industrie technik

USER MANUAL

ROOM CONTROLLER

EVOLUTION SPLIT

AHS2 SERIES

Modbus

12/03/2025 Rev. 0.0.7

EN

TABLE OF CONTENT

AB Industrietechnik srl – Via Julius Durst, 50 – 39042 BRESSANONE (BZ) Italy – Tel: +39 0472/830626 – info@industrietechnik.it – www.industrietechnik.it

1. Technical features

• Display unit: AHS2 (optional)

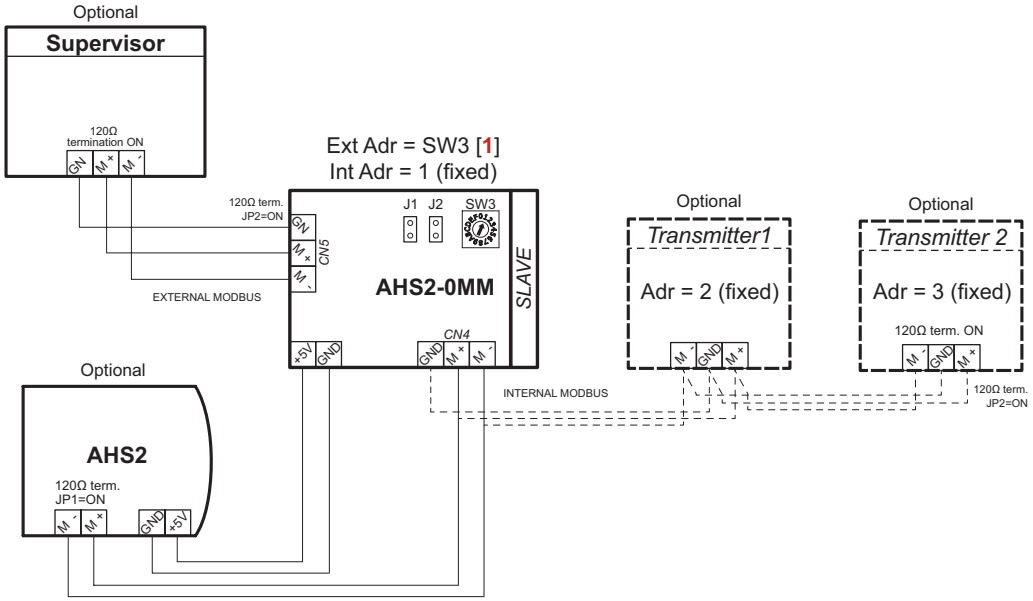
Power supply:	5 Vdc provided by AHS2-0MM
Ambient temperature:	0…50°C
Display:	LCD display with backlight
Inputs:	2 potential-free contacts SELV (limit of voltage: 5 Vdc) USB for configuration and software update
Communication:	external network
Dimensions:	128 x 80 x 28.5 mm
Installation:	wall mounting
Protection class:	2
CE compliance standards:	EN 60730-1

• Remote unit: AHS2-0MM

Power supply:	110…240 Vac, 50/60 Hz
Power consumption:	max 1.1 W (3.5 VA) AHS2-0MM (with AHS2 connected)
Ambient temperature:	0…40°C
Inputs:	2 potential-free contacts SELV (limit of voltage: 4 Vdc) 2 NTC10K sensors USB for software update
Outputs:	3 analogue outputs 0-10 V (R_L >10K) 5 SPST 240 Vac relays. K1 K2 K3 combined total 3 A (AC1), K5 K6 each 1 A (AC1) 1 SPST 240 Vac, 10 A (AC1) relay K4
Connections:	max. cross-selectional area 1.5 mm^2 (flexible cord conductors)
Communication:	one external network Modbus RTU (slave) for BMS, configuration or display. One internal network for connection up to 15 units.
Dimensions:	140 x 121,5 x 47 mm
Protection class:	2
Mode of operation:	type 1
Rated impulse voltage:	2.5 kV
Control pollution degree:	2
Low voltage directive LVD:	EN 60730-1
CE compliance standards:	EN 60730-1

2. Internal and external Modbus network

The internal Modbus network is used to connect AHS2-0MM to optional AHS2 display unit.and to one or two optional transmitters.
The presence of transmitter 1 depends on parameter 034, the transmitter 2 on parameter 036.



The minimum configuration of the internal network consists of a single AHS2-0MM slave.
The maximum configuration of the internal network consists of one AHS2-0MM slave connected to AHS2 display and 2 transmitters.
The communication parameters for transmitter 1 must be set to baud=9600 bit/s, partity=even, address=2.
The communication parameters for transmitter 2 must be set to baud=9600 bit/s, partity=even, address=3.
AHS2-0MM is ready for communicating on internal network with AHS2 display unit and transmitters, nothing has to be set.

The external Modbus network allows the connection of a supervisor to AHS2-0MM.
To connect a supervisor for the first time on CN5 connector use the address set on rotary switch SW3 of AHS2-0MM unit (jumper J2 must be OFF) with baud rate 19200 bit/s, parity even.

Address A=10, B=11, C=12, D=13, E=14, F=15, address 0 is not valid and must not be selected.

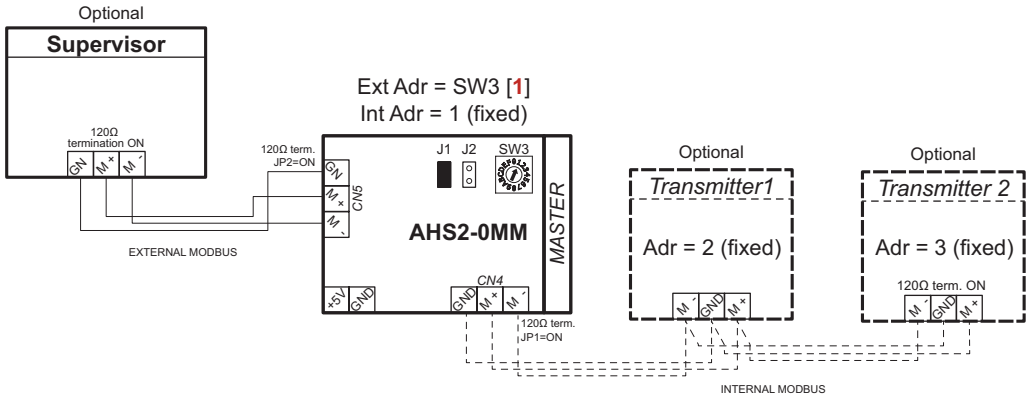
If the address of AHS2-0MM towards supervisor must be higher than 15 then mount jumper J2 and set parameter 217.

J2		OFF (Ext Adr = SW3)
J2		ON (Ext Adr = par. 317)

Parameter 317 can be set either by the AHS2 unit (with password 33) or by Modbus connecting a supervisor on CN5 and setting the variable **ADR_MOD_MODBUS_ADDRESS_CN5** (12424).
The baud rate and parity can only be changed for external Modbus network.
With AHS2 set parameters 315 for the baud rate, 316 for parity and exit parameters setting to transfert the new values to AHS2-0MM or by Modbus set the variables **ADR_MOD_MODBUS_BAUD_CN5** (12422) and **ADR_MOD_MODBUS_PARITY_CN5** (12423).

Note: in case no AHS2 is connected and one or two transmitters are connected to AHS2-0MM unit, set jumper J1 to set AHS2-0MM unit as master and allow reading data from optional transmitters.

J1		OFF (Slave mode)
J1		ON (Master mode)



3. Possible sensor for regulation

A wide choice can be made when selecting the regulation sensor for a AHS2-0MM.
The regulation sensor of a given unit can be:

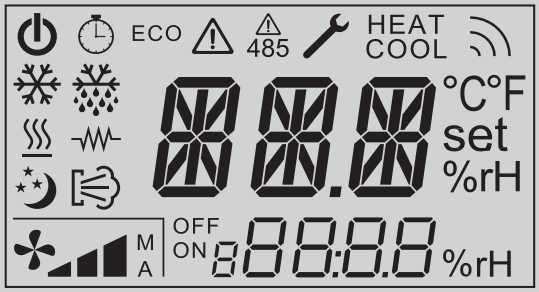
- a remote room sensor:
  set parameters 002=0, 021=1 (AI1) or 023=1 (AI2) on AHS2 or write 0 on variable **TYPE_SENSOR_REG** (12263), 1 on **ANALOG_INPUT1_FUNC** (12282) or 1 on **ANALOG_INPUT2_FUNC** (12284) on AHS2-0MM.
- a temperature delivered by transmitter 1:
  set parameters 002=0, 021≠1 (AI1) and 023≠1 (AI2), 034=1,2,3 or 5, 035=1 on AHS2 or write 0 on variable **TYPE_SENSOR_REG** (12263), value≠1 on **ANALOG_INPUT1_FUNC** (12282) and value≠1 on **ANALOG_INPUT2_FUNC** (12284), 1,2,3, or 5 on **PRESENCETRANSM1** (12295), 1 on **FUNCTEMPTRANSM1** (12296) on AHS2-0MM.
- a temperature delivered by transmitter 2:
  set parameters 002=0, 021≠1 (AI1) and 023≠1 (AI2), 036=1,2,3 or 5, 037=1 on AHS2 or write 0 on variable **TYPE_SENSOR_REG** (12263), value≠1 on **ANALOG_INPUT1_FUNC** (12282) and value≠1 on **ANALOG_INPUT2_FUNC** (12284), 1,2,3 or 5 on **PRESENCETRANSM2** (12297), 1 on **FUNCTEMPTRANSM2** (12298) on AHS2-0MM.
- the internal room sensor of optional AHS2:
  set parameters 002=1, 318=0 on AHS2 or write 1 on variable **TYPE_SENSOR_REG** (12263), 0 on **TYPE_DISPLAY_FUNC** (12425) from supervisor. The variable **ADR_MOD_FORCE_TEMP_AHS2** (12087) must be set to -300.
- a room temperature delivered by supervisor system connected on CN5 of AHS2-0MM.
  Write the value of temperature multiplied by 10 (for example 255 to transmit a temperature of 25.5°C) on variable **ADR_MOD_FORCE_TEMP_AHS2** (12087).
  Do not exceed 9 minutes without sending a message from supervisor to AHS2-0MM unit otherwise supervisor is considered not connected and temperature is forced to a value corresponding to sensor open (-200).
- a remote supply sensor:
  set parameters 002=2, 021=2 (AI1) or 023=2 (AI2) on AHS2 or write 2 on variable **TYPE_SENSOR_REG** (12263), 2 on **ANALOG_INPUT1_FUNC** (12282) or 2 on **ANALOG_INPUT2_FUNC** (12284) on AHS2-0MM.
- a remote supply transmitter 1:
  set parameters 002=2, 021≠2 (AI1) and 023≠2 (AI2), 034=3, 035=2 on AHS2 or write 1 on variable **TYPE_SENSOR_REG** (12263), value≠2 on **ANALOG_INPUT1_FUNC** (12282) and value≠2 on **ANALOG_INPUT2_FUNC** (12284), 3 on **PRESENCETRANSM1** (12295), 2 on **FUNCTEMPTRANSM1** (12296) on AHS2-0MM.
- a remote supply transmitter 2:
  set parameters 002=2, 021≠2 (AI1) and 023≠2 (AI2), 036=3, 037=2 on AHS2 or write 1 on variable **TYPE_SENSOR_REG** (12263), value≠2 on **ANALOG_INPUT1_FUNC** (12282) and value≠2 on **ANALOG_INPUT2_FUNC** (12284), 3 on **PRESENCETRANSM2** (12297), 2 on **FUNCTEMPTRANSM2** (12298) on AHS2-0MM.

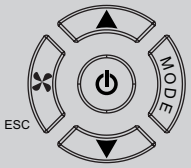
Note: for remote room sensor regulation, if a AHS2 is connected to a AHS2-0MM unit it is also possible to consider the temperature of internal AHS2 together with remote regulation sensor of AHS2-0MM to obtain the regulation sensor.
Example: to regulate with a weighting of 25% of the remote sensor connected on AI1 (or AI2) and a weighting of 75% of the internal sensor of the AHS2 with I02=2, set the following setting on AHS2-0MM unit:
Write 0 on variable **TYPE_SENSOR_REG** (12263) (parameter 002).
Write 1 on variable **ANALOG_INPUT1_FUNC** (12282) (parameter 021) to set AI1 as regulation sensor.
Write 25 on variable **ADR_MOD_WEIGHTREMAISENS**(12301) (parameter 103) to set the weigth of remote regulation sensor

The following formula is applied for calculation of regulation sensor:

Treg=[Ti (100 - Y) + (TA x Y)] / 100 with:
Ti=internal sensor of AHS2,
TA=remote sensor connected on AI1 of AHS2-0MM,
Y=weigth of remote sensor.
For not considering weighting set the parameter 103 to 100 (default value).

4. Display, keypad and icons of AHS2 unit





	Display A
	Display B
	On/Off
flashing	Timer extension on
continuously displayed	Clock setting
ECO	Economy function on
	General alarm
485	Communications alarm
	Parameters menu
HEAT COOL	Work season
	Max ventilator working hours overtaken alarm
	Cooling or free cooling on
flashing	Battery frost protection or heat exchanger frost protection on
flashing	Condensate alarm
continuously displayed	Dehumidification on
flashing	Air change request
continuously displayed	Humidification on
	Heating or free heating on
	Electric resistance on
	Holiday function
flashing	Free cooling or free heating on
M A	Ventilator speed M = manual speed selection A = automatic speed selection
OFF ON	ON = heat recovery on OFF = heat recovery off OFF blinking = heat recovery off for free cooling/heating or due to heat exchanger frost protection alarm ON/OFF alternating blinking = modulating bypass damper of the heat exchanger with cross-flow partially open (free heating or free cooling in progress)

8	Display C time zone number on
	Free cooling or free heating on
Keyboard	
	On/Off, navigation and confirm key
	Change setpoint, navigation and value entry keys
ESC	Speed type key and **ESC** operation in navigation
MODE	Manual season or occupation change key or operating mode (see *"MODE button functionality" page 13*)

5. Quick access parameter setting

The controller carries out the following operations by pressing one or more buttons:
- Keypad lock
- Switch on and off
- Configuration of the setpoint or setpoint offset
- Ventilator 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 307 (see *"MODE button functionality" page 13*)
307=0: season change (if it is local, for 2-pipe systems)
307=1: timer extension.
307=2: operating mode (without clock, using the timer, holiday)

• Keypad lock

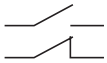
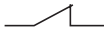
To lock the keypad, press the  buttons at the same time; the display shows the text LK for one second.
When any button is pressed, it is no longer possible to access the parameters and the display shows LK.

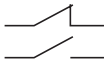
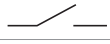
To unlock the keypad, press the  buttons again; the display shows NLK for one second.

