DO4) or $\emptyset 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\emptyset 1=0$;
- define the return air sensor $\emptyset 19=1$ (AI1) or $\emptyset 21=1$ (AI2) or $\emptyset 23=1$ (AI3)
- define external sensor $\emptyset 19=3$ (AI1) or $\emptyset 21=3$ (AI2) or $\emptyset 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- Modulating bypass damper for heat exchanger $\emptyset 10=4$, $\emptyset 11=1$, $\emptyset 30=13$ (AO1) or $\emptyset 31=13$ (AO2) or $\emptyset 32=13$ (AO3),



Treg: control temperature


WHS: heating operation setpoint


17B: 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 (parameter 155) to the minimum opening position (parameter 154) in the band defined by 17B.

The rotary on/off heat exchanger is deactivated if $T_{reg} \geq (WHS + 17B)$. The icon  is switched off.

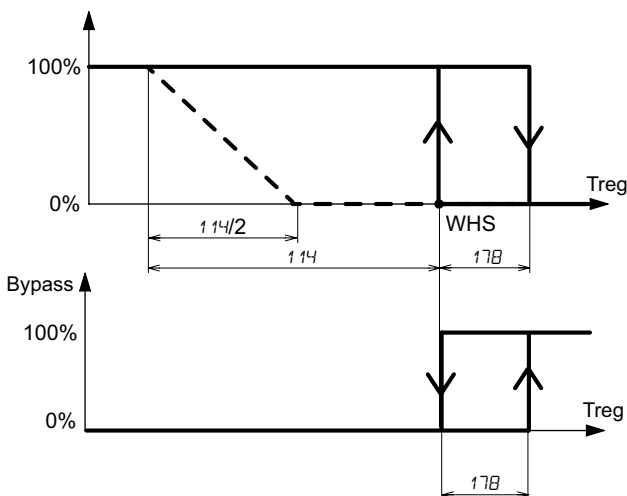
Operation with on/off bypass heat exchanger and heating modulating valve:

Do following settings:

- set type of heat exchanger $\varnothing 12=3$,
- select a digital output for the rotary on/off heat exchanger $\varnothing 25=14$ (DO1) or $\varnothing 26=14$ (DO2) or $\varnothing 27=14$ (DO3) or $\varnothing 28=14$ (DO4) or $\varnothing 29=14$ (DO5)
- do the regulation on room sensor (internal or remote sensor) $\varnothing 01=0$;
- define the return air sensor $\varnothing 19=1$ (AI1) or $\varnothing 21=1$ (AI2) or $\varnothing 23=1$ (AI3)
- define external sensor $\varnothing 19=3$ (AI1) or $\varnothing 21=3$ (AI2) or $\varnothing 23=3$ (AI3).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\varnothing 10=2$, $\varnothing 11=1$, $\varnothing 25=13$ (DO1) or $\varnothing 26=13$ (DO2) or $\varnothing 27=13$ (DO3) or $\varnothing 28=13$ (DO4) or $\varnothing 29=13$ (DO5),
- modulating heating valve $\varnothing 02=2$ and $\varnothing 30=3$ (AO1) or $\varnothing 31=3$ (AO2) or $\varnothing 32=3$ (AO3)
- or modulating mixed-use valve in heating $\varnothing 02=2$ $\varnothing 03=1$ and $\varnothing 30=5$ (AO1) or $\varnothing 31=5$ (AO2) or $\varnothing 32=5$ (AO3)
- or modulating electrical resistance $\varnothing 02=1$ and $\varnothing 30=6$ (AO1) or $\varnothing 31=6$ (AO2) or $\varnothing 32=6$ (AO3)



Treg: control temperature

WHS: heating operation setpoint

114: heating proportional band


17B: 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.

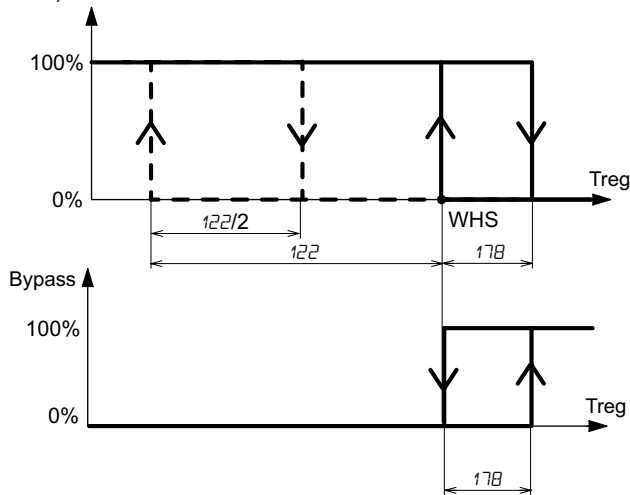
Operation with on/off bypass heat exchanger and heating on/off valve:

Do following settings:

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

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\text{010}=2$, $\text{011}=1$, $\text{025}=13$ (DO1) or $\text{026}=13$ (DO2) or $\text{027}=13$ (DO3) or $\text{028}=13$ (DO4) or $\text{029}=13$ (DO5),
- heating valve on/off $\text{002}=4$ and $\text{025}=4$ (DO1) or $\text{026}=4$ (DO2) or $\text{027}=4$ (DO3) or $\text{028}=4$ (DO4) or $\text{029}=4$ (DO5) or electrical resistance on/off $\text{002}=3$ and $\text{025}=7$ (DO1) or $\text{026}=7$ (DO2) or $\text{027}=7$ (DO3) or $\text{028}=7$ (DO4) or $\text{029}=7$ (DO5) or on/off mixed-use valve in heating $\text{002}=4$, $\text{003}=2$ and $\text{025}=6$ (DO1) or $\text{026}=6$ (DO2) or $\text{027}=6$ (DO3) or $\text{028}=6$ (DO4) or $\text{029}=6$ (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.

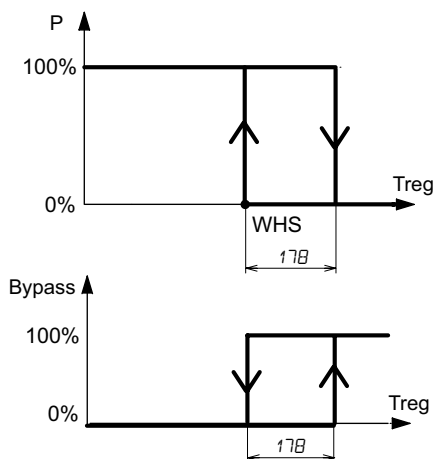
Operation with on/off bypass heat exchanger without heating valve:

Do following settings:

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


If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.


- On/off bypass damper for heat exchanger $\text{010}=2$, $\text{011}=1$, $\text{025}=13$ (DO1) or $\text{026}=13$ (DO2) or $\text{027}=13$ (DO3) or $\text{028}=13$ (DO4) or $\text{029}=13$ (DO5)



Treg: control temperature
WHS: heating operation setpoint
17B: 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 $Treg \geq (WHS + 17B)$. 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 $1B5 \neq 1$ and 3, on/off bypass is forced to OFF, modulating bypass is forced to minimum opening position defined by parameter $1B4$.

If parameter $1B5=1$ or 3, on/off bypass is forced to ON, modulating bypass is forced to maximum opening position defined by parameter $1B5$.

• 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 $1B3$ to the maximum defined by parameter $1B4$

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.

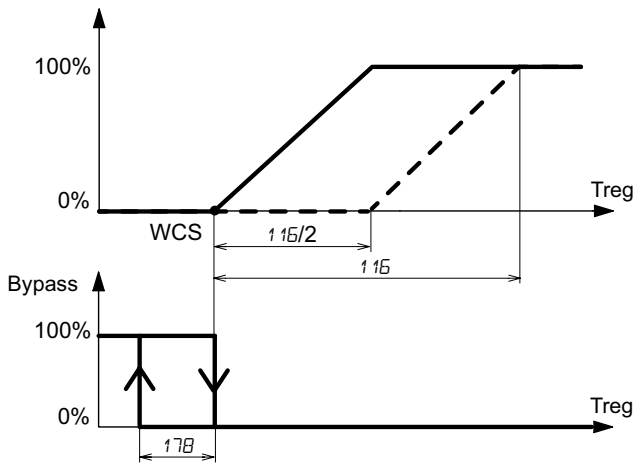
Operation with on/off bypass heat exchanger and cooling modulating valve:

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 $T_{reg} \leq WCS$:

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 $T_{reg} \leq (WCS - 178)$ 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:

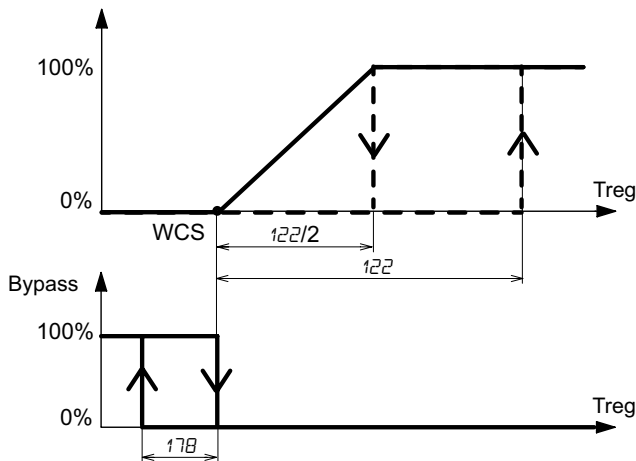
- set type of heat exchanger 012=4,
- select an analogue output for the modulating rotary heat exchanger 030=12 (AO1) or 031=12 (AO2) or 032=12 (AO3),
- do the regulation on room sensor (internal or remote sensor) 001=0;
- define the return air sensor 019=1 (AI1) or 021=1 (AI2) or 023=1 (AI3)
- define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

$17B$: 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 $1B3=0$ (with $1B3\neq 0$, 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 $1B3=0$), 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 $Treg \leq (WCS + 122/2)$.