• Switch on and off

The appliance can be switched on or off in 4 different ways:
- manually using the keypad of AHS2,
- from an external contact on AHS2-0MM or AHS2,
- using time bands of AHS2,
- from Modbus by supervisor

If the unit has been switched off by remote contact, it can only be switched on by putting the contact on ON position.
If the remote contact is in the ON position with parameter 312=0, it is possible to turn the unit on with a source other the one used to turn it off.
Example: if the unit has been switched off by the timer, it can be switched on manually or via Modbus or by external contact.
If the remote contact is on the ON position with parameter 312=1, and the unit has been switched off manually (or by Modbus), it can be switched on only manually (or by Modbus) but not by the schedule.
To put the unit in the on/off position manually with AHS2, press the ⏻ button until ON or OFF is displayed.
To use an external contact as on/off, configure 017=2 (DI1) or 019=2 (DI2) or 021=9 (AI1 used as DI) or 023=9 (AI2 used as DI) on AHS2-0MM, or 301=2 (DI1) or 303=2 (DI2) on AHS2
Example for digital input 1 (017=2) of AHS2-0MM:

Unit OFF=  (018=0)
Unit ON=  (018=0)

Unit OFF=  (018=1)
Unit ON=  (018=1).

To switch the unit on/off using the timer periods, configure the parameter 310=1 and set the timer periods in which unit is on (see *"7. TIMER PERIODS operation and configuration (AHS2 unit)" page 15*) To switch the unit on/off via modbus function, write 1 in the register 12088 to put unit in ON or 0 to put it in OFF (see *"48. AHS2-0MM Modbus variables on CN5" page 155*. If the appliance is switched off, the display of AHS2 shows the mode in which it was switched off.

MA = manually switched off using keypad of AHS2.

rEM = switched off using remote contact.

MOd = switched off by modbus.

t.Mb = switched off using the time bands (if 310=1).

If the appliance is switched off, all of the outputs are deactivated except for the main control output in heating mode if the frost protection function is activated (see *"29. Frost protection operation of the heating battery" page 115*).

• Setpoint and setpoint offset configuration

Depending on the control method chosen, the temperature 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 *"18. Control with setpoint compensation" page 43*). 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 104 setpoint (for the 2-pipe operation in heating mode), 105 (for the 2-pipe operation in cooling mode) or 106 (for the 4-pipe functionality) if 311=0 or a change of ±x°C from the setpoint if 311=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 311=1 (COMFORT function activated), a change of ±x°C from the setpoint is defined by the parameter 194.
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"** icon flashes. 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 ESC button.

• Ventilator operating mode

-> For manual 1, 2, 3-speed selection for on/off or modulating ventilator (010=0), speed can be changed as indicated below.

Press button ESC, the icon ✣ flashes with the indication of the ventilator operating mode on display B.

Press button ESC one or more times to select the ventilator operating mode:

- M SPE0=ventilation stopped (speed 0 can be selected only for on/off ventilator),
- M SPE 1=control with speed 1
- M SPE2=control with speed 2 (only visible for 2,3-speed or modulating ventilator),
- M SPE3=control with speed 3 (only visible for 3-speed or modulating ventilator).

The value is automatically saved.
To exit the menu, wait for 4 seconds until display B stops flashing.

-> For modulating ventilator and manualy regulated with option 010=8, speed can be changed linearly based on the following procedure.

Press the button ESC, icons ▂▄▆ flash together with the indication of the percentage of the current voltage applied to the ventilator on display B.
The percentage of the voltage applied to the ventilator is on the range 0 (corresponding to the voltage for speed 1) and 100%

(corresponding to the voltage for speed 3).
Press the button ▲ o ▼ to increase or decrease the percentage of voltage applied.
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 307, the function is selected by quick access by pressing the MODE button. The other 2 functions can, however, be accessed by pressing the ESC MODE buttons.

Access to the rapid function using the MODE button:

- If 307=0 (quick access to the local season change configuration if no contact is configured as remote season change)

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

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

- If 307=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 309 if the timer function parameter 310=0.
With 310=1 (switch on/off using the time bands) the timer extension function enables continued operation in the ON mode by excluding the timer periods for a period of time corresponding to parameter 309.

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

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

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

- If 307=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

push the MODE button,
nOrM flashes on display B (for control excluding time bands) or
t.Mb flashes on display B and the ⏱ icon (for control including time bands) or
HOLY flashes on display B and the ☾ icon (for control in the "non-occupied/holiday" mode).

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

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

Not-quick access to the functions using the keypad **:**

■ If the **MODE** button quick access function is set to local season change (307=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
MOC	Timer extension noOC=timer extension off OC=with timer extension (for the duration corresponding to the parameter 309 the economy function and the non-occupied/holiday function are excluded if 310=0, the appliance stays switched on if 310=1).	noOC	noOC	OC
MOd	Operating mode: nOrM=operation without time bands t1Mb=operation using the time bands HOLY=non-occupied/holiday operation	nOrM	nOrM t1Mb 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 309.
If the timer extension function is not active, the icon is off.

■ If the **MODE** button quick access function is set to timer extension (307=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: nOrM=operation without time bands t1Mb=operation using the time bands HOLY=non-occupied/holiday operation	nOrM	nOrM t1Mb 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 (307=2), to access the other functions, press the ESC and MODE buttons at the same time to enter the menu for changing the seasonal change function and timer extension.

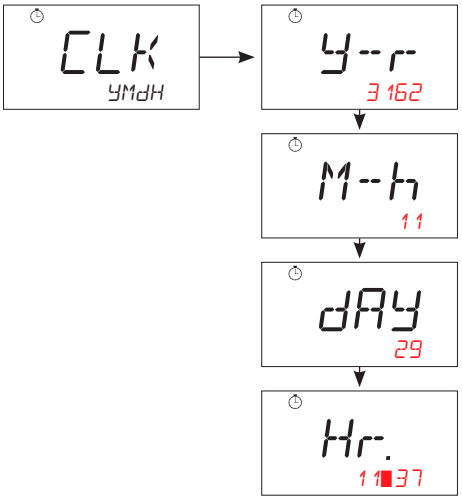
Parameter	Description	Default	Min	Max
SEA	Local season change (local season change configuration for 2-pipe systems): HEAT=Heating mode CooL=Cooling mode	HEAT	HEAT	COOL
MOC	Timer extension noOC=timer extension off OC=with timer extension (for the duration corresponding to the parameter 309 the economy function and the non-occupied/holiday function are excluded if 310=0, the appliance stays switched on if 310=1).	noOC	noOC	OC

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

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

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

6. DATE and TIME setting



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	3162	3120
M-h	Month	1	12
dAY	Day	1	31
Hr.	Time (hour)	0	23
	Minutes	0	59

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

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

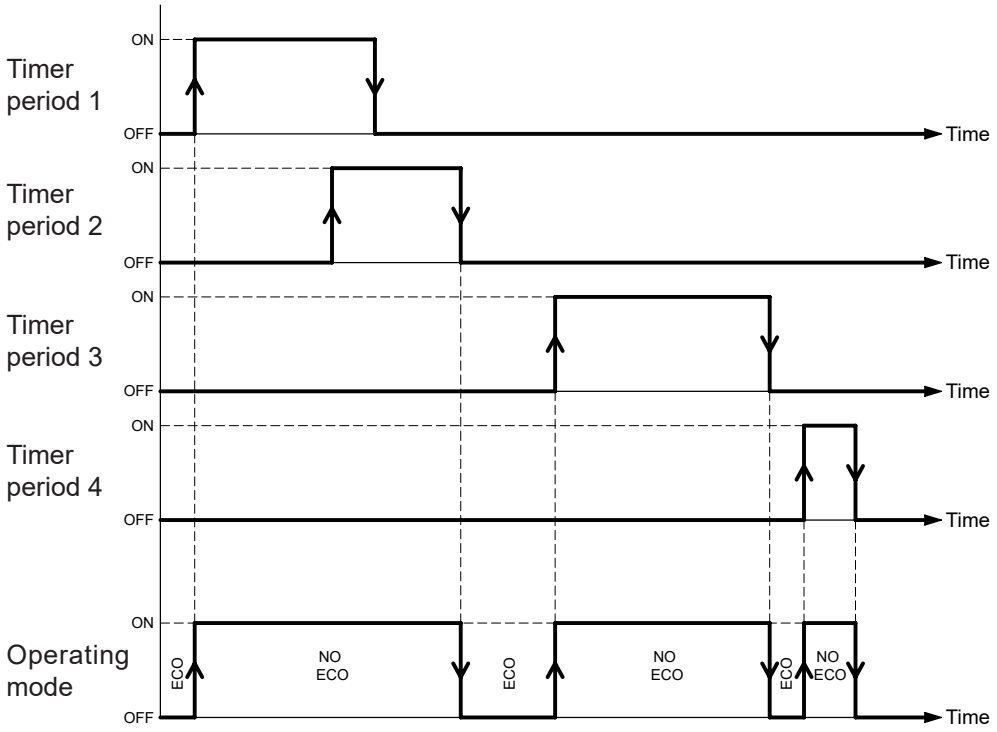
To exit the menu, press the ESC button again or wait for about 119 seconds.

Note: setting parameter 308=1 for the European zone, the unit is able to automatically update for daylight savings time. If parameter 308=0 (other regions), the automatic update for daylight savings time is disabled.

7. TIMER PERIODS operation and configuration (AHS2 unit)

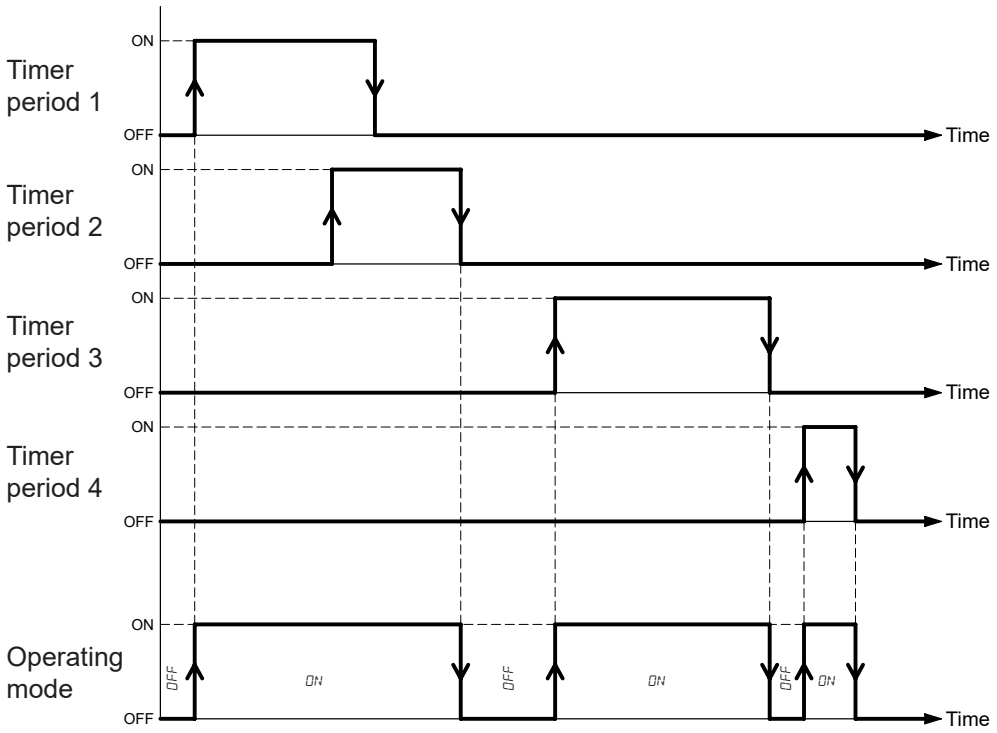
Depending on parameter 310 the timer periods can be assigned to normal/economy control (310=0) or to switching the appliance on/off (310=1).
It is possible to use up to 4 time zones per day.

- With 310=0 control is normal within an ON timer period (control with base setpoints). Outside of ON periods, the controller operates in economy mode (see *"10. Operating setpoint, economy, holiday modes" page 19*).



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

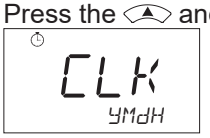
- With *310*=1, in an ON period, the appliance is switched on. Outside the ON periods, the controller is switched off, and only the frost protection function is activated if parameter *189*=1.



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

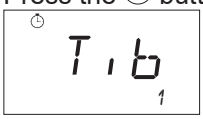
To operate using a timer period, set the start time (ON) and the end time (OFF).
If the start time (ON) is equal or previous to the end time (OFF), the correspondent timer period is excluded.
If one timer period falls within another timer period, the first start time and the last end time will be used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

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



Press the ▲ button , the following screen is displayed:

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

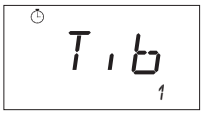


Press the ▲ or ▼ button to select the timer period to be modified.
Press the ⏻ button and the screen is displayed showing the day of the flashing timer period:

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

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

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



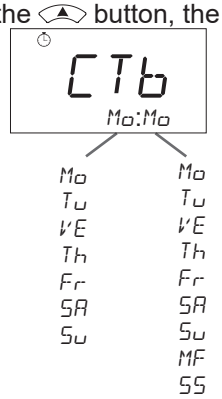
Press the ESC button to return to the main menu or repeat the procedure to set another timer period.

Parameter	Description	Min	Max
WPR	Timer period settings menu		
T i b	Timer period selection	1	4
x	Day of the week Mon = Monday; TuE = Tuesday; WEd = Wednesday; Thu = Thursday; Fr i = 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

8. Duplication of TIMER PERIODS

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

Press the ▲ button, the following screen is displayed:



Day to be copied: destination day

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

Parameter	Description	Min	Max
CTb	Copy periods (Mo. tu. UE. tH. Fr. SA. Su)	Mo	SS
Mo	Monday		
Tu	Tuesday		
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		

9. Control sensors

It is possible to set regulation with
- 2-pipe fixed point (*00 1*=0) or 4-pipe fixed point (*00 1*=3),
- 2-pipe compensated (*00 1*=1) or 4-pipe compensated (*00 1*=4),
- cascade (*00 1*=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	see paragraph *"9. Control sensors" page 19*
	Supply	
2 or 4-tube compensation (*)	Room	
	Supply	
Cascade	Room + Supply	

(*) Set an external sensor to carry out compensation: *02 1*=3 (AI1) or *023*=3 (AI2).

In the event that one or more sensors are configured as remote control sensors (*02 1*=1 and/or *023*=1), only one sensor is considered to be associated with the internal sensor: the one with the highest priority which is **AI1**.
Note: if no analogue input is used as a remote sensor (*02 1*≠1 and *023*≠1), the internal sensor is used as the control sensor even if *103* is not equal to 0.

Cascade control mode uses the room control sensor and setpoint to calculate the supply setpoint.
The control is performed based on the supply temperature (see *"12. Logic of heating and cooling batteries" page 24*).
It is essential to associate a supply sensor with one of the sensor inputs to be able to use this type of control: *02 1*=2 (AI1) or *023*=2 (AI2).

10. Operating setpoint, ECONOMY, HOLIDAY MODES

If one of the digital contacts is configured as a "non-occupied/holiday" remote contact *0 17*=3 (DI1) or *0 19*=3 (DI2) or an analogue input is configured as a "non-occupied/holiday" contact *02 1*=9 (AI1) or *023*=9 (AI2) the "non-occupied/holiday" mode can be activated if the corresponding contact is in the appropriate position (see *"40. Digital and analogue input logic" page 141*).

2-pipe systems (*00 1*= 0, 1):
In the "non-occupied/holiday" mode, the heating setpoint is decreased by *120* (see the 2-pipe heating graph, *WHS*), the cooling setpoint is increased by *120* (see the 2-pipe cooling graph, *WCS*).

4-pipe systems (*00 1*=2, 3, 4):
In the "non-occupied/holiday" mode, the heating activation point is decreased by *120* (see 4-pipe graph, *WHS*) and the cooling activation point is increased by *120* (see 4-pipe graph, *WCS*).

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

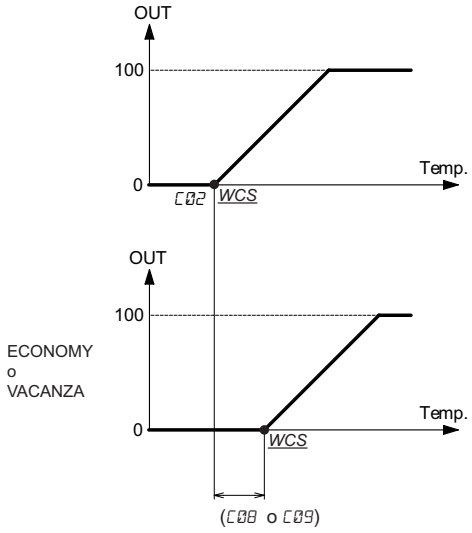
If one of the digital contacts is configured as an "economy" remote contact *0 17*=4 (DI1) or *0 19*=4 (DI2) or an analogue input is configured as an economy contact *02 1*=10 (AI1) or *023*=10 (AI2), the economy mode can be activated if the corresponding contact is in the appropriate position (see *"40. Digital and analogue input logic" page 141*).

2-pipe systems (*00 1*= 0, 1):
In "economy" mode the heating setpoint is reduced by *119* (see 2-pipe heating graph *WHS*), the cooling setpoint is increased by *119* (see 2-pipe cooling graph, *WCS*)

4-pipe systems (*00 1*=2, 3, 4):
In "economy" mode, the heating activation point is reduced by *119* (see 4-pipe graph, *WHS*) and the cooling activation point is increased by *119* (see 4-pipe graph, *WCS*).

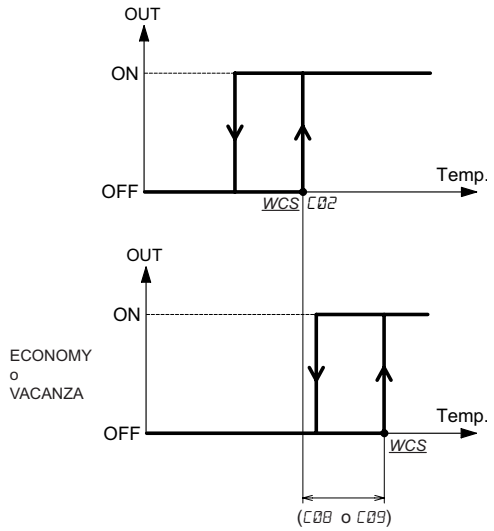
The "**ECO**" icon is displayed to signal the "economy" mode.
The "non-occupied/holiday" mode has priority over the economy mode when both modes are activated.

2-pipe diagram (analogue output, cooling)



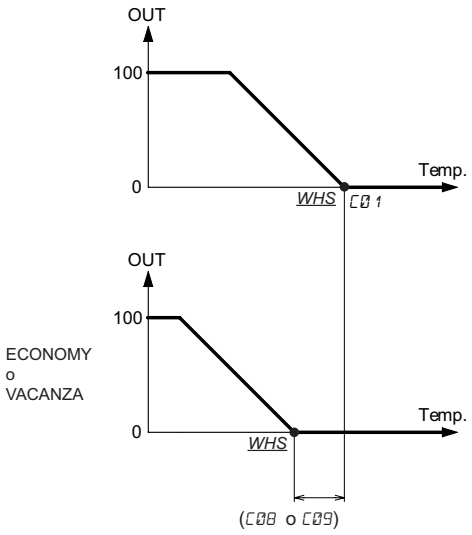
105 2-pipe cooling setpoint
WCS: cooling trigger point

2-pipe diagram (digital output, cooling)



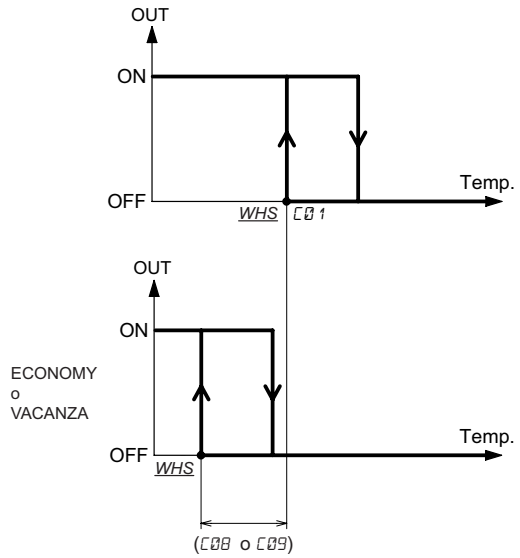
105 2-pipe cooling setpoint
WCS: cooling trigger point

2-pipe diagram (analogue output, heating)



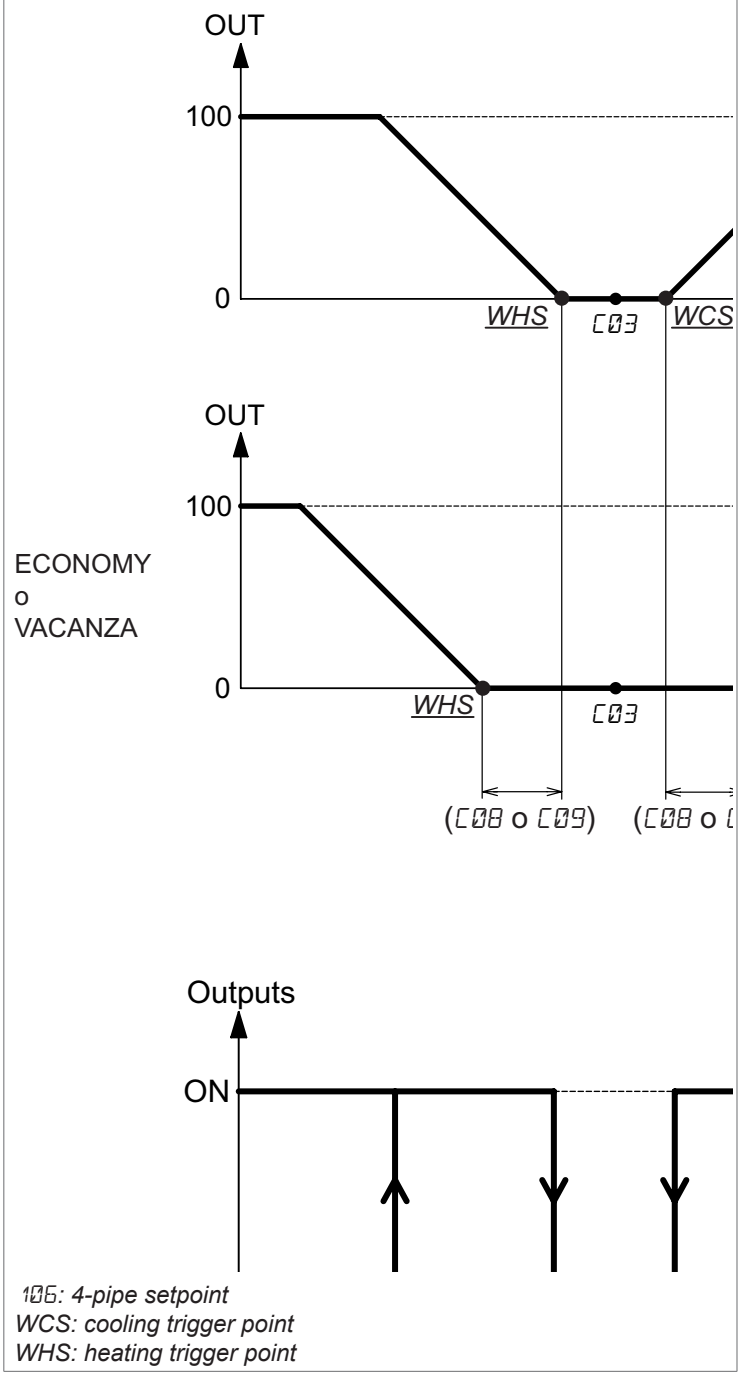
104: 2-pipe heating setpoint
WHS: heating trigger point

2-pipe diagram (digital output, heating)



104: 2-pipe heating setpoint
WHS: heating trigger point

4-pipe diagram (analogue output)



106: 4-pipe setpoint
WCS: cooling trigger point
WHS: heating trigger point

It is possible to display the operating setpoint by configuring the parameter 305 or 306 to 5. 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 “economy” mode, and if the operating mode has been set manually with timer periods (Mod=t.Mb) and the timer period function 310=0 (see *“5. Quick access parameter setting” page 11*), then regulation is controlled within the timer periods with the base setpoints. Outside of the timer period, economy mode is active.
Otherwise, the contact or sensor status configured in “non-occupied/holiday” or “economy” mode has priority and the timer periods are not considered.

If none of the contacts or sensors are configured in “non-occupied/holiday” or “economy” mode and if operating mode is in holiday mode (manually configured using quick access parameters → see *“MODE button functionality” page 13*), then regulation is controlled with the holiday mode. Otherwise the contact or sensor status configured in the “non-occupied/holiday” or “economy” mode has priority other the manual configuration.
When timer extension mode is activated manually, it takes priority over energy saving, holiday (see *“31. Timer extension or forced presence modes” page 115*) and the timer period modes.

11. Batteries for temperature and humidity control

The configuration for the batteries for temperature and humidity control is carried out using the following parameters
- heating type battery 003,
- cooling type battery 004,
- post-heating type battery 005.
- humidifier type battery 007.
- dehumidifier type battery 008.

Battery	Type of battery	Setting
Heating battery	No heating battery	003=0
	Modulating electrical resistance	003=1
	Modulating heating valve	003=2
	Electrical resistance on/off	003=3
	Heating valve on/off	003=4
Cooling battery	No cooling battery	004=0
	Modulating cooling valve	004=1
	Cooling valve on/off	004=2
Mixed-use heating/cooling battery	No mixed-use battery	-
	Modulating mixed-use valve	003=2 and 004=1
	Mixed-use valve on/off	003=4 and 004=2
Post-heating battery	No post-heating battery	005=0
	Post-modulating resistance	005=1
	Modulating post-heating valve	005=2
	Post resistance on/off	005=3
	Post-heating valve on/off	005=4
Humidifier	No humidifier	007=0
	Modulating humidifier	007=1
	Humidifier on/off	007=2
Dehumidifier	No dehumidifier	008=0 and 004=0
	Dehumidification through modulating cooling battery	008=0, 004=1, 139 ≠0
	Modulating dehumidifier	008=1
	Dehumidifier on/off	008=2

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

Element	Settings
Modulating electrical resistance	031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3)
Modulating heating valve	031=3 (AO1) or 032=3 (AO2) or 033=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) 030=7 (DO6)
Heating valve on/off	025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5) 030=4 (DO6)

Modulating cooling valve	031=4 (AO1) or 032=4 (AO2) or 033=4 (AO3)
Cooling valve on/off	025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) 030=5 (DO6)
Modulating mixed-use valve	031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3)
Mixed-use valve on/off	025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) 030=6 (DO6)
Modulating post-heating resistance	031=8 (AO1) or 032=8 (AO2) or 033=8 (AO3)
Modulating post-heating valve	031=7 (AO1) or 032=7 (AO2) or 033=7 (AO3)
Post-heating resistance on/off	025=9 (DO1) or 026=9 (DO2) or 027=9 (DO3) or 028=9 (DO4) or 029=9 (DO5) 030=9 (DO6)
Post-heating valve on/off	025=8 (DO1) or 026=8 (DO2) or 027=8 (DO3) or 028=8 (DO4) or 029=8 (DO5) 030=8 (DO6)
Modulating humidifier	031=10 (AO1) or 032=10 (AO2) or 033=10 (AO3)
Humidifier on/off	025=16 (DO1) or 026=16 (DO2) or 027=16 (DO3) or 028=16 (DO4) or 029=16 (DO5) 030=16 (DO6)
Dehumidification through cooling battery	031=4 (AO1) or 032=4 (AO2) or 033=4 (AO3)
Modulating dehumidifier	031=11 (AO1) or 032=11 (AO2) or 033=11 (AO3)
Dehumidifier on/off	025=17 (DO1) or 026=17 (DO2) or 027=17 (DO3) or 028=17 (DO4) or 029=17 (DO5) 030=17 (DO6)

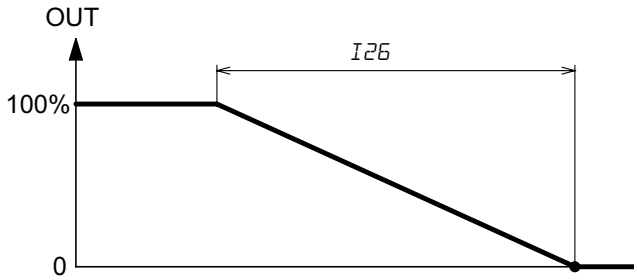
12. Logic of heating and cooling batteries

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

• 2-pipe HEATING controller (*001*=0 or 1)

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

Modulating or 3-point controller:
- The PI type controller operates in the following way for modulating control:



Treg: control sensor
WHS = 104 if the regulation is set at a fixed point (001=0) or calculated setpoint based on compensation (001=1)
OUT: modulating output:
- *modulating heating valve if 003=2 and 031=3 (AO1) or 032=3 (AO2) or 033=3 (AO3).*
- *modulating electrical resistance if 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3).*
- *modulating mixed-use valve if 003=2 and 004=1 and 031=5 (AO1) or 032=5 (AO2) of 033=5 (AO3).*
- *3-point heating valve if 003=5 and 025=22 (DO1) or 026=22 (DO2) or 027=22 (DO3) or 029=22 (DO5) or 030=22* (DO6) *for controlling the opening valve, 025=23 (DO1) or 026=23 (DO2) or 027=23 (DO3) or 029=23 (DO5) or 030=23* (DO6) *for controling the closure valve. The valve stroke time is defined by parameter 207.*
- *3-point mixed-use valve if 003=5, 004=4 and 025=26 (DO1) or 026=26 (DO2) or 027=26 (DO3) or 029=26 (DO5) or 030=26* (DO6) *for controlling the opening valve, 025=27 (DO1) or 026=27 (DO2) or 027=27 (DO3) or 029=27 (DO5) or 030=27* (DO6) *for controling the closure valve. The valve stroke time is defined by parameter 207.*

111: proportional heating band.