The modulating rotary heat exchanger reaches its minimum speed if $Treg \leq WCS$:

if minimum speed is different from 0 ($1B3\neq 0$), icon ❄️ is switched off and the bypass remains OFF.

if minimum speed is equal to 0 ($1B3=0$), and if $Treg \leq (WCS - 17B)$ the on/off bypass damper is activated and icon ❄️ is switched off.

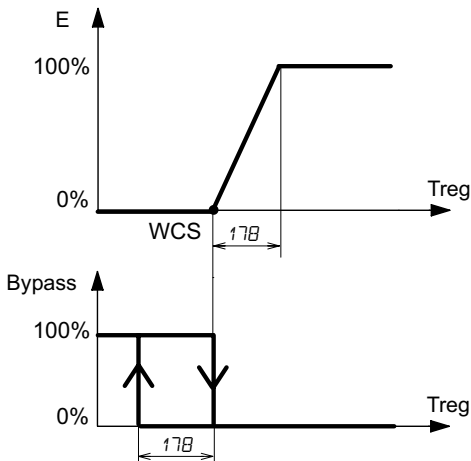
Operation with on/off bypass heat exchanger without cooling valve:

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

$17B$: hysteresis regulation free heating/cooling

E: modulating rotary heat exchanger output

Bypass: on/off bypass damper output with $1B3=0$ (with $1B3\neq 0$, 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 $1B3=0$), icon ❄️ is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WCS to $(WCS + 17B)$.

The modulating rotary heat exchanger reaches its minimum speed if $Treg \leq WCS$:

- with $1B3=0$ minimum speed of modulating rotary heat exchanger is equal to 0. The bypass is activated if $Treg \leq (WCS - 17B)$, icon ❄️ is switched off,

- with $1B3\neq 0$ 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 $\text{019}=3$ (AI1) or $\text{021}=3$ (AI2) or $\text{023}=3$ (AI3).

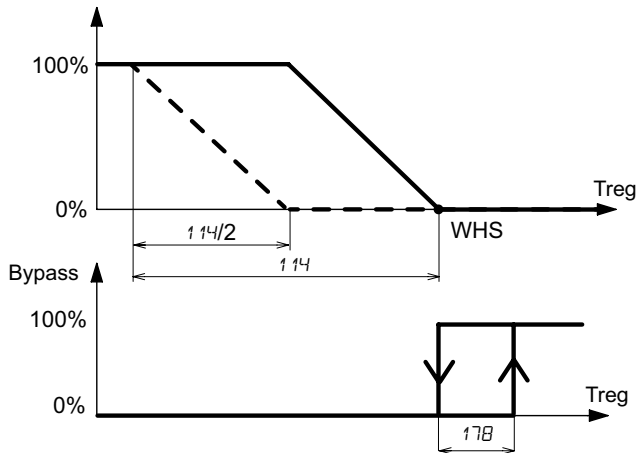
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\text{010}=2$, $\text{011}=1$, $\text{025}=13$ (DO1) or $\text{026}=13$ (DO2) or $\text{027}=13$ (DO3) or $\text{028}=13$ (DO4) or $\text{029}=13$ (DO5),

- modulating heating valve $\text{002}=2$ and $\text{030}=3$ (AO1) or $\text{031}=3$ (AO2) or $\text{032}=3$ (AO3)

or modulating mixed-use valve in heating $\text{002}=2$ $\text{003}=1$ and $\text{030}=5$ (AO1) or $\text{031}=5$ (AO2) or $\text{032}=5$ (AO3)

or modulating electrical resistance $\text{002}=1$ and $\text{030}=6$ (AO1) or $\text{031}=6$ (AO2) or $\text{032}=6$ (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 $\text{183}=0$ (with $\text{183}\neq 0$, 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 $\text{183}=0$), 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) to (WHS - 114/2).

The modulating rotary heat exchanger reaches its minimum speed if $Treg \geq WHS$:

if minimum speed is different from 0 ($\text{183}\neq 0$), icon  is switched off and the bypass remains OFF.

if minimum speed is equal to 0 ($\text{183}=0$), and if $Treg \leq (WHS + 178)$ 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 $\text{012}=4$,

- select an analogue output for the modulating rotary heat exchanger $\text{030}=12$ (AO1) or $\text{031}=12$ (AO2) or $\text{032}=12$ (AO3),

- do the regulation on room sensor (internal or remote sensor) $\text{001}=0$;

- define the return air sensor $\text{019}=1$ (AI1) or $\text{021}=1$ (AI2) or $\text{023}=1$ (AI3)

- define external sensor $\text{019}=3$ (AI1) or $\text{021}=3$ (AI2) or $\text{023}=3$ (AI3).

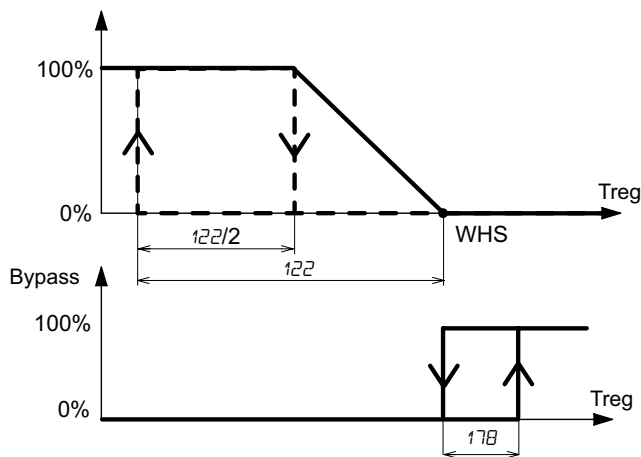
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.

- On/off bypass damper for heat exchanger $\text{010}=2$, $\text{011}=1$, $\text{025}=13$ (DO1) or $\text{026}=13$ (DO2) or $\text{027}=13$ (DO3) or $\text{028}=13$ (DO4) or $\text{029}=13$ (DO5),

- heating valve on/off $\text{002}=4$ and $\text{025}=4$ (DO1) or $\text{026}=4$ (DO2) or $\text{027}=4$ (DO3) or $\text{028}=4$ (DO4) or $\text{029}=4$ (DO5)

or electrical resistance on/off $\text{002}=3$ and $\text{025}=7$ (DO1) or $\text{026}=7$ (DO2) or $\text{027}=7$ (DO3) or $\text{028}=7$ (DO4) or $\text{029}=7$ (DO5)

or on/off mixed-use valve in heating $\text{002}=4$, $\text{003}=2$ and $\text{025}=6$ (DO1) or $\text{026}=6$ (DO2) or $\text{027}=6$ (DO3) or $\text{028}=6$ (DO4) or $\text{029}=6$ (DO5)



Treg: control temperature

WHS: heating operation setpoint

122: hysteresis for on/off output


17B: 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 1B3=0 (with 1B3≠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 1B3=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 $Treg \geq (WHS - 122/2)$.

The modulating rotary heat exchanger reaches its minimum speed if $Treg \geq WHS$:

if minimum speed is different from 0 (1B3≠0), icon  is switched off and the bypass remains OFF.

if minimum speed is equal to 0 (1B3=0), and if $Treg \geq (WHS + 17B)$ the on/off bypass damper is activated and icon  is switched off.

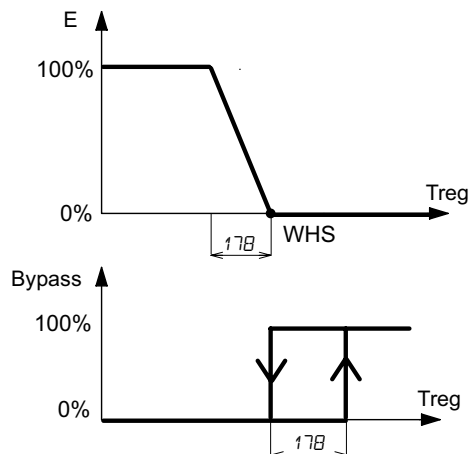
Operation with on/off bypass heat exchanger without heating valve:

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

17B: hysteresis regulation free heating/cooling


E: modulating rotary heat exchanger output


Bypass: on/off bypass damper output with 1B3=0 (with 1B3≠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 $1B3=0$), icon  is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WHS to $(WHS - 17B)$.