If the operating temperature drops below *WHS,* the valve starts to open or the modulating electrical resistance starts to be modulated. The icon is displayed if a valve is controlled, the icon for modulating heating heater.
The modulating valve or electrical resistance can be controlled with PI action if the integral heating time *112* does not equal 0 or, with proportional action only if *112*=0.
The (or) icon switches off if the modulating valve (or the electrical resistance) closes (or is no longer powered).

In case of a 3-point valve is used, when the controller is switched on and every 24 hours, the valve runs through a reset cycle (valve closure) for 119% of the stroke time of the valve *207* before executing the regulation.
In addition it is also possible to reset the 3-point valve by Modbus writing the value 1 on variable **ADR_MOD_FORCED_RESET_3PT_VALVE** (12114).

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

OUT

Treg: control sensor
WHS = 104 if the controller is set at a fixed point (001=0) or calculated setpoint based on compensation (if 001=1)
OUT: output on/off:

- on/off valve if 003=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5) or 030=4 (DO6).
- electrical resistance on/off if 003=3, 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5) oe 030=7 (DO6)
- mixed-use valve on/off if 003=4, 004=2, 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).
115: heating hysteresis for on/off output.

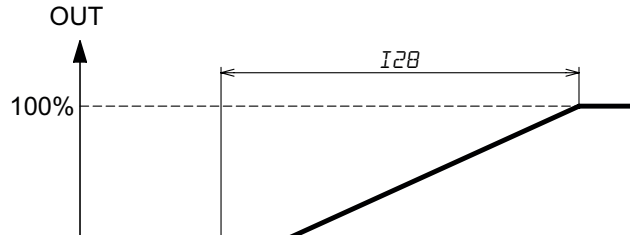
If Treg < (WHS - 115), the valve (or the electrical resistance) is activated. The ♨ (or ⏦) icon is displayed.
If Treg >= WHS, the valve (or electrical resistance) is deactivated. The ♨ (or ⏦) icon is switched off.

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

• 2-pipe COOLING control (001=0 or 1) without mid-season mode (016=0)

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

Modulating or 3-point controller:
• The PI type controller operates in the following way for modulating control:

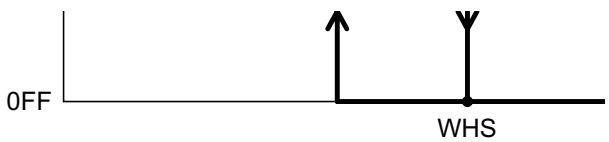


Treg: control sensor
WCS = 105 if the controller is set at a fixed point (001=0) or calculated setpoint based on compensation (if 001=1)
OUT: modulating output:
- modulating valve if 004=1 and 031=4 (AO1) or 032=4 (AO2) or 033=4 (AO3).
- modulating mixed-use valve if 003=2 and 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3).
- 3-point cooling valve if 004=4 and 025=24 (DO1) or 026=24 (DO2) or 027=24 (DO3) or 028=24 (DO4) or 029=24 (DO5) for controlling the opening valve, 025=25 (DO1) or 026=25 (DO2) or 027=25 (DO3) or 028=25 (DO4) or 029=25 (DO5) for controling the closure valve. The valve stroke time is defined by parameter 207.
- 3-point mixed-use valve if 003=5, 004=4 and 025=26 (DO1) or 026=26 (DO2) or 027=26 (DO3) or 029=26 (DO5) or 030=26 (DO6) *for controlling the opening valve, 025=27 (DO1) or 026=27 (DO2) or 027=27 (DO3) or 029=27 (DO5) or 030=27* (DO6) *for controling the closure valve. The valve stroke time is defined by parameter 207.*
113: 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 *114* does not equal 0 or with proportional action only if *114*=0.
The ❄ icon switches off if the valve closes.

In case of a 3-point valve is used, when the controller is switched on and every 24 hours, the valve runs through a reset cycle (valve closure) for 119% of the stroke time of the valve *207* before executing the regulation.
In addition it is also possible to reset the 3-point valve by Modbus writing the value 1 on variable **ADR_MOD_FORCED_RESET_3PT_VALVE** (12114).

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



Treg: control sensor

WCS = 105 if the controller is set at a fixed point (001=0) or calculated setpoint based on compensation (if 001=1)
OUT: output on/off:
- *on/off valve if 004=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) or 030=5 (DO6).*
- *mixed-use valve on/off if 003=4, 004=2, 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).*

115: heating hysteresis for on/off output.

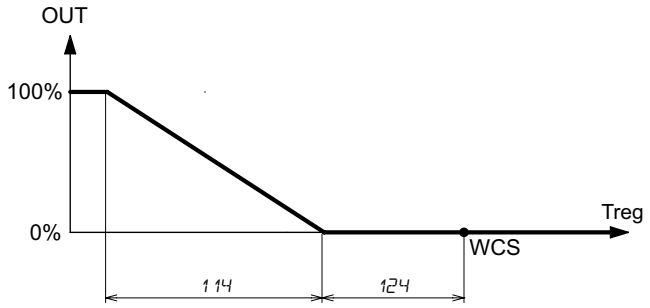
If Treg > (*WCS + 115),* the valve is activated. The ❄ icon is displayed.
If Treg <= *WCS,* the valve is disabled and the ❄ icon is switched off.

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

• 2-pipe COOLING control (001=0 or 1) with mid-season mode (016=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.

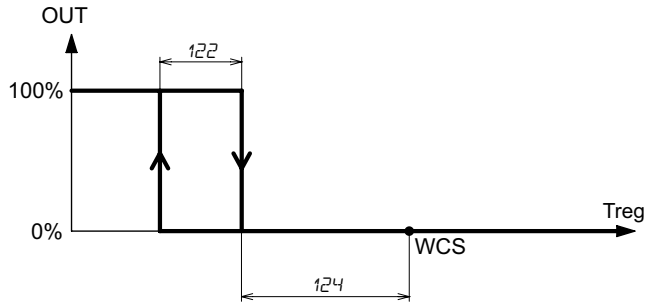
Mid-season mode with modulating heating element:



Treg: control sensor
WCS = 105 if the controller is set at a fixed point (001=0) or calculated setpoint based on compensation (if 001=1)
122: differential activation of heating in the summer season
111: proportional band of heating controller
OUT: modulating electrical resistance if 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3).

If Treg < WCS - 122, the modulating electrical resistance is directed to heat, the ⏦ icon is displayed and remains displayed until the temperature rises above this threshold.
The modulating resistance can be controlled with PI action if the integral heating time 112 does not equal 0 or, with proportional action only if 112=0.

Mid-season mode with on/off heating element:



Treg: control sensor
WCS = 105 if the controller is set at a fixed point (001=0) or calculated setpoint based on compensation (if 001=1)
122: differential activation of heating in the summer season
115: heating hysteresis for on/off output
OUT: electrical resistance on/off if 003=3, 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5) or 030=7 (DO6).

If Tref < (*WCS -* 122 - 115), the electrical resistance is activated. The ⏦ icon is displayed.
If Treg >= (*WCS -* 122), the electrical resistance is disabled and the ⏦ icon is switched off.

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

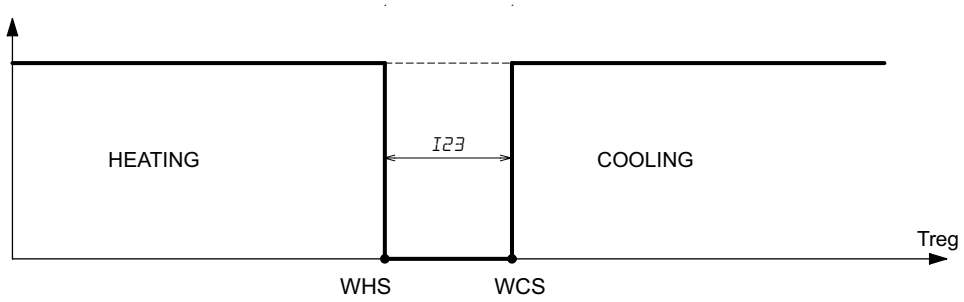
• 4-pipe controller (00 1=3 or 4)

In 4-pipe mode, the operating season is automatically selected based on the room temperature, the 4-pipe room setpoint 106 if 00 1=3 or the calculated winter compensation setpoint if 00 1=4 and 130=2 or 3, the neutral zone 12 1.
Based on the controller selection, 2 setpoints are calculated:

if 00 1=3:
- WHS = heating setpoint = 106 - (12 1/2)
- WCS = cooling setpoint = 106 + (12 1/2)

if 00 1=4:
- WHS = calculated winter compensated setpoint - (12 1/2)
- WCS = calculated winter compensated setpoint + (12 1/2)

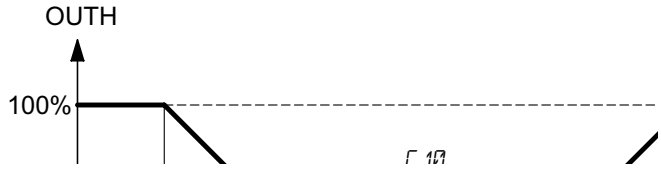
If the temperature rises above WCS, the operating season is considered to be cooling and the "**COOL"** icon is displayed.
If the temperature falls below WHS, the operating season is considered to be heating and the "**HEAT"** icon is displayed.



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 0 16 has no influence on the 4-pipe controller and is not taken into consideration.

Modulating or 3-point 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
12 1: neutral zone
111: proportional heating band.
113: proportional cooling band.
OUTH: modulating heating output:
- *modulating valve if 003=2 and 03 1=3 (AO1) or 032=3 (AO2) or 033=3 (AO3).*
- *modulating electrical resistance if 003=1 and 03 1=6 (AO1) or 032=6 (AO2) or 033=6 (AO3).*
- *3-point heating valve if 003=5 and 025=22 (DO1) or 026=22 (DO2) or 027=22 (DO3) or 029=22 (DO5) or 030=22* (DO6) *for controlling the opening valve, 025=23 (DO1) or 026=23 (DO2) or 027=23 (DO3) or 029=23 (DO5) or 030=23* (DO6) *for controling the closure valve. The valve stroke time is defined by parameter 207.*

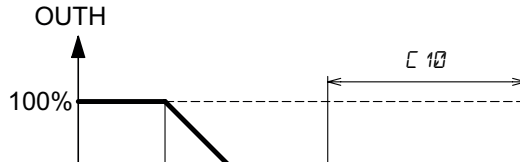
OUTC: modulating cooling output:
- *modulating valve if 004=1 and 03 1=4 (AO1) or 032=4 (AO2) or 033=4 (AO3).*
- *3-point cooling valve if 004=4 and 025=24 (DO1) or 026=24 (DO2) or 027=24 (DO3) or 029=24 (DO5) or 030=24* (DO6) *for controlling the opening valve, 025=25 (DO1) or 026=25 (DO2) or 027=25 (DO3) or 029=25 (DO5) or 030=25* (DO6) *for controling the closure valve. The valve stroke time is defined by parameter 207.*

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 112 does not equal 0 or, with proportional action only if 112=0.
The (or) icon switches off if the heating or modulating valve (or the electrical resistance) closes (or is no longer

powered) when Treg >= WHS.
If the operating temperature rises above *WCS*, the modulating cooling valve starts to open. The ❄ icon is displayed.
The valve can be controlled with PI action if the integral time *114* does not equal 0 or with proportional action only if *114*=0.
The ❄ icon switches off if the valve closes when Treg <= WCS.

In case of 3-point valves are used, when the controller is switched on and every 24 hours, the valves run through a reset cycle (valves closure) for 119% of the stroke time of the valves *207* before executing the regulation.
In addition it is also possible to reset the 3-point valves by Modbus writing the value 1 on variable **ADR_MOD_FORCED_RESET_3PT_VALVE** (12114).

Modulating or 3-point 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
121: neutral zone
116: cooling hysteresis for on/off output.
111: proportional heating band
OUTH: modulating heating output:
- *modulating valve if 003=2 and 031=3 (AO1) or 032=3 (AO2) or 033=3 (AO3).*
- *modulating electrical resistance if 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3).*
- *3-point heating valve if 003=5 and 025=22 (DO1) or 026=22 (DO2) or 027=22 (DO3) or 029=22 (DO5) or 030*=22 (DO6) *for controlling the opening valve, 025=23 (DO1) or 026=23 (DO2) or 027=23 (DO3) or 029=23 (DO5) or 030*=23 (DO6) *for controling the closure valve. The valve stroke time is defined by parameter 207.*

OUTC: cooling output on/off:
- *on/off valve if 004=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) or 030*=5 (DO6).

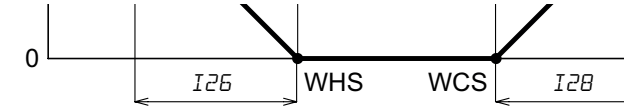
If the operating temperature drops below *WHS*, the heating valve starts to open or the modulating electrical resistance starts to be modulated. The ♨ icon is displayed if a valve is controlled, the ⏦ icon for a modulating electrical resistance.
The valve or modulating electric resistance can be controlled with PI action if the integral heating time *112* does not equal 0 or, with proportional action only if *112*=0.
The ♨ (or ⏦) icon switches off if the modulating valve (or the electrical resistance) closes (or is no longer powered) when Treg >= WHS.

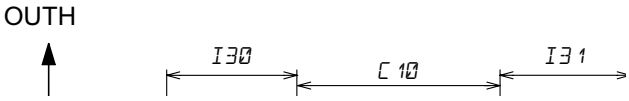
If Treg > (*WCS* + *116),* the cooling valve is activated. The ❄ icon is displayed.
If Treg <= *WCS,* the cooling valve is deactivated and the ❄ icon is switched off.

In case of a 3-point heating valve is used, when the controller is switched on and every 24 hours, the valve runs through a reset cycle (valve closure) for 119% of the stroke time of the valve *207* before executing the regulation.
In addition it is also possible to reset the 3-point valve by Modbus writing the value 1 on variable **ADR_MOD_FORCED_RESET_3PT_VALVE** (12114).

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
121: neutral zone
115: heating hysteresis for on/off output.
116: cooling hysteresis for on/off output.
OUTH: heating output on/off:
- on/off valve if 003=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 003=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 004=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) or 030=5 (DO6).

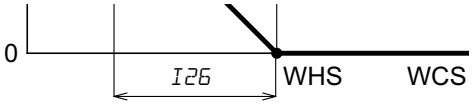
If Treg < (*WHS - 115),* the heating valve (or electrical resistance) is activated. The ♨ (or ⏦) icon is displayed.
If Treg >= WHS, the heating valve (or electrical resistance) is disabled. The ♨ (or ⏦) icon is switched off.

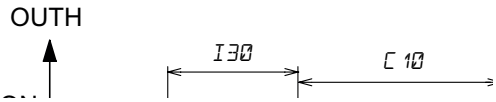
If Treg > (*WCS + 116),* the cooling valve is activated. The ❄ icon is displayed.
If Treg <= *WCS,* the cooling valve is deactivated and the ❄ icon is switched off.

Controlling heating on/off and modulating or 3-point cooling:

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

g





Treg: control sensor
WHS = calculated heating setpoint
WCS = calculated cooling setpoint
121: neutral zone
115: heating hysteresis for on/off output.
113: proportional cooling band
OUTH: heating output on/off:
- on/off valve if 003=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 003=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 004=1 and 031=4 (AO1) or 032=4 (AO2) or 033=4 (AO3).
- 3-point cooling valve if 004=4 and 025=24 (DO1) or 026=24 (DO2) or 027=24 (DO3) or 029=24 (DO5) or 030=24 (DO6) *for controlling the opening valve, 025=25 (DO1) or 026=25 (DO2) or 027=25 (DO3) or 028=25 (DO4) or 029=25 (DO5) or 030*=25 (DO6) *for controling the closure valve. The valve stroke time is defined by parameter 207.*

If Treg < (*WHS - 115),* the heating valve (or electrical resistance) is activated. The ♨ (or ⏦) icon is displayed.
If Treg >= WHS, the heating valve (or electrical resistance) is disabled. The ♨ (or ⏦) icon is switched off.

If the operating temperature rises above *WCS*, the cooling valve starts to open. The ❄ icon is displayed.
The cooling valve can be controlled with PI action if the integral time 114 does not equal 0, or with proportional action only if 114=0.
The ❄ icon switches off if the cooling valve closes.

In case of a 3-point cooling valve is used, when the controller is switched on and every 24 hours, the valve runs through a reset cycle (valve closure) for 119% of the stroke time of the valve 207 before executing the regulation.
In addition it is also possible to reset the 3-point valve by Modbus writing the value 1 on variable **ADR_MOD_FORCED_RESET_3PT_VALVE** (12114).

• Cascade control (00 1=2)

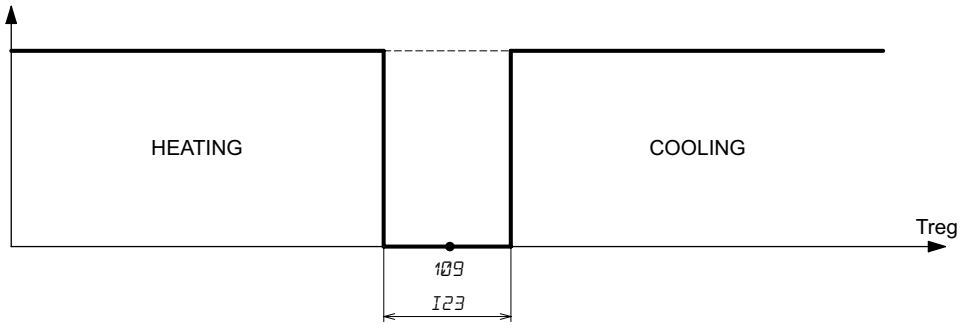
This type of operation is only possible in two cases:
- in 4-pipe system if a modulating (or 3-point) heating output and a modulating (or 3-point) cooling outputs are defined and
- in 2-pipe system if a mixed-use modulating (or 3-point) valve is defined, as shown below.

In 4-pipe system:
Select one of the following options for heating:
- modulating heating valve if 003=2 and 03 1=3 (AO1) or 032=3 (AO2) or 033=3 (AO3) or
- modulating electrical resistance if 003=1 and 03 1=6 (AO1) or 032=6 (AO2) or 033=6 (AO3) or
- 3-point heating valve if 003=5 and 025=22 (DO1) or 026=22 (DO2) or 027=22 (DO3) or 029=22 (DO5) *or* 030=22 (DO6) for controlling the opening valve, 025=23 (DO1) or 026=23 (DO2) or 027=23 (DO3) or 029=23 (DO5) *or* 030=23 (DO6) for controling the closure valve (the valve stroke time is defined by parameter 207).

Select one of the following options for cooling:
- modulating cooling valve if 004=1 and 03 1=4 (AO1) or 032=4 (AO2) or 033=4 (AO3) or
- 3-point cooling valve if 004=4 and 025=24 (DO1) or 026=24 (DO2) or 027=24 (DO3) or 029=24 (DO5) *or* 030=24 (DO6) for controlling the opening valve, 025=25 (DO1) or 026=25 (DO2) or 027=25 (DO3) or 029=25 (DO5) *or* 030=25 (DO6) for controling the closure valve, (the valve stroke time is defined by parameter 207).

In addition, a supply sensor must be present at the analogue input 02 1=2 (AI1) or 023=2 (AI2) or 023=2 (AI3).

The operating season is automatically selected based on the room temperature, the 4-pipe controller setpoint 106 and the neutral zone 12 1.
If Treg < 106 - (12 1/2), the operating season is cooling, and the **"HEAT"** icon is displayed.
If Treg > 106 + (12 1/2), the operating season is cooling, and the **"COOL"** icon is displayed.



Treg: room sensor
106: *4-pipe setpoint control*
12 1: neutral zone

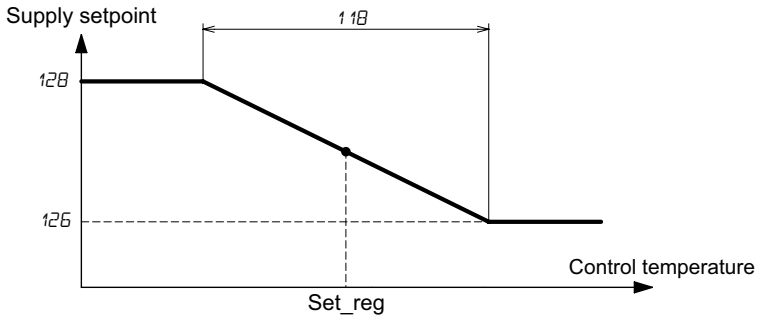
Note: when the unit is switched on, if the room temperature is in the neutral zone, the season is considered to be heating.

In 2-pipe system:
set a mixed-use valve as indicated below:
- modulating 003=2, 004=1 and 03 1=5 (AO1) or 032=5 (AO2) or 033=5 (AO3) or
- 3-point mixed-use valve if 003=5, 004=4 and 025=26 (DO1) or 026=26 (DO2) or 027=26 (DO3) or 029=26 (DO5) *or* 030=26 (DO6) for controlling the opening valve, 025=27 (DO1) or 026=27 (DO2) or 027=27 (DO3) or 029=27 (DO5) *or* 030=27 (DO6) for controling the closure valve, (the valve stroke time is defined by parameter 207).

In addition, a supply sensor must be present at the analogue input 02 1=2 (AI1) or 023=2 (AI2) or 023=2 (AI3).

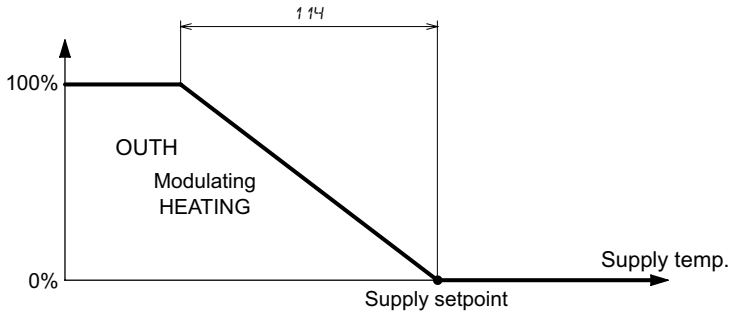
Calculation of the working supply setpoint:
A first PI controller controller, called the master, calculates a supply setpoint, considering the following parameters:
- room temperatures Treg,
- 2-pipe working heating setpoint WHS or working cooling setpoint WCS based on the working season if a mixed-used valve is present or the 4-pipe setpoint control 106 if a heating coil and cooling coil are used.
- proportional band for calculating the supply setpoint 117

- integral time for calculating the supply setpoint 118.



117: *proportional supply band*
set_reg: 2-pipe working heating setpoint WHS in heating or 2-pipe cooling working setpoint WCS in cooling if a mixed-used valve is present
set_reg: 4-pipe setpoint control 106 if a heating coil and cooling coil are used

Control with a single mixed-use in heating mode:

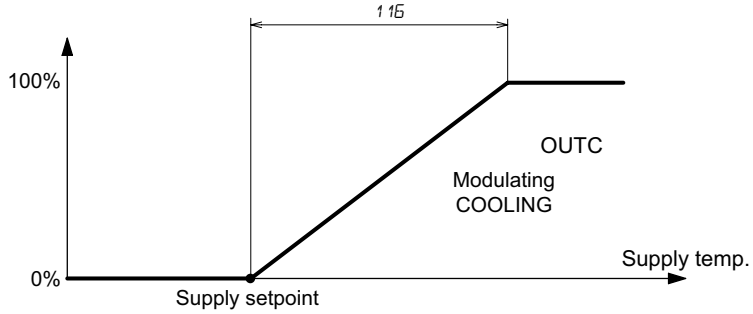


111: *proportional heating band*
Supply setpoint: setpoint calculated for valve regulation

The PI heating controller controls the valve, taking the following control parameters into account:
- supply temperature,
- supply setpoint,
- proportional band for heating supply control 111
- integral control time for heating supply 112.

If the temperature of the supply sensor is lower than the supply setpoint, the output heating 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 112 does not equal 0, or with proportional action only if 112=0.

Control with a single mixed-use in cooling mode:

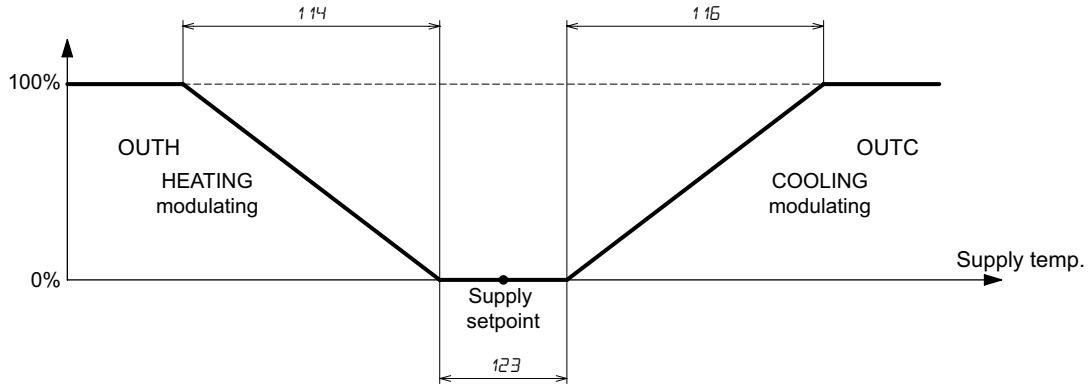


113: *proportional cooling band*
Supply setpoint: setpoint calculated for valve regulation

The PI cooling controller controls the valve, considering the following control parameters:
- supply temperature,
- supply setpoint,
- proportional band for cooling supply control 113
- integral control time for cooling supply 114.

If the temperature of the supply sensor is higher than the supply set, 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 *114* does not equal 0, or with proportional action only if *114*=0.

Control with heating and cooling valves:
2 PI controllers control the modulating heating and cooling valves, based on the supply temperature, the calculated supply setpoint and the neutral zone *121*.



The PI heating controller controls the heating valve, considering the following control parameters:
- supply temperature,
- supply setpoint - neutral_zone (*121*) / 2,
- proportional band for heating supply control *111*
- integral control time for heating supply *112*.

The PI cooling controller controls the cooling valve, considering the following control parameters:
- supply temperature,
- supply setpo + neutral_zone (*121*) / 2,
- proportional band for cooling supply control *113*
- integral control time for cooling supply *114*.

If the temperature of the supply sensor is lower than the supply set - *121* / 2, the heating output valve (or modulating resistance) is active, the ♨ (or ⏦) icon is displayed. The cooling valve remains closed and the ❄ icon remains switched off.
The ♨ (or ⏦) icon switches off when the output of the heating slave PI controller is equal to 0.
The heating valve can be controlled with PI action if the integral time *112* does not equal 0, or with proportional action only if *112*=0.

If the temperature of the supply sensor is higher than the supply set + *121* / 2, the cooling output valve is activated, and the ❄ icon is displayed. The heating valve remains closed and the ♨ (or ⏦) icon remains switched off.
The ❄ icon switches off when the output of the cooling slave PI controller is equal to 0.
The cooling valve can be controlled with PI action if the integral time *114* does not equal 0, or with proportional action only if *114*=0.

13. 3-point valve

It is possible to control 3-point valves for 2-pipe or 4-pipe systems.

Define the following settings to use a 3-point heating valve:
- 003=5
- Select digital output for controlling the opening of the 3-point heating valve 025=22 (DO1) or 026=22 (DO2) or 027=22 (DO3) or 029=22 (DO5) *or* 030=22 (DO6),
- Select digital output for controlling the closure of the 3-point heating valve 025=23 (DO1) or 026=23 (DO2) or 027=23 (DO3) or 029=23 (DO5) *or* 030=23 (DO6),
- Set the valve stroke time with parameter 207.

Define the following settings to use a 3-point cooling valve:
- 004=4
- Select digital output for controlling the opening of the 3-point cooling valve 025=24 (DO1) or 026=24 (DO2) or 027=24 (DO3) or 029=24 (DO5) *or* 030=24 (DO6),
- Select digital output for controlling the closure of the 3-pointf cooling valve 025=25 (DO1) or 026=25 (DO2) or 027=25 (DO3) or 029=25 (DO5) *or* 030=25 (DO6).