The modulating rotary heat exchanger reaches its minimum speed if $Treg \geq WHS$:

- with $1B3=0$ minimum speed of modulating rotary heat exchanger is equal to 0. The bypass is activated if $Treg \geq (WCS + 17B)$, icon  is switched off,

- with $1B3 \neq 0$ 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 $1B5 \neq 1$ and 3, on/off bypass is forced to OFF.

If parameter $1B5=1$ 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 $\varnothing 15=14$ (DI1) or $\varnothing 17=14$ (DI2) or an analogue input configured as a “frost protection heat exchanger contact” $\varnothing 19=21$ (AI1) or $\varnothing 21=21$ (AI2) or $\varnothing 23=21$ (AI3).

To activate the detection using a frost protection sensor on the heat exchanger, set $\varnothing 19=4$ (AI1) or $\varnothing 21=4$ (AI2) or $\varnothing 23=4$ (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

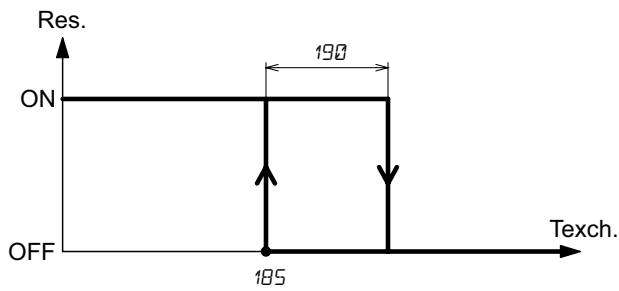
Se $186=4$ the speed of the supply fan is reduced relative to the extract fan and a pre-heating electric heater placed on the heat exchanger is activated. The parameter 187 allows you to select the percentage of the speed reduction.

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 $\varnothing 19=4$ (AI1) or $\varnothing 21=4$ (AI2) or $\varnothing 23=4$ (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 *FLC* is displayed on the alarms page.

If $Texch \geq (185 + 190)$, 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.

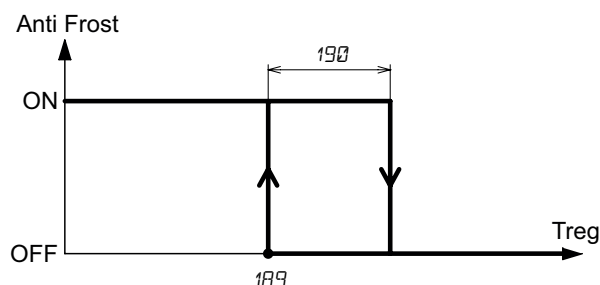
To enable the frost protection operation, set $188=1$.

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 $015\neq 6$ (DI1) and $017\neq 6$ (DI2), no analogue input is configured for “frost protection” $019\neq 13$ (AI1) and $021\neq 13$ (AI2) and $023\neq 13$ (AI3) or as antifreeze heating battery sensor $019\neq 22$ (AI1) or $021\neq 22$ (AI2) or $023\neq 22$ (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 $Treg \geq (189 + 190)$, 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 appliance $199=1$, 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 *MDC* to $0C$ (see “MODE button functionality” page 10). Once activated, a delay equal to the value of the parameter 198 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 195 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: 205 = 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: 205 = 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 205 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	x	x	x	x	x	x	x
	AO3	AO2	AO1	DO5	DO4	DO3	DO2	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:

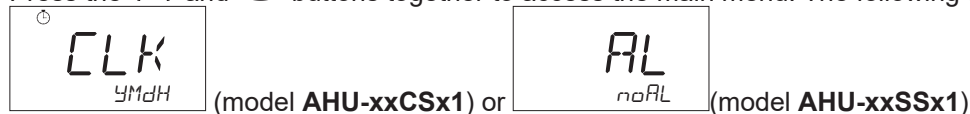
If the controller is connected to a master control system and the forced outputs option is selected, AB Industrietechnik does not take responsibility for any damage caused by the incorrect command of these outputs.

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:



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
<i>noAL</i>	No alarm_	-	-
<i>CoF</i>	Configuration not valid	Outputs for valves, electric heater, humidifier and dehumidifier are deactivated	
<i>FIR</i>	Severe filter	All control is stopped.	
<i>FI-</i>	General filter	Just an indication, no effect on control.	
<i>FIS</i>	Supply filter	Just an indication, no effect on control.	
<i>FIE</i>	Extractor filter	Just an indication, no effect on control.	
<i>AL -</i>	General	Just an indication, no effect on control.	
<i>ALC</i>	Condensation	Only operates in cooling. Humidifier OFF. Cooling valve closed.	 
<i>ALF</i>	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 <i>19 1</i> .	 
<i>AFC</i>	Frost protection heat exchanger	If <i>18E</i> =0, reduction of supply fan speed. If <i>18E</i> =1, bypass open. If <i>18E</i> =2, activation of pre-heating heat exchanger resistance. If <i>18E</i> =3 reduction of supply fan speed and bypass open If <i>18E</i> =4 reduction of supply fan speed and activation of pre-heating heat exchanger resistance	 
<i>EDL</i>	Internal sensor has an error	If used as a regulation sensor, the elements being controlled are disabled.	
<i>ED 1</i>	AI1 sensor has an error (*)	If used as a regulation sensor, the elements being controlled are disabled.	

<i>E02</i>	AI2 sensor has an error (*)	If used as a regulation sensor, the elements being controlled are disabled.	
<i>E03</i>	AI3 sensor has an error (*)	If used as a regulation sensor, the elements being controlled are disabled.	
<i>E04</i>	Internal humidity sensor (*)	If used for humidity control, the humidity detected is set to 0.	
<i>LILL</i>	Low temperature limit	see paragraph <u>"14. Supply limits function with fixed-point control" page 33</u>	
<i>L IHL</i>	High temperature limit	see the limits paragraph <u>"14. Supply limits function with fixed-point control" page 33</u>	
<i>L ILH</i>	Low humidity limit	Dehumidifier OFF	
<i>L IHH</i>	High humidity limit	Humidifier OFF	
<i>ALU</i>	Fans	Activation of digital output for fan alarms if configured <i>025</i> =18 (DO1) or <i>026</i> =18 (DO2) or <i>027</i> =18 (DO3) or <i>028</i> =18 (DO4) or <i>029</i> =18 (DO5)	
<i>ECL</i>	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:

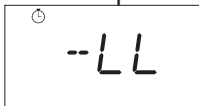
- in the event of a short circuit on the sensor, the temperature is considered to be high and setpoint *134* is used as the compensated setpoint.
- in the event of an open sensor, the temperature of the sensor is considered to be low and the setpoint *133* is used as the compensation setpoint (see paragraph "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:

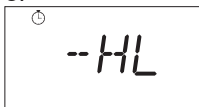
- in the event of a short circuit on the sensor, the temperature is considered to be high and setpoint *138* is used as the compensation setpoint.
- in the event of an open sensor, the temperature of the sensor is considered to be low and the setpoint *137* is used as the compensation setpoint (see paragraph "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:

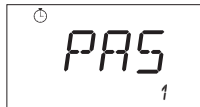


(model **AHU-xxCSx1**) or



(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  button to exit the parameter editing mode without saving.

To exit the menu, press the  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

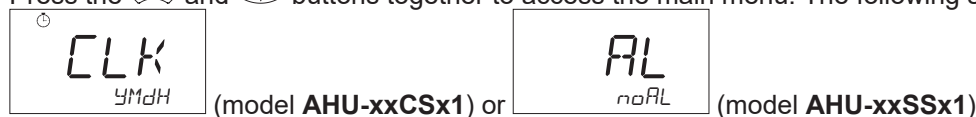
Note: Depending on the model of the appliance used, certain parameters are not displayed.



Example: for the AHU-4xxSx1 model, the following parameters are not displayed: 030, 031, 032.

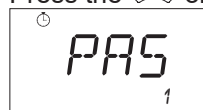
35. Configuration of installer parameters (level 2 password)

Installer parameters are password protected.

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





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  button to exit the parameter editing mode without saving.