To define a mixed-use 3-point valve, set the parameters 003=5 and 004=4 and select the digital outputs as 3-point heating/cooling valve
- Select digital output for controlling the opening of the 3-point heating/cooling valve 025=26 (DO1) or 026=26 (DO2) or 027=26 (DO3) or 029=26 (DO5) *or* 030=26 (DO6),
- Select digital output for controlling the closure of the 3-point heating/cooling valve 025=27 (DO1) or 026=27 (DO2) or 027=27 (DO3) or 029=27 (DO5) *or* 030=27 (DO6)

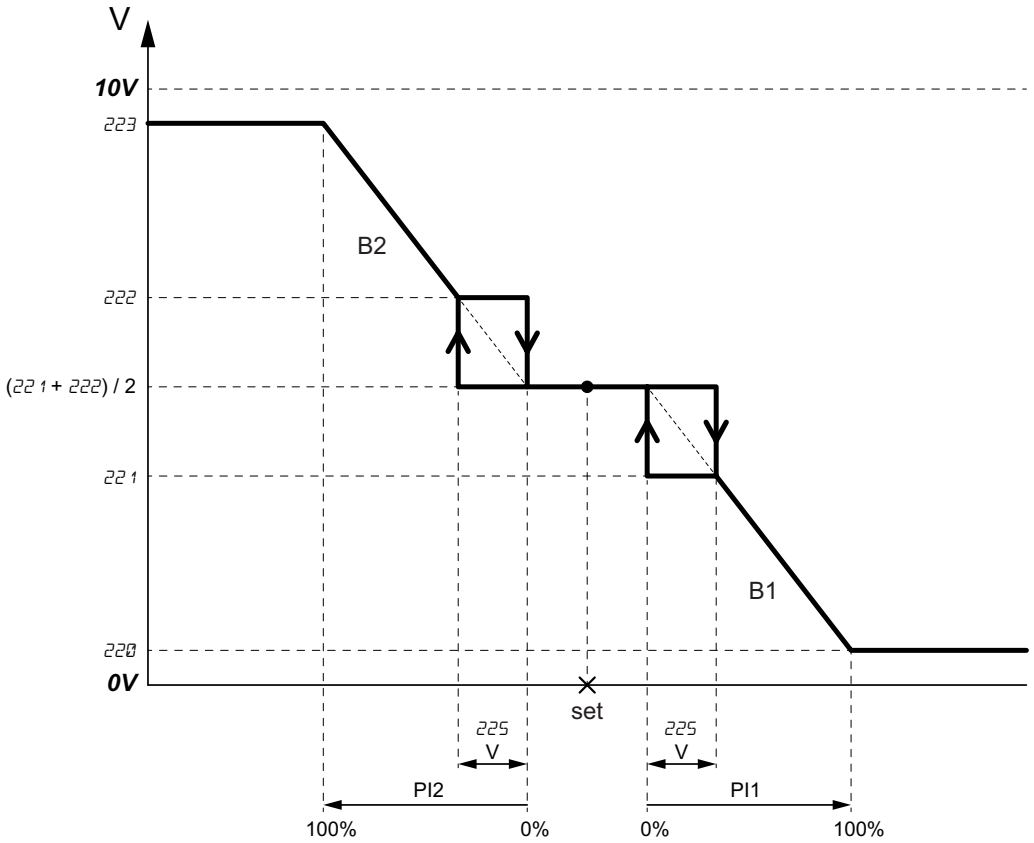
- Set the valve stroke time with parameter 207.

When the controller is switched on and every 24 hours, the 3-point valve runs through a reset cycle (valve closure) for 119% of the stroke time of the valve 207 before executing the regulation.
In addition it is also possible to reset the 3-point valve by Modbus writing the value 1 on variable **ADR_MOD_FORCED_RESET_3PT_VALVE** (12114).

Regulation is done based on explanation of the last paragraph.

14. 6-way valve

The 6-way valve is used in 4-pipe system. With one 0..10V signal it is possible to regulate heating and cooling water by separating ranges of voltage for heating and cooling. The valve is driven according to the following graph:



B1: band 1 of regulation -> heating if 205=0, cooling if 206=1
B2: band 2 of regulation -> cooling if 205=0, heating if 206=1
201: low limit band 1
202: high limit band 1
203: low limit band 2
204: high limit band 2
206: hysteresis regulation 6-way valve
PI1: heating PI regulation if 205=0, cooling PI regulation if 205=1
PI2: cooling PI regulation if 205=0, heating PI regulation if 205=1

At default settings band B1 is assigned for heating (*205=0)* and band B2 for cooling.
The 0..100% PI1 regulation is scaled from parameter *201* (0% + hysteresis *206*, start open for heating water) to parameter *202* (100%, fully open for heating water). Parameters *201* and *202* are expressed in volt.
The 0..100% PI2 regulation is scaled from parameter *203* (0% + hysteresis *206*, start open for cooling water) to parameter *204* (100%, fully open for cooling water). Parameters *203* and *204* are expressed in volt.
By parameter *205* it is possible to change the assignment of the band B1: heating if *205*=0, cooling if *205*=1.

At the middle between regulation ranges, also called neutral position, the signal applied is equal to [*202*+*203*/2]). Heating and cooling waters are closed.
When the PI regulation passes the hysteresis of the 6-way valve, the voltage output starts regulating from the beginning of the band considered and the end of it. If the PI regulation returns inside the hysteresis, the voltage output remains equal to the init band voltage and is set back to the middle of the regulation ranges if the PI regulation returns to 0%.
The hysteresis avoids flickering of the valve when PI1 or PI2 regulation is near of the init of the bands of regulation.

In case a condense contact is used and is active, the cooling regulation part for the 6-way valve is blocked and the valve is set to the neutral position. The heating regulation part is not affected by the condense alarm.

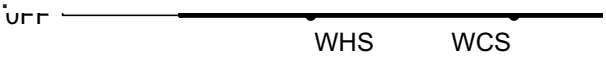
15. Heat pump

It is possible to control a heat pump in heating and cooling driving the compressor and/or reverse cycle valve.
The heat pump can be used if 001=0 (fixed point control for 2-pipe operation) or 001=1 (control with compensated setpoint for 2-pipe operation)

• Heat pump with reverse valve in cooling:

To control a heat pump with reverve cycle valve used in cooling do the following settings:
- 015 = 1,
- set an output to drive the compressor 025=28 (DO1) or 026=28 (DO2) or 027=28 (DO3) or 028=28 (DO4) or 029=28 (DO5) *or* 030=28 (DO6),
- set an output to drive the reverve cycle valve used in cooling 025=29 (DO1) or 026=29 (DO2) or 027=29 (DO3) or 028=29 (DO4) or 029=29 (DO5) *or* 030=29 (DO6),

In heating:



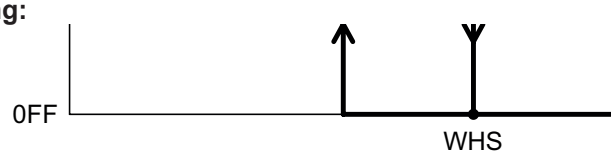
OUT

Treg: control sensor
WHS = 104 if the controller is set at a fixed point (001=0) or calculated setpoint based on compensation (if 001=1)
OUT: on/off compressor output:
115: heating hysteresis for on/off output.

If Treg < (WHS - 115), the compressor is activated. The ♨ icon is displayed.
If Treg >= WHS, the compressor is deactivated. The ♨ icon is switched off.

Note: In case the winter compensation is used (130=2 or 3), you must pair an external sensor with an analogue input 021=3 (AI1) or 023=3 (AI2).

In cooling:



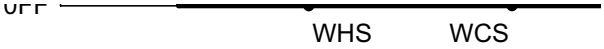
Treg: control sensor
WCS = 105 if the controller is set at a fixed point (001=0) or calculated setpoint based on compensation (if 001=1)
OUT: on/off compressor and reverse cycle valve outputs:
116: cooling hysteresis for on/off output.

If Treg > (*WCS +* 116), the compressor and reverse cycle valve are activated. The ❄ icon is displayed.
If Treg <= *WCS,* the compressor and reverse cycle valve are deactivated and the ❄ icon is switched off.

• Heat pump with reverse valve in heating:

To control a heat pump with reverve cycle valve used in heating do the following settings::
- 015 = 1,
- set an output to drive the compressor 025=28 (DO1) or 026=28 (DO2) or 027=28 (DO3) or 028=28 (DO4) or 029=28 (DO5) *or* 030=28 (DO6),
- set an output to drive the reverve cycle valve used in heating 025=30 (DO1) or 026=30 (DO2) or 027=30 (DO3) or 028=30 (DO4) or 029=30 (DO5) *or* 030=30 (DO6),

In heating:

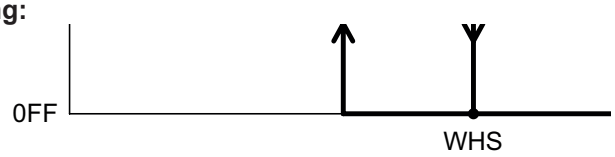


OUT

Treg: control sensor
WHS = 104 if the controller is set at a fixed point (001=0) or calculated setpoint based on compensation (if 001=1)OUT: uscite OUT: on/off compressor and reverse cycle valve outputs.
115: heating hysteresis for on/off output.

If Treg < (WHS - 115), the compressor and reverse cycle valve are activated. The icon is displayed.
If Treg >= WHS, the compressor and reverse cycle valve are deactivated. The icon is switched off.

In cooling:



Treg: control sensor
WCS = 105 if the controller is set at a fixed point (001=0) or calculated setpoint based on compensation (if 001=1)
OUT: uscita on/off compressore:
116: cooling hysteresis for on/off output.

If Treg > (*WCS +* 116*),* the compressor is activated. The icon is displayed.
If Treg <= *WCS,* the compressor is deactivated and the icon is switched off.

Note: In case the winter compensation (130=2 or 3) or summer compensation (130=1 or 3) is used, you must pair an external sensor with an analogue input 021=3 (AI1) or 023=3 (AI2).

• Heat pump protection:

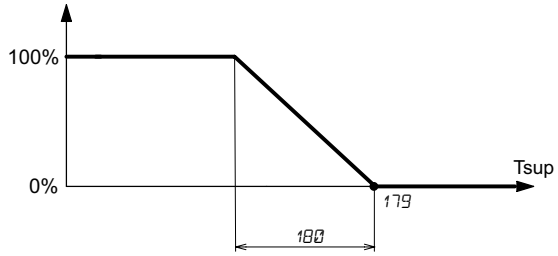
To avoid the compressor can be damaged, the compressor can be activated again after deactivation if delay defined by parameter 208 has elapsed.

16. Post-heating battery logic

The post-heating battery can be used as a post-heating battery following a reduction in temperature due to dehumidification, as a battery for integration with the heating battery and post-heating battery following a reduction in temperature due to dehumidification, or as a post-heating.
Post-heating can be carried out using a modulating valve (005=2), an on/off valve (005=4), a modulating resistance (005=1), or an on/off resistance (005=3).
In integration, the post-heating battery uses the control sensor and the current operating setpoint for control.
In post-heating, 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: 021=2 (AI1) or 023=2 (AI2).
Through the parameter 006 the post-heating battery's operation is selected:
- 006=0 post-heating in dehumidification,
- 006=1 integration and post-heating in dehumidification. If no dehumidification is active, the post-heating battery works in integration mode and is a second stage for heating, otherwise in post-heating,
- 006=2 post-heating.
The control is proportional, integral 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.

• Modulating post-heating stage:

- post-heating in dehumidification (006=0) or post-heating (006=2) with valve: 005=2 and 031=7 (AO1) or 032=7 (AO2) or 033=7 (AO3).
- post-heating in dehumidification (006=0) or post-heating (006=2) with electrical resistance: 005=1 and 031=8 (AO1) or 032=8 (AO2) or 033=8 (AO3).

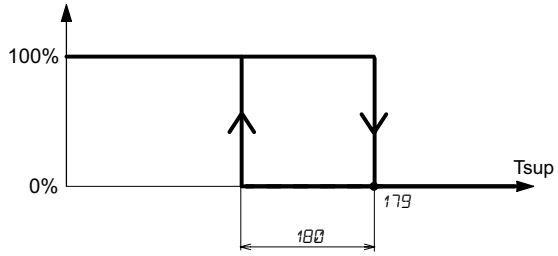


Tsup: supply temperature: 021=2 (AI1) or 023=2 (AI2)
179: post-heating setpoint
180: proportional post-heating band

During control, the (or) icon is displayed if the signal applied to the valve (or the modulating resistance) is not equal to 0 (Tsup< 179). The regulation is PI if the integral time 181 does not equal 0, or with proportional action only if 181=0.
The (or) icon is switched off if the signal applied to the valve (or the modulating resistance) is equal to 0 (Tsup>= 179) and if the heating stage is also disabled.

• On-off post-heating stage:

- post-heating in dehumidification (006=0) or post-heating (006=2) with valve: 005=4 and 025=8 (DO1) or 026=8 (DO2) or 027=8 (DO3) or 028=8 (DO4) or 029=8 (DO5) *or* 030=8 (DO6).
- post-heating in dehumidification (006=0) or post-heating (006=2) with electrical resistance: 005=3 and 025=9 (DO1) or 026=9 (DO2) or 027=9 (DO3) or 028=9 (DO4) or 029=9 (DO5) *or* 030=9 (DO6).

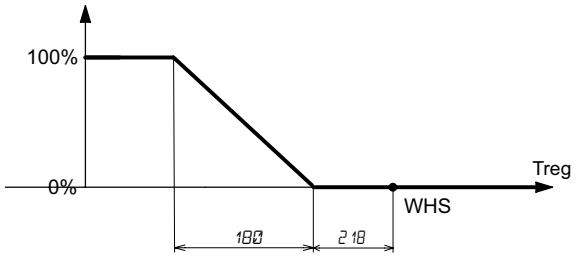


Tsup: supply temperature: 021=2 (AI1) or 023=2 (AI2)
179: post-heating setpoint
180: proportional post-heating band

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

• Modulating integration stage:

- 006=1,
- integrational stage with valve: 005=2 and 031=7 (AO1) or 032=7 (AO2) or 033=7 (AO3).
- integrational stage with electrical resistance: 005=1 and 031=8 (AO1) or 032=8 (AO2) or 033=8 (AO3).

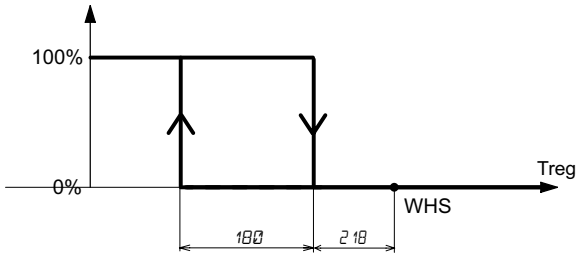


Treg: control temperature
WHS: heating control setpoint
180: proportional post-heating band
129: differential post-heating

During control, the ♨ (or ⏦) icon is displayed if the signal applied to the valve (or the modulating resistance) in integration is not equal to 0: Tsup < WHS - 129.
The regulation is PI if the integral time 181 does not equal 0, or with proportional action only if 181=0.
The ♨ (or ⏦) icon switches off if the signal applied to the valve (or the modulating resistance) in integration is equal to 0, Tsup >= WHS - 129 and if the heating stage is also deactivated.

• Integration on/off stage:

- 006=1,
- integration stage with valve: 005=4 and 025=8 (DO1) or 026=8 (DO2) or 027=8 (DO3) or 028=8 (DO4) or 029=8 (DO5) *or* 030=8 (DO6).
- integration stage with electrical resistance: 005=3 and 025=9 (DO1) or 026=9 (DO2) or 027=9 (DO3) or 028=9 (DO4) or 029=9 (DO5) *or* 030=9 (DO6).



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

If Treg < WHS - 129 - 180 the heating integration stage is activated, the ♨ (or ⏦) icon is displayed if the integration is a valve (or electrical resistance).
If Treg >= WHS - 129 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.