To exit the menu, press the  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 106=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 $T_{reg} = [T_i (100 - Y) + (TA1 \times Y)] / 100$ 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 by 120 In economy mode (120>0), the heating setpoint is reduced by 120 In boost mode (120<0), the cooling setpoint is reduced by 120 In boost mode (120<0), the heating setpoint is increased by 120 Example: 120=3 -> economy mode bH5=20 - 120=17°C bC5=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 by 121 In the “non-occupied/holiday” mode, the heating setpoint is reduced by 121 Example: 121=5 bH5=20 - 121=15°C bC5=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 14=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 compensation 136 (°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 (m³/h) setpoint	1500	0	5000
162	Proportional band for pressure (Pa)/flow constant (m³/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 <u>display A</u> 0=internal sensor temperature 1=external sensor temperature AI1 2=external sensor temperature AI2 3=external sensor temperature AI3 4=control temperature (see " <u>8. Control sensors</u> " page 16) 5=internal humidity reading (for AHU-xxxSH1 models only) 6=operating temperature setpoint (see " <u>9. Operating setpoint, economy/BOOST, holiday modes</u> " 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 <u>display B</u> 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= <u>display B</u> 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 <ul style="list-style-type: none"> if 199=0, the operating setpoint does not consider the economy/boost and holiday modes for the duration 198 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 <u>display B</u> 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
ϱ_{11}	Manual speed limit. In case of activation of electrical resistance, if the percentage power applied to the electrical resistance exceeds the parameter ϱ_{11} the speed of the fan increases by the same percentage.	50	15	100
ϱ_{12}	Temperature/humidity control priority 0=Temperature priority 1=Humidity priority	0	0	1
ϱ_{13}	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		
$\text{DI}15=0$ (Input DI1) or $\text{DI}17=0$ (Input DI2) Not used			
$\text{DI}15=1$ (Input DI1) or $\text{DI}17=1$ (Input DI2) Remote season change contact	Logic DI1 $\text{DI}15 =$ Logic DI2 $\text{DI}17 =$	0	1
	Summer		
	Winter		
$\text{DI}15=2$ (Input DI1) or $\text{DI}17=2$ (Input DI2) Remote On/Off	Logic DI1 $\text{DI}15 =$ Logic DI2 $\text{DI}17 =$	0	1
	On		
	Off		
$\text{DI}15=3$ (Input DI1) or $\text{DI}17=3$ (Input DI2) Not occupied	Logic DI1 $\text{DI}15 =$ Logic DI2 $\text{DI}17 =$	0	1
	"Non-occupied holiday" mode		
	"Occupied" mode		
$\text{DI}15=4$ (Input DI1) or $\text{DI}17=4$ (Input DI2) Economy mode	Logic DI1 $\text{DI}15 =$ Logic DI2 $\text{DI}17 =$	0	1
	No economy/boost mode		
	Economy/boost mode		
$\text{DI}15=5$ (Input DI1) or $\text{DI}17=5$ (Input DI2) Forced presence	Logic DI1 $\text{DI}15 =$ Logic DI2 $\text{DI}17 =$	0	1
	No forced presence		
	Forced presence		
$\text{DI}15=6$ (Input DI1) or $\text{DI}17=6$ (Input DI2) Heat frost protection battery	Logic DI1 $\text{DI}15 =$ Logic DI2 $\text{DI}17 =$	0	1
	Frost protection off		
	Frost protection on		
$\text{DI}15=7$ (Input DI1) or $\text{DI}17=7$ (Input DI2) Generic alarm	Logic DI1 $\text{DI}15 =$ Logic DI2 $\text{DI}17 =$	0	1
	No alarm		
	Alarm active		
$\text{DI}15=8$ (Input DI1) or $\text{DI}17=8$ (Input DI2) Condensation alarm	Logic DI1 $\text{DI}15 =$ Logic DI2 $\text{DI}17 =$	0	1
	No condensation		
	Condensation alarm		
$\text{DI}15=9$ (Input DI1) or $\text{DI}17=9$ (Input DI2) Generic filter alarm	Logic DI1 $\text{DI}15 =$ Logic DI2 $\text{DI}17 =$	0	1
	No generic filter alarm		
	Generic filter alarm		
$\text{DI}15=10$ (Input DI1) or $\text{DI}17=10$ (Input DI2) Supply filter alarm	Logic DI1 $\text{DI}15 =$ Logic DI2 $\text{DI}17 =$	0	1
	no supply filter alarm		
	supply filter alarm		
$\text{DI}15=11$ (Input DI1) or $\text{DI}17=11$ (Input DI2) Extraction filter alarm	Logic DI1 $\text{DI}15 =$ Logic DI2 $\text{DI}17 =$	0	1
	No extraction filter alarm		
	Extraction filter alarm		

Parameter	Logic		
15=12 (Input DI1) or 17=12 (Input DI2) Stop all alarm	Logic DI1 15 = Logic DI2 18 =	0	1
	No stop all alarm		
	Stop all alarm		
15=13 (Input DI1) or 17=13 (Input DI2) Fan alarm	Logic DI1 15 = Logic DI2 18 =	0	1
	No fan alarm		
	Fan alarm		
15=14 (Input DI1) or 17=14 (Input DI2) Frost protection heat exchanger alarm	Logic DI1 15 = Logic DI2 18 =	0	1
	No frost protection heat exchanger		
	Frost protection heat exchanger		

- **Analogue inputs**

1. Analogue input 1 (AI1):






















Parameter	Logic		
$\varnothing 19=0$	Sensor not used		
$\varnothing 19=1$ Remote regulation sensor	The AI1 sensor is used together with the internal sensor to obtain the final room regulation temperature according to the parameter $\varnothing 105$ (see “8. Control sensors” page 16■)		
$\varnothing 19=2$ Supply sensor	The AI1 sensor is used as a limit sensor for fixed-point regulation with limits ($\varnothing 125$ and/or $\varnothing 127$ not equal to 0), or as a regulation sensor for the valves ($\varnothing 11=1$), or as a regulation sensor in the cascade regulation ($\varnothing 14=2$).		
$\varnothing 19=3$ External sensor	The AI1 sensor is used for the compensation ($\varnothing 130$ not equal to 0)		
$\varnothing 19=4$ Frost protection heat exchanger sensor	The AI1 sensor is used as a frost protection heat exchanger sensor		
$\varnothing 19=5$ to 7	Not selectable by the AI1 sensor		
$\varnothing 19=8$ Remote season change contact	$\varnothing 20 =$ Summer	0	1
	Winter		
$\varnothing 19=9$ Remote on/off contact	$\varnothing 20 =$ On	0	1
	Off		
$\varnothing 19=10$ Non-occupied/holiday remote contact	$\varnothing 20 =$ “Non-occupied holiday” mode	0	1
	“Occupied” mode		
$\varnothing 19=11$ Energy savings remote contact	$\varnothing 20 =$ No economy/boost mode	0	1
	Economy/boost mode		
$\varnothing 19=12$ Forced presence contact	$\varnothing 20 =$ No forced presence	0	1
	Forced presence		
$\varnothing 19=13$ Heat frost protection battery contact	$\varnothing 20 =$ Frost protection off	0	1
	Frost protection on		
$\varnothing 19=14$ Generic alarm contact	$\varnothing 20 =$ No alarm	0	1
	Alarm active		
$\varnothing 19=15$ Condensation alarm contact	$\varnothing 20 =$ No condensation	0	1
	Condensation alarm		
$\varnothing 19=16$ Generic filter alarm contact	$\varnothing 20 =$ No generic filter alarm	0	1
	Generic filter alarm		
$\varnothing 19=17$ Supply filter alarm contact	$\varnothing 20 =$ No supply filter alarm	0	1
	Supply filter alarm		

Parameter	Logic	0	1
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.




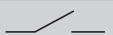



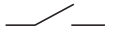










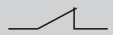
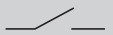
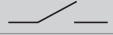


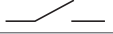









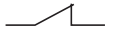
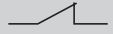
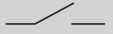
2. Analogue input 2 (AI2):

Parameter	Logic	0	1
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 105 (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	0	1
02 1=12 Forced presence contact	022 = No forced presence		
	Forced presence		
02 1=13 Heat frost protection battery contact	022 = Frost protection off		
	Frost protection on		
02 1=14 Generic alarm contact	022 = No alarm		
	Alarm active		
02 1=15 Condensation alarm contact	022 = No condensation		
	Condensation alarm		
02 1=16 Generic filter alarm contact	022 = No generic filter alarm		
	Generic filter alarm		
02 1=17 Supply filter alarm contact	022 = No supply filter alarm		
	Supply filter alarm		
02 1=18 Extraction filter alarm contact	022 = No extraction filter alarm		
	Extraction filter alarm		
02 1=19 Stop all alarm contact	022 = No stop all alarm		
	Stop all alarm		
02 1=20 Fan alarm contact	022 = No fan alarm		
	Fan alarm		
02 1=21 Frost protection heat exchanger alarm contact	022 = No frost protection heat exchanger		
	Frost protection heat exchanger alarm		
02 1=22 Frost protection heating battery sensor	The AI2 sensor is used as antifreeze heating battery sensor		

For configurations 02 1=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
	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
	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
	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
	No condensation		
	Condensation alarm		
023=16 Generic filter alarm contact	024 =	0	1
	No generic filter alarm		
	Generic filter alarm		

Parameter	Logic	0	1
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:

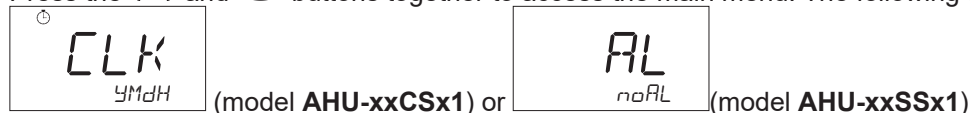
- | | | |
|---------------------------------|---|------------------|
| Digital input 1 (DI1) | - | Highest priority |
| Digital input 2 (DI2) | | |
| Analogue input 1 (AI1) | | |
| Analogue input 2 (AI2) | | |
| Analogue input 3 (AI3) | - | Lowest priority |
- ↓



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.