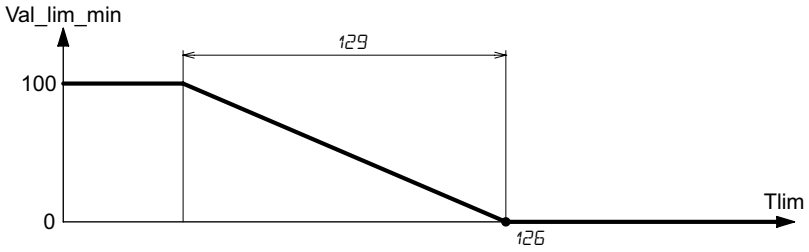
17. Supply limits function with fixed-point control

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 123 and 125 respectively.
The limit sensor is the supply sensor. Pair it with a sensor input 021=2 (AI1) or 023=2 (AI2).
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 123=1.
To enable the lower limits in heating mode, set 123=2.
To enable the lower limits in heating and cooling modes, set 123=3.
To disable this function, set 123=0.
Pair the supply with an input:021=1 for input AI1 or 023=1 for input AI2.

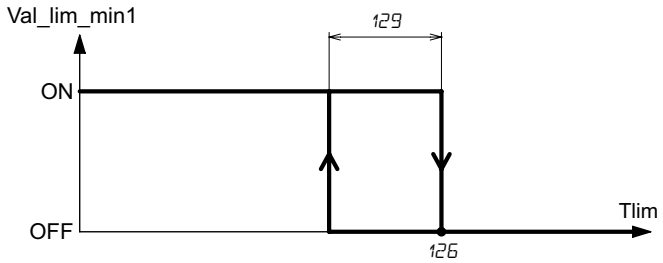
Low limit in heating mode:



Val_lim_min: theoretical value of the low limit output in heating mode
Tlim: temperature of the supply sensor
124: setpoint of low limit
127: proportional limit band

When active, if the supply temperature falls below the minimum supply setpoint 124 for a time upper than the delay of alarm limit activation 198, the theoretical output of the heating control is added to the theoretical value of the limit regulation Val_lim_min.
The limit regulation is PI if the integral time 128 does not equal 0, or with proportional action only if 128=0.

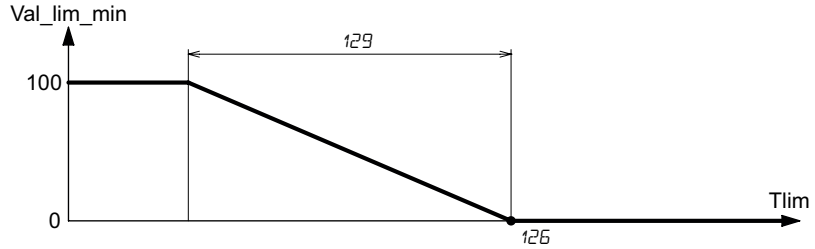
If heating regulation is on/off type, the theoretical output Val_lim_min is converted as indicated on the graph below



Val_lim_min1: theoretical value of the low limit output in heating mode Val_lim_min converted in ON/OFF
Tlim: temperature of the supply sensor
124: setpoint of low limit
127: proportional limit band
ON corrisponds to Val_lim_min=100%
OFF corrisponds to Val_lim_min=0%

During low limit alarm condition the ⚠ icon is displayed and the message LI-L is displayed on the alarms page.

Low limit in cooling mode:

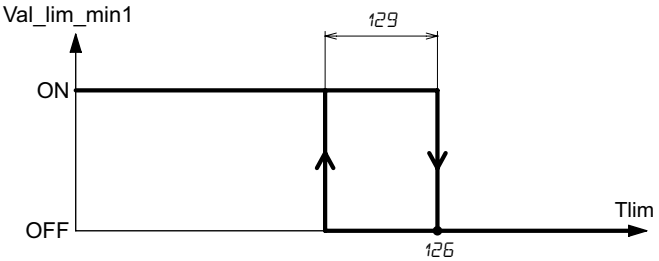


Val_lim_min: theoretical value of the low limit output in cooling mode
Tlim: temperature of the supply sensor
124: setpoint of low limit
127: proportional limit band

Control without dehumidification (139=0):
When active, if the supply temperature falls below the minimum supply setpoint 124 for a time upper than the delay of alarm limit activation 198, the theoretical output of the cooling control is substracted to the theoretical value of the limit regulation Val_lim_min.
The limit regulation is PI if the integral time 128 does not equal 0, or with proportional action only if 128=0.

Control with dehumidification using the cooling battery (008=0 and 139≠0):
In the event that the request for dehumidification has priority over the temperature (196=1), the limit function does not operate on the cooling battery.

If cooling regulation is on/off type, the theoretical output Val_lim_min is converted as indicated on the graph below



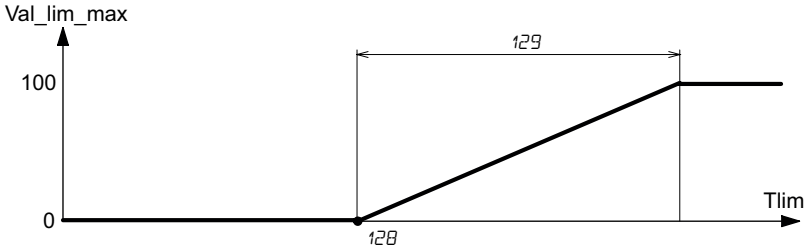
Val_lim_min1: theoretical value of the low limit output in cooling mode Val_lim_min converted in ON/OFF
Tlim: temperature of the supply sensor
124: setpoint of low limit
127: proportional limit band
ON corrisponds to Val_lim_min=100%
OFF corrisponds to Val_lim_min=0%

During low limit alarm condition the ⚠ icon is displayed and the message LI-L is displayed on the alarms page.

• Maximum limit:

To enable the high limit in cooling mode, set 125=1.
To enable the high limit in heating mode, set 125=2.
To enable the high limit in heating and cooling mode, set 125=3.
To disable this function, set 125=0.

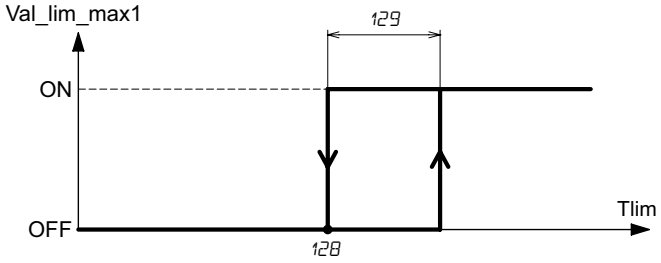
High limit in heating mode:



Val_lim_max: theoretical value of the high limit output in heating mode
Tlim: temperature of the supply sensor
126: setpoint of high limit
127: proportional limit band

When active, if the supply temperature goes above the maximum supply setpoint 126 for a time upper than the delay of alarm limit activation 198, the theoretical output of the heating control is substracted to the theoretical value of the limit regulation Val_lim_max.
The limit regulation is PI if the integral time 128 does not equal 0, or with proportional action only if 128=0.

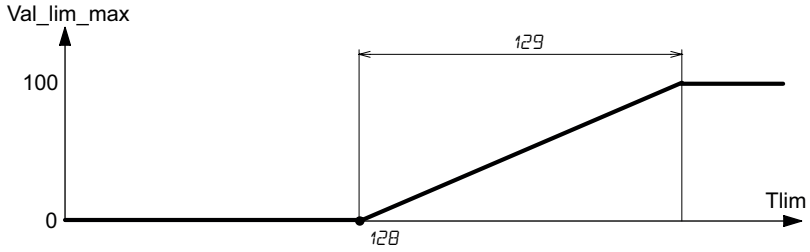
If heating regulation is on/off type, the theoretical output Val_lim_max is converted as indicated on the graph below



Val_lim_max1: theoretical value of the high limit output in heating mode Val_lim_max converted in ON/OFF
Tlim: temperature of the supply sensor
126: setpoint of high limit
127: proportional limit band
ON corrisponds to Val_lim_max=100%
OFF corrisponds to Val_lim_max=0%

During high limit alarm condition the ⚠ icon is displayed and the message LI-H is displayed on the alarms page.

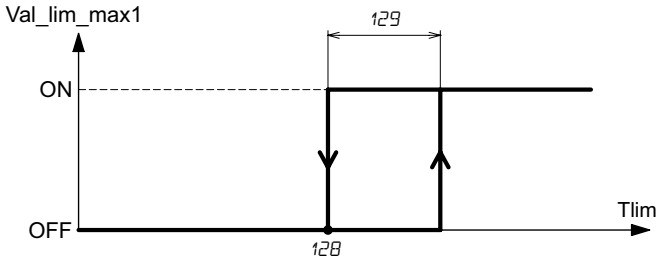
High limit in cooling mode:



Val_lim_max: theoretical value of the high limit output in cooling mode
Tlim: temperature of the supply sensor
126: setpoint of high limit
127: proportional limit band

When active, if the supply temperature goes above the maximum supply setpoint 126 for a time upper than the delay of alarm limit activation 198, the theoretical output of the cooling control is added to the theoretical value of the limit regulation Val_lim_max.
The limit regulation is PI if the integral time 128 does not equal 0, or with proportional action only if 128=0.

If cooling regulation is on/off type, the theoretical output Val_lim_max is converted as indicated on the graph below



Val_lim_max1: theoretical value of the high limit output in cooling mode
Tlim: temperature of the supply sensor
126: setpoint of high limit
127: proportional limit band
ON corrisponds to Val_lim_max=100%
OFF corrisponds to Val_lim_max=0%

During high limit alarm condition 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 001=0, 1, 3 or 4 (2-pipe fixed point control or with compensation, 4-pipe fixed point control or with compensation).

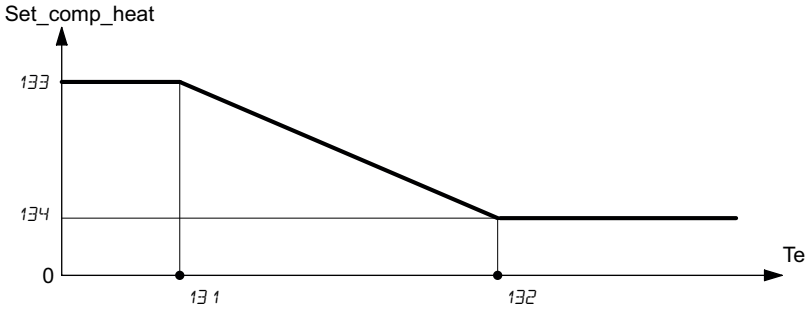
18. Control with setpoint compensation

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 001=1 (2-pipe control with external compensation) or 001=4 (4-pipe control with external compensation),
- type of compensation:
  - 031=1 for compensation in cooling mode,
  - 031=2 for compensation in heating mode,
  - 031=3 for compensation in heating and cooling modes,
- a sensor input to connect the external sensor: 021=3 for input AI1 or 023=3 for input AI2.

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

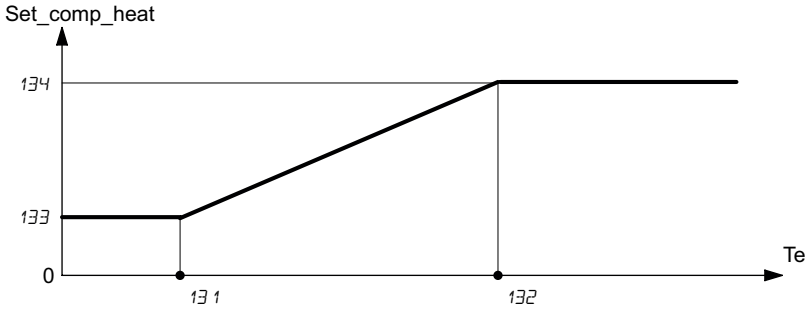
Two separate points are defined, as indicated in the charts below

Example of compensation curve with 133 > 134.



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

Example of compensation curve with 133 < 134.



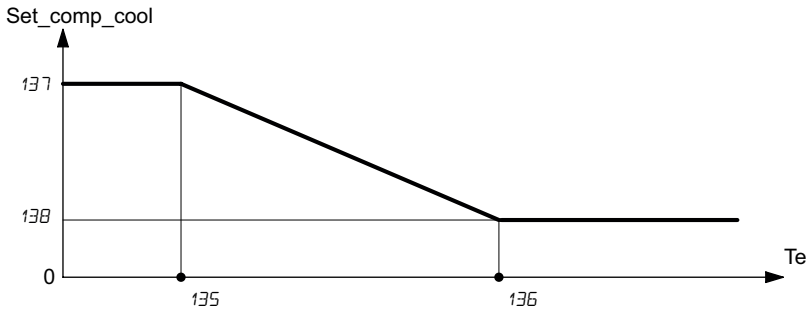
Set_comp_heat: winter compensated setpoint
Te: external temperature
131: minimum external temperature for winter compensation
132: maximum external temperature for winter compensation
133: compensated setpoint corresponding to the minimum external temperature for winter compensation 131
134: compensated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

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

• Compensation in the 2-pipe cooling mode:

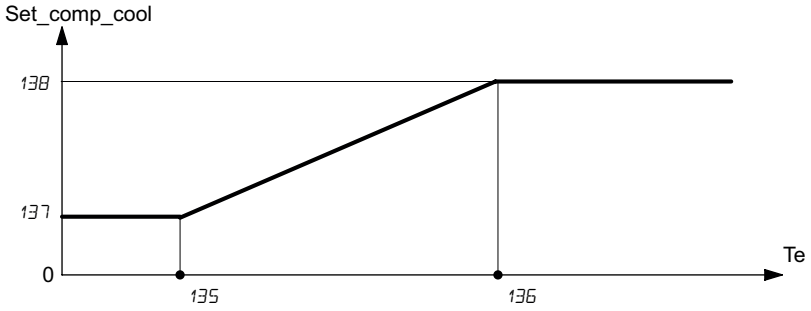
Two separate points are defined, as indicated in the charts below

Example of compensation with *137* > *138*.



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

Example of compensation curve with *137* < *138*.



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

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

19. Dehumidification

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

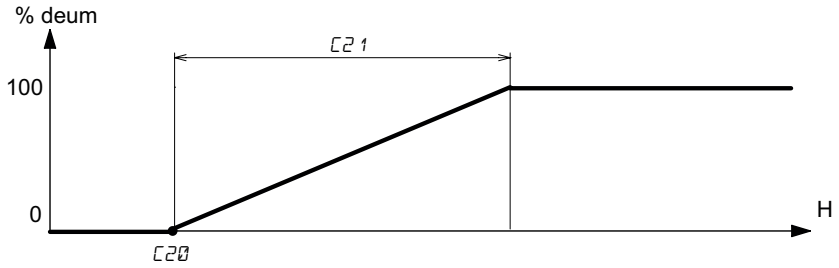
Humidity can be controlled using the humidity sensor inside the controller or using a remote humidity transmitter 1 or 2.