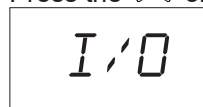
37. Visualizzazione stato ingressi/uscite


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:

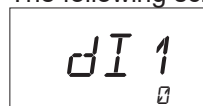


Press the  or  button until the following screen is displayed:





Press the  button to access the list of inputs, outputs.

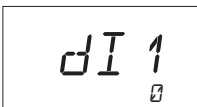
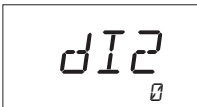


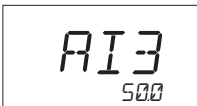


The following screen appears corresponding to digital input 1:


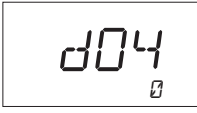

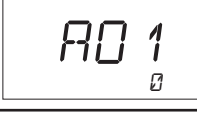





the second line indicates the state of input 1.

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
	Digital input 1	0 = contact open 1 = contact closed
	Digital input 2	0 = contact open 1 = contact closed
	Analogue input 1	Input sensor 019>=1 and 019<=4: -2000 = sensor open 970 = short-circuit on sensor - 150..900 = temperature value no5 = input not used
		Contact input 019>=8 0 = contact open 1 = contact closed
	Analogue input 2	Input sensor 021>=1 and 021<=4: -2000 = sensor open 970 = short-circuit on sensor - 150..900 = temperature value no5 = input not used
		Contact input 021>=8 0 = contact open 1 = contact closed
	Analogue input 3	Input sensor 023>=1 and 023<=4: -2000 = sensor open 970 = short-circuit on sensor - 150..900 = temperature value no5 = 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
	Digital output 1	0 = relay deactivated 1 = relay activated
	Digital output 2	0 = relay deactivated 1 = relay activated

	Digital output 3	0 = relay deactivated 1 = relay activated
	Digital output 4	0 = relay deactivated 1 = relay activated
	Digital output 5	0 = relay deactivated 1 = relay activated
	Analogue output 1	00.. 100 = voltage value
	Analogue output 2	00.. 100 = voltage value
	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.

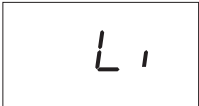
Press the  button to access the default parameters reset level.



To cancel and return to the controller, press the  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  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




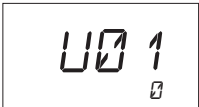
(model **AHU-xxSSx1**)



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.

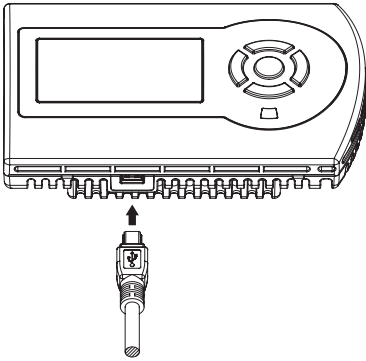
Press the  button one or more times or wait for about 120 seconds to exit firmware version level.

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

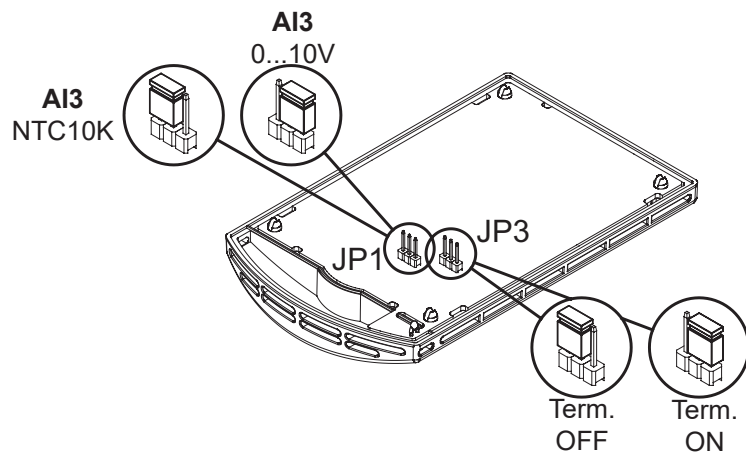
The device is equipped with a USB “device” interface which can be used to configure parameters or update the software. To connect the controller to a PC via the USB connection, use a cable with Type A connector on one end and Mini B connector on the other.



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 ^(Note5)	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 19B 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 2 13≠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 **A13** 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)	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	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	0	0	4	R/W
9129	ACTIV_HALF_SEASON_MODE → Activation of mid-season operation 0=not enabled 1=enabled	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	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)	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)	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)	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)	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	025	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 ($\Delta^{\circ}\text{C}$ [$\Delta^{\circ}\text{F}$]) ^(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]) (Note1)	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]	132	R/W
9181	TEMP_EXT_MAX_COMP_HEATING → Maximum external temperature for winter compensation (°C [°F]) (Note1)	132	200 [68]	131	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]	136	R/W
9185	TEMP_EXT_MAX_COMP_COOLING → Maximum external temperature for summer compensation (°C [°F]) ^(Note1)	136	350 [95]	135	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 (m³/h) setpoint	161	1500	0	5000	R/W
9211	PROP_BAND_PRESSURE → Proportional band for pressure (Pa) /flow rate (m³/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_ANTI Frost_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_ANTI Frost_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_ANTI Frost → Setpoint for frost protection heat battery (°C [°F]) ^(Note1)	189	50 [41]	40 [39]	100 [50]	R/W
9239	HYST_ANTI Frost → 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_ANTI Frost → 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 <u>display A</u> 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 <u>display B</u> 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= <u>display B</u> 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 <u>display B</u> 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	2 10	0	0	1	R/W
9260	LIMIT_MANUAL_SPEED → Manual speed limit	2 11	50	15	100	R/W
9261	PRIORITY_TEMP_HUM → Temperature/humidity control priority 0=temperatura priority 1=humidity priority	2 12	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	2 13	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 195).

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.

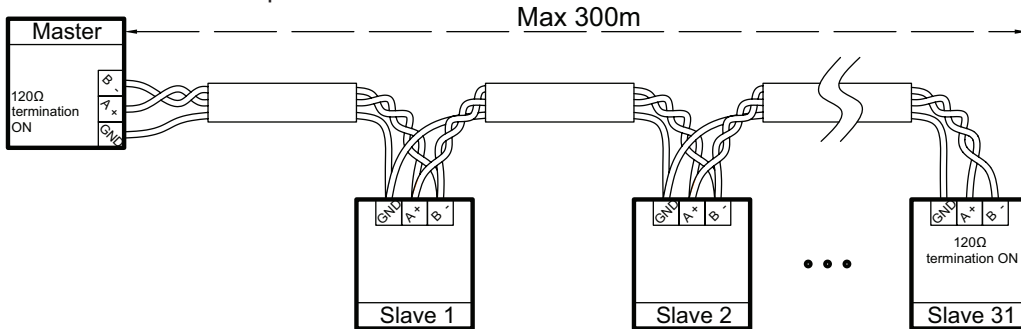
For a baud rate of 9600, the cable (AVG26 type) can be up to 1000 m long.

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.

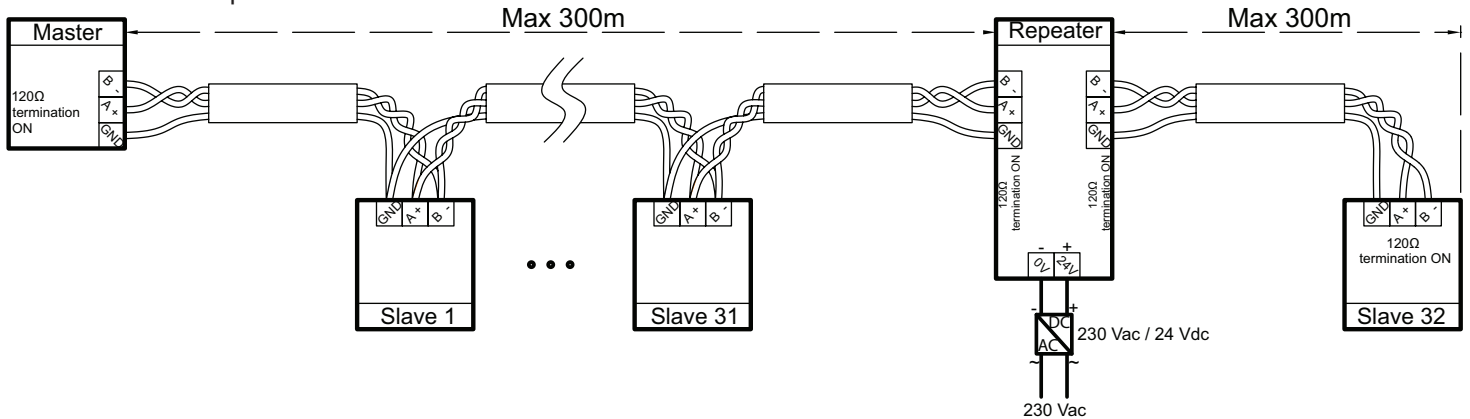
To increase the number of devices on the line or increase the length of the cables, you must install a signal repeater.

Add a signal repeater for every group of 32 appliances connected.


Connection without repeater:



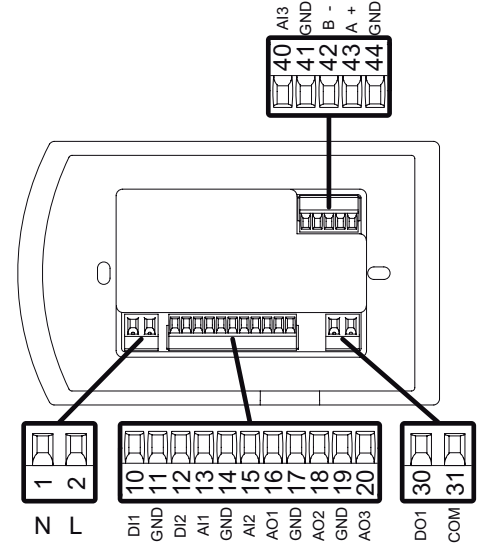
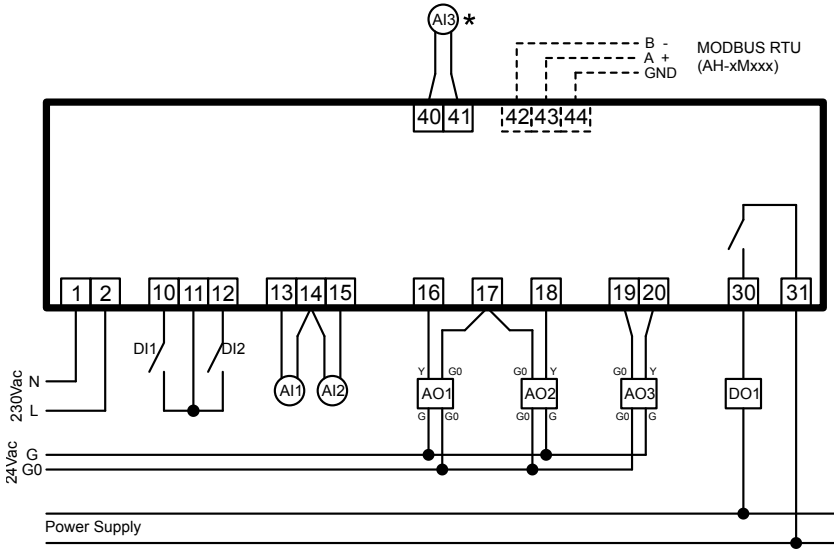
Connection with repeater:



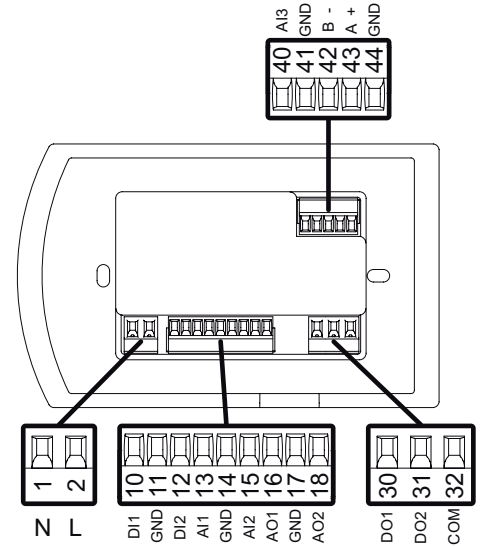
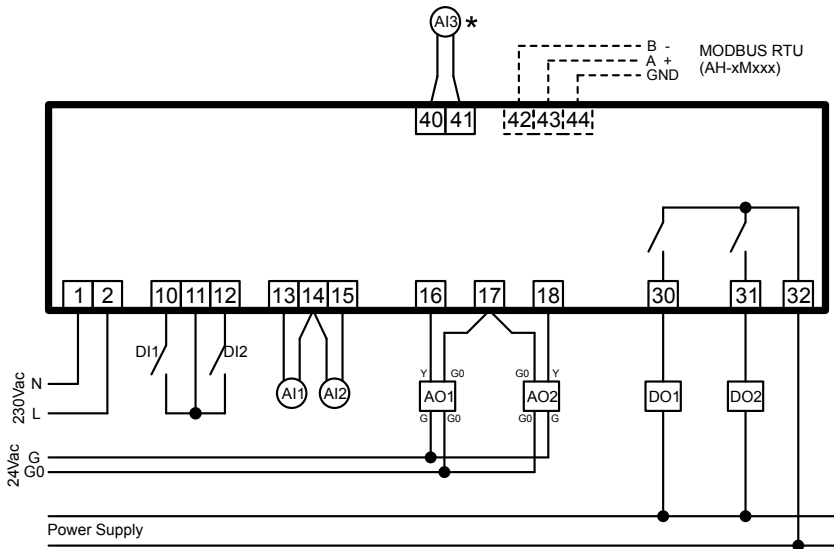
43. Electrical connections

 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.

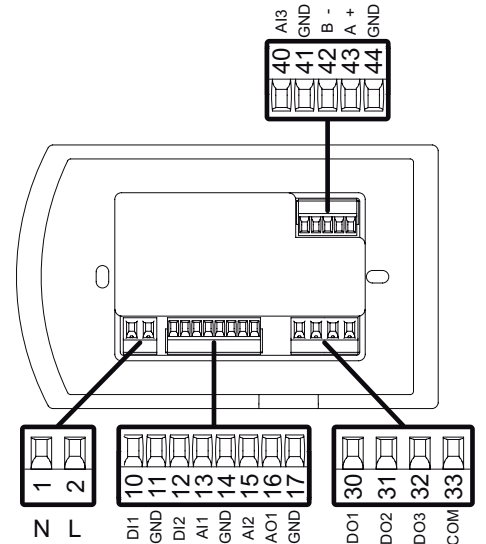
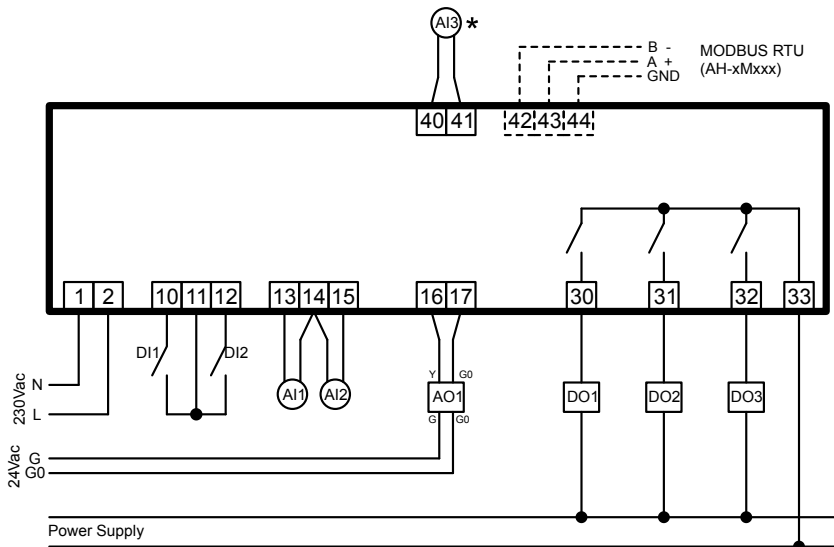
Connection of AHU-0xxSx1 version



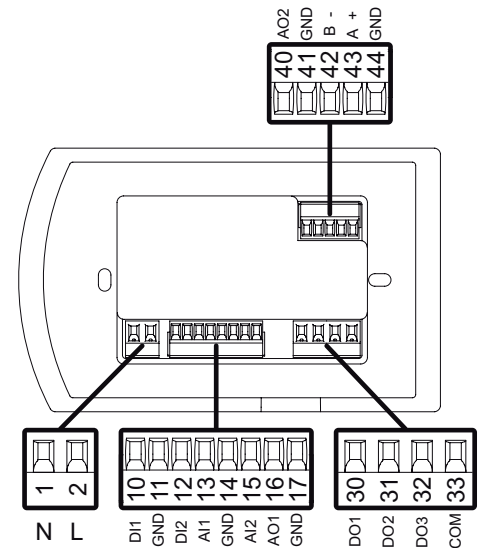
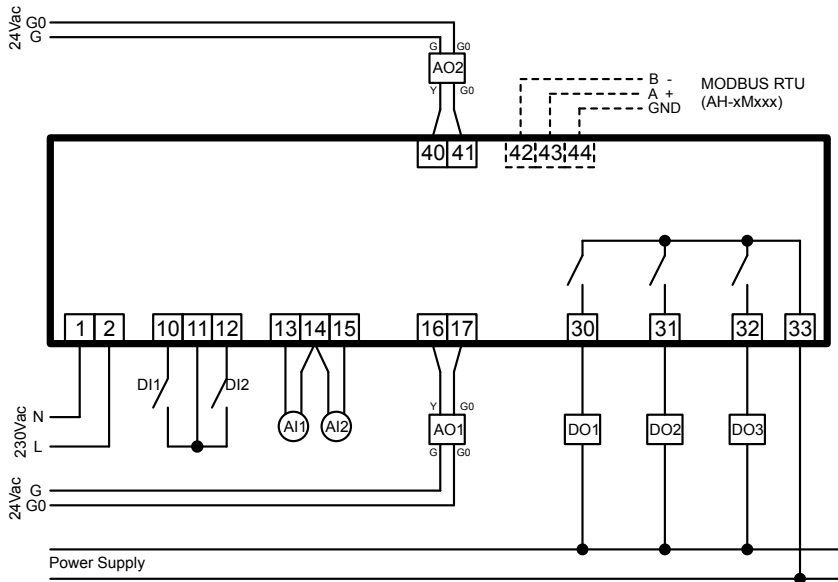
Connection of AHU-1xxSx1 version



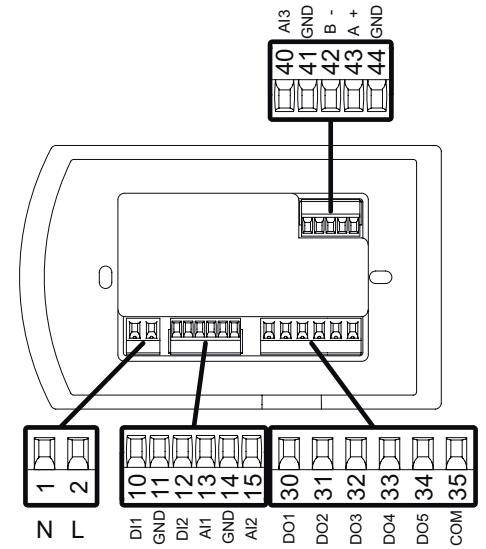
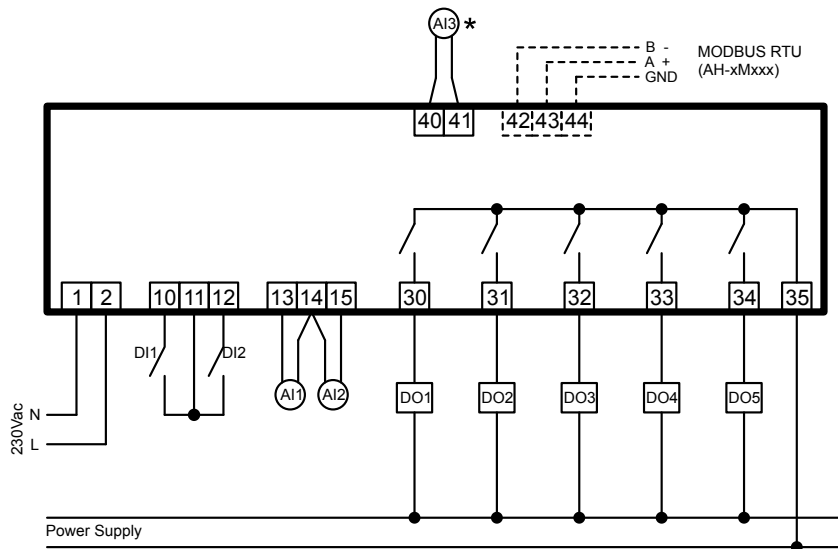
Connection of AHU-2xxSx1 version



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.

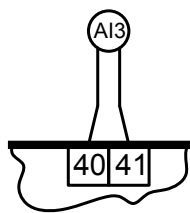


Figure 1

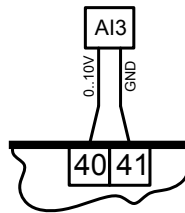


Figure 2

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

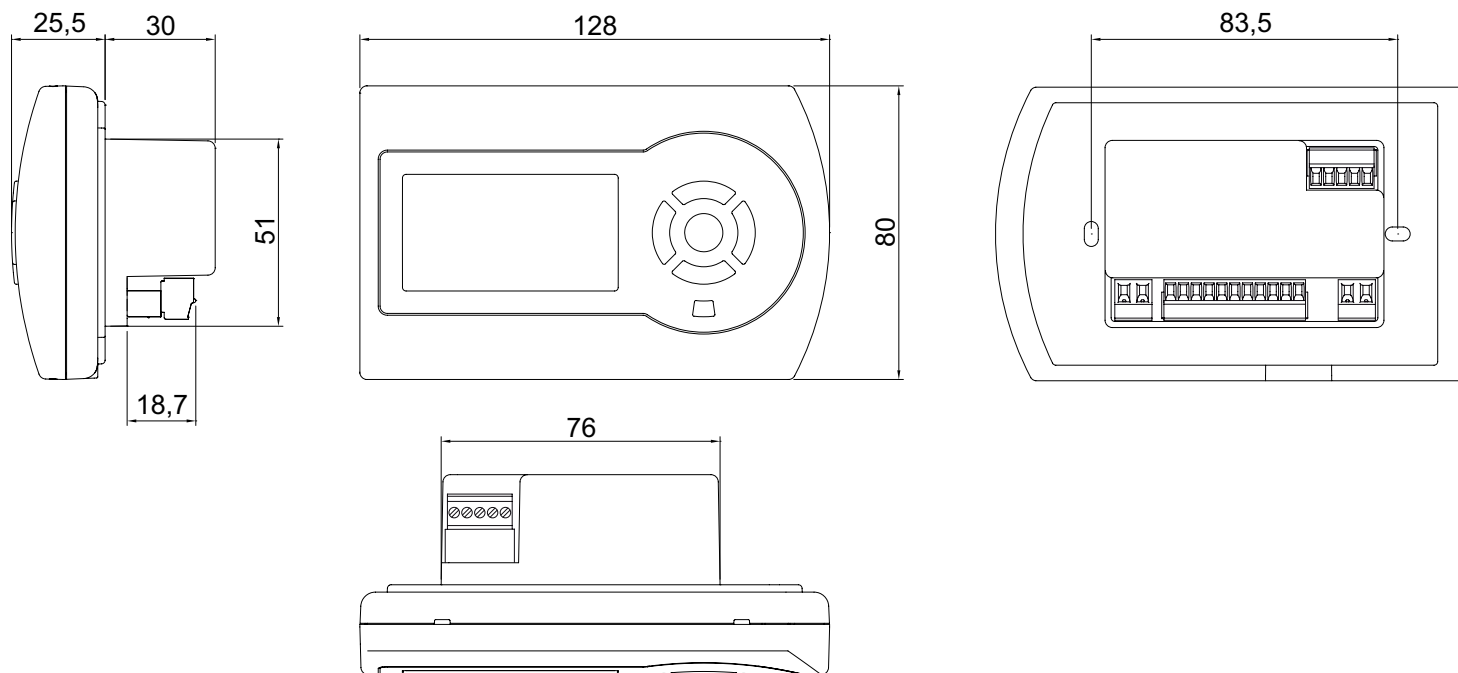
DO1 - DO2 - DO3 - DO4 - DO5 = Digital outputs 1...5

COM = Common for digital outputs

A + / B - = Modbus (only for **AHU-xMxSx1** models)

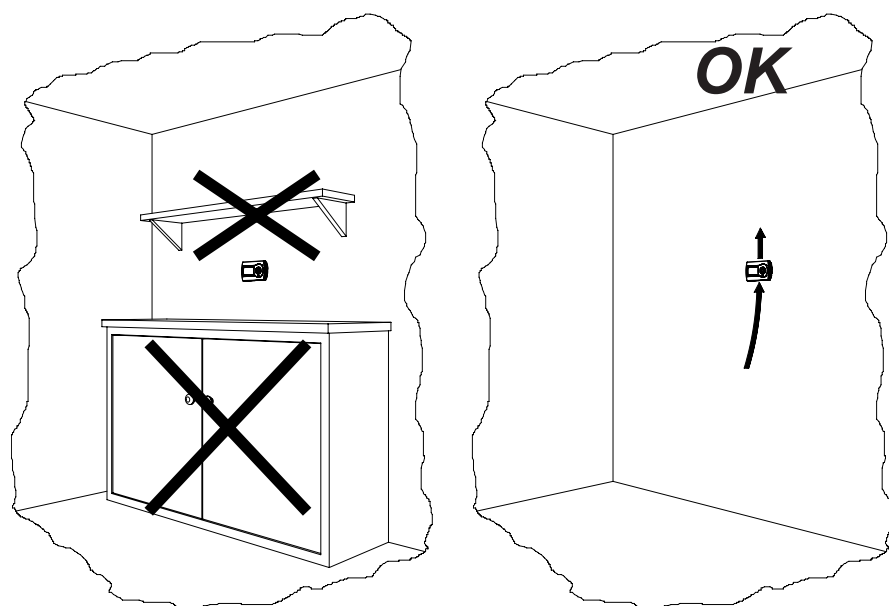
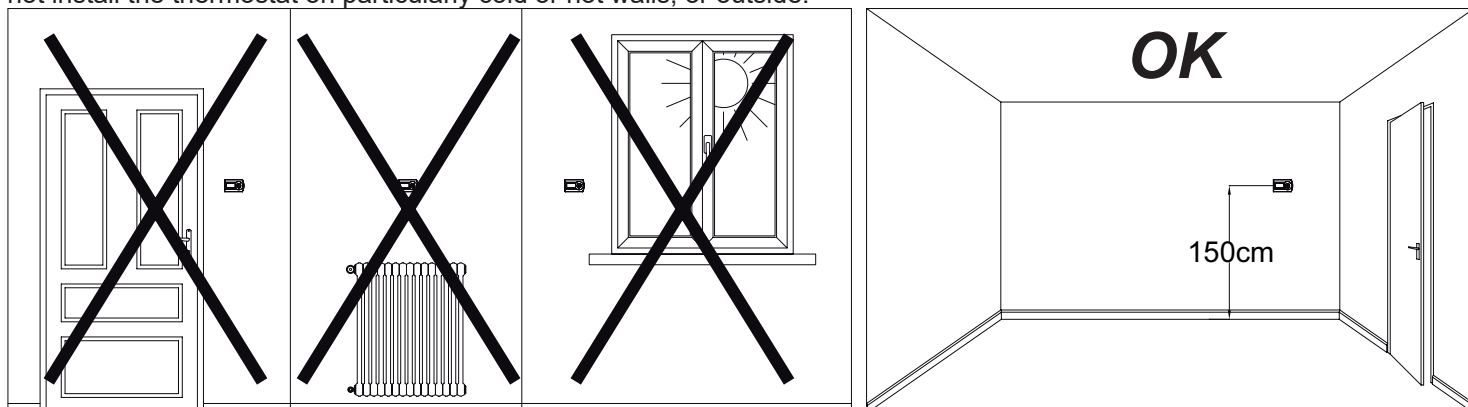
GND = Common for the digital inputs, analogue inputs, analogue and modbus outputs

44. Dimensions

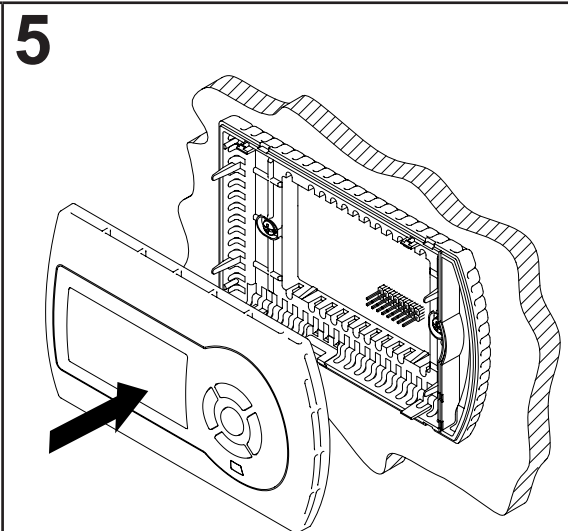
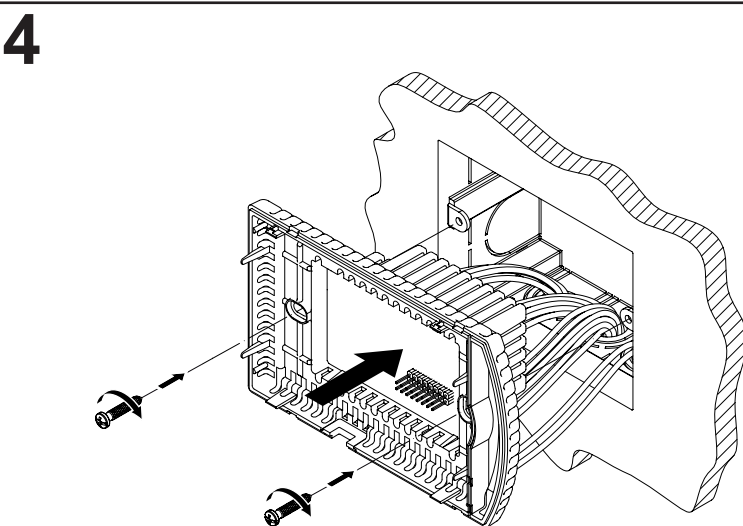
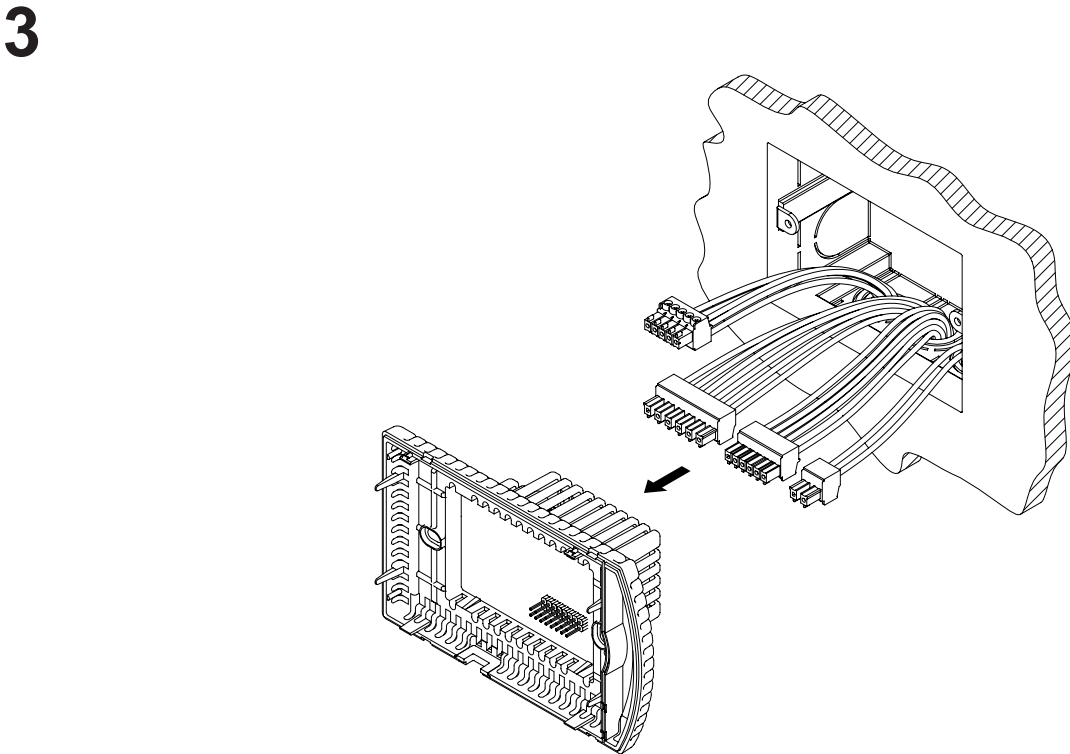
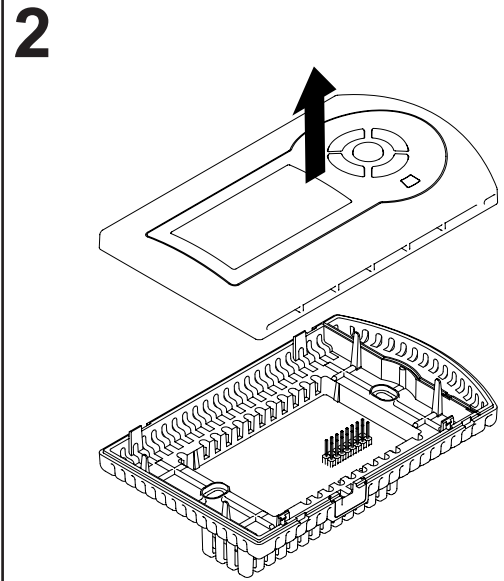
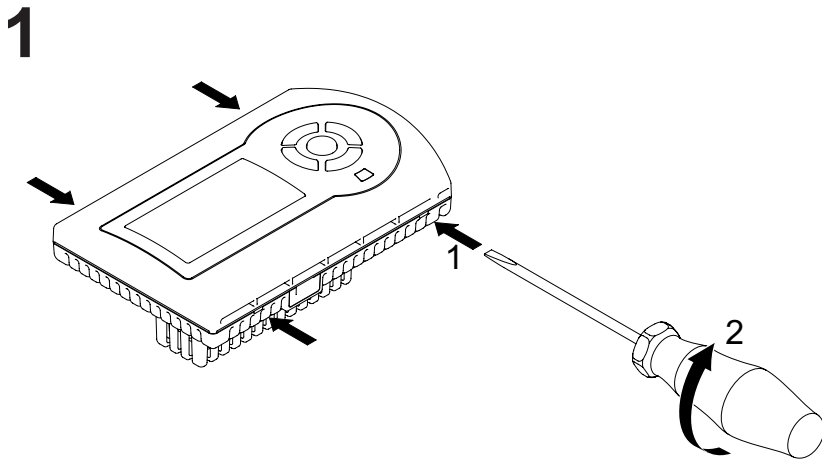


45. Mounting instructions

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.





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