• 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
141: humidity neutral zone
142: humidity setpoin
143: humidity proportional band

Settings for dehumidification with cooling battery:
- select the type of dehumidification with cooling battery 008=0,
- define the type of cooling battery 004=1 and
  - a modulating output for the cooling battery 031=4 (AO1) or 032=4 (AO2) or 033=4 (AO3)
  - or a modulating output for a mixed-use battery 031=5 (AO1) or 032=45 (AO2) or 033=5 (AO3),
- turn on dehumidification
  - with an internal humidity sensor 139=1 or 139=4 only in cooling
  - or with a remote humidity sensor 139=2 or 139=5 only in cooling with tranmitter 1 or 139=3 or 139=6 only in cooling with tranmitter 2
- 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.

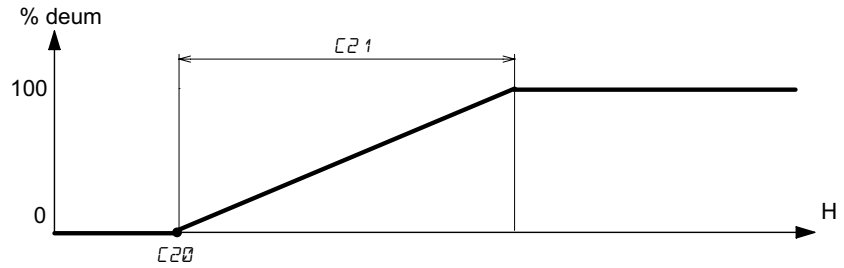
If the cooling request has priority, the icon is switched off.

In both cases, the icon is displayed.

Note: If the frost protection (with 189=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
141: humidity neutral zone
142: humidity setpoint
143: humidity proportional band

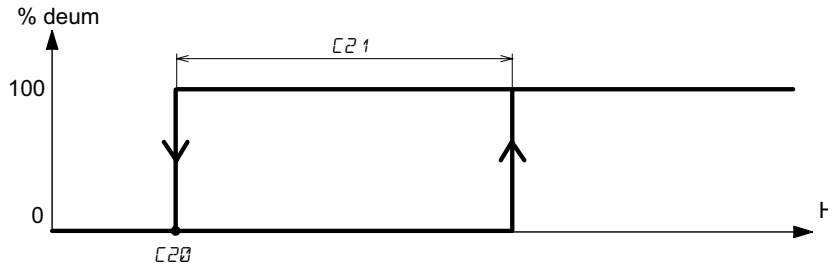
Settings for dehumidification with modulating dehumidifier:
- select the type of dehumidification with modulating dehumidifier 008=1,
- define the modulating dehumidifier output 031=11 (AO1) or 032=11 (AO2) or 033=11 (AO3) ,
- turn on dehumidification
  - with an internal humidity sensor 139=1 or 139=4 only in cooling
  - or with a remote humidity sensor 139=2 or 139=5 only in cooling with transmitter 1, 139=3 or 139=6 only in cooling with transmitter 2
- humidity neutral zone 141,
- humidity setpoint 142,
- humidity proportional band 143,
- humidity integral time 144.

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

Note: If the frost protection (with 189=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
141: humidity neutral zone
142: humidity setpoint
143: humidity proportional band

Settings for dehumidification with on/off dehumidifier:
- select the type of dehumidification with the on/off dehumidifier 008=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=4 only in cooling
  - or with a remote humidity sensor 139=2 or 139=5 only in cooling with transmitter 1, 139=3 or 139=6 only in cooling with transmitter 2
- humidity neutral zone 141,
- humidity setpoint 142,
- humidity proportional band 143.

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

Note: If the frost protection (with 189=1), condensation alarm or steady ventilation are activated, dehumidification is shut down.

• Using an external damper regulated on dehumidification:

See chapter *"Regulation of on/off damper based on dehumidification" page 84*

• Using a modulating ventilator regulated on dehumidification:

See chapter*"25. Operating mode of the ventilators" page 72* paragraph "Regulation of speed based on dehumidification (010=7)".

20. 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 or using a remote humidity transmitter 1 or 2. The presence of a one or more speeds on/off ventilator or a modulating supply ventilator 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
141: humidity neutral zone
142: humidity setpoint
143: humidity proportional band

Settings for humidification with modulating humidifier:
- select the type of modulating humidifier 007=1,
- define the modulating humidifier output 031=10 or 032=10 or 033=10,
- turn on humidification
  - with an internal humidity sensor 140=1 or 140=4 only in heating
  - or with a remote humidity sensor 140=2 or 140=5 only in heating with transmitter 1, 139=3 or 139=6 only in heating with transmitter 2
- 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 189=1), condensation alarm or steady ventilation are activated, humidification is shut down.

• Using an on/off humidifier:

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

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

Settings for humidification with on/off humidifier:
- select the type of on/off humidifier 007=2,
- define the on/off humidifier output 025=16 (DO1) or 026=16 (DO2) or 027=16 (DO3) or 028=16 (DO4) or 029=16 (DO5),
- turn on humidification
  - with an internal humidity sensor 140=1 or 140=4 only in heating
  - or with a remote humidity sensor 140=2 or 140=5 only in heating with transmitter 1, 139=3 or 139=6 only in heating with transmitter 2
- humidity neutral zone 141,
- humidity setpoint 142,
- humidity proportional band 143

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

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

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

Note: If the frost protection (with 189=1), condensation alarm or steady ventilation are activated, dehumidification is shut down.

• humidification authorization for humidifier not managed by the controller:

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

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

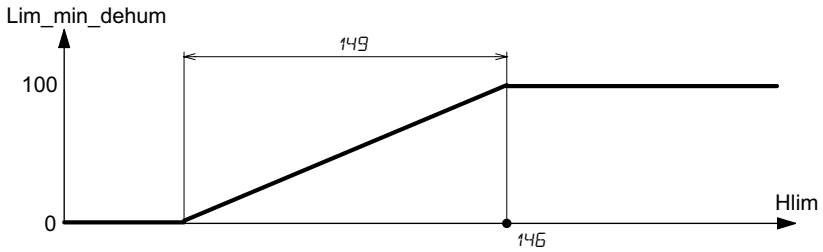
21. Humidity supply limits function

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 transmitter 1 or 2.
If no transmitter is used, 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 to transmitter 1 (145=1) or 2 (145=2)
- define the minimum limit setpoint 146 and the humidity limit proportional band 149.

Low limit in dehumidification mode with modulating control:

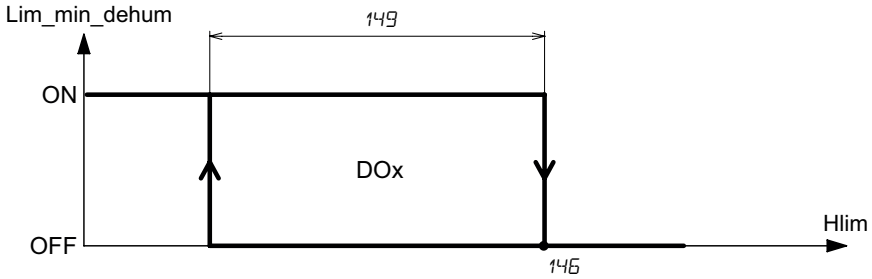


Hlim: Limit supply humidity sensor
Lim_min_dehum.: theoretical value of the low limit output in dehumidification
146: low limit humidity setpoint
149: proportional band for humidity limit

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

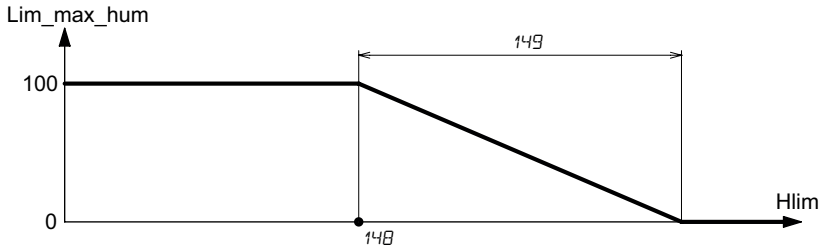
If the supply humidity falls below the low limit humidity setpoint I46 - (proportional band for humidity limit I49), the on/off output in dehumidification mode is controlled considering the lowest value between the theoretical on/off value of the dehumidification control and the theoretical value of 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 to transmitter 1 (147=1) or 2 (147=2),
- define the maximum limit setpoint 148 and the humidity limit proportional band 149.

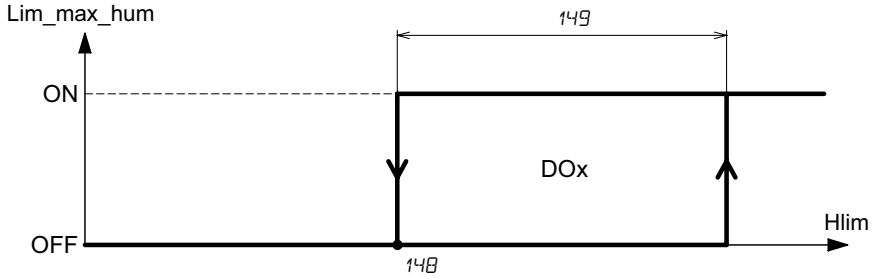
High limit in humidification mode with modulating control:



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

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

High limit in humidification mode with on/off control:



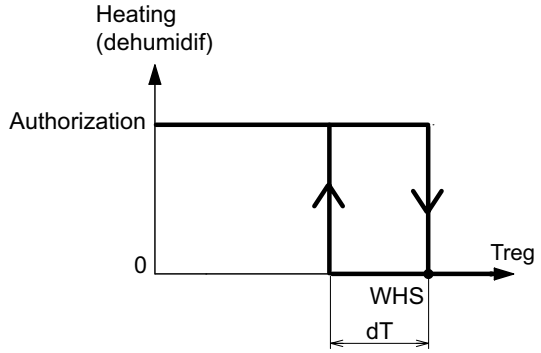
Hlim: Limit supply humidity sensor
Lim_max_hum: theoretical value of the high limit output in humidification
148: high limit humidity setpoint
149: proportional band for humidity limit

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

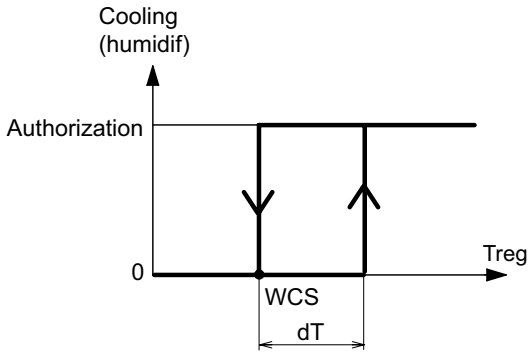
22. Temperature/humidity control priority

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 *196*:
- *196*= 0 means the temperature control is prioritized. The control of the temperature is carried out first; when the temperature setpoint is reached then humidity control is started.
To do again temperature regulation, temperature must vary as indicated below:

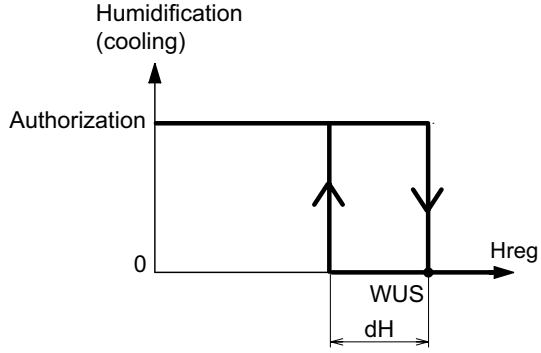


Treg: regulation temperature
WHS: heating operation setpoint
dT: 0.2°C
During dehumidification if Treg < WHS - dT, heating regulation is started and dehumidification regulation stopped till WHS is reached again
.

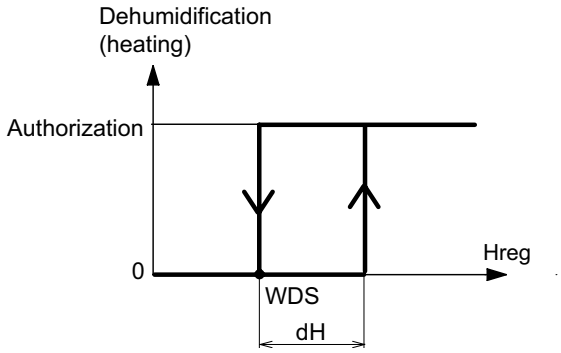


Treg: regulation temperature
WCS: cooling operation setpoint
dT: 0.2°C
During humidification if Treg > WCS + dT, cooling regulation is started and humidity regulation stopped till WCS is reached again.

- *196*= 1 means the humidity control is prioritized. The control of the humidity is carried out first; when the humidity setpoint is reached then the temperature control is started.
To do again humidity regulation, humidity must vary as indicated below:



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



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

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

• Temperature priority, 196=0:

Temperature setpoint not reached:

Temperature request	Humidity request	Heating battery	Cooling/ dehumidification battery	Post-heating battery (*)	Humidifier
Heating	Humidification	ON	OFF	006=0 (post only): OFF	ON
				006=1 (post+integ) ON (controlled in integration through the control sensor and the WHS operating setpoint)	
Heating	Dehumidification	ON	OFF	006=0 (post only): OFF	OFF
				006=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	008=0: ON (controlled with the max between the cooling request and dehumidification request)	OFF (if cooling request is higher than dehumidification request)	OFF
			008=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 006=2, the post-heating battery has the function of additional heating battery. It is controlled based on the supply sensor and the post-heating setpoint 179 independently of the priority.

Temperature setpoint reached, control of humidity:

Temperature request	Humidity request	Heating battery	Cooling/ dehumidification battery	Post-heating battery	Humidifier
Heating achieved	Humidification	OFF	OFF	OFF	ON
Heating achieved	Dehumidification	OFF	008=0: ON (controlled by the dehumidification signal) 008=1 or 2: ON (dehumidification using the modulating or on/off dehumidifier)	ON (controlled by the supply sensor and post-heating setpoint 179)	OFF
Cooling achieved	Humidification	OFF	OFF	OFF	ON
Cooling achieved	Dehumidification	OFF	008=0: ON (controlled by the dehumidification signal) 008=1 or 2: ON (dehumidification using the modulating or on/off dehumidifier)	ON (controlled by the supply sensor and the post-heating setpoint 179)	OFF

(*) if 006=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, 196=1:

Humidity setpoint not reached:

Temperature request	Humidity request	Heating battery	Cooling/ dehumidification battery	Post-heating battery	Humidifier
Heating	Humidification	OFF	OFF	OFF	ON
Heating	Dehumidification	OFF	008=0: ON (controlled by the dehumidification signal) 008=1: ON (dehumidification using the modulating or on/off dehumidifier)	ON (controlled by the supply sensor and the post-heating setpoint 179)	OFF
Cooling	Humidification	OFF	OFF	OFF	ON
Cooling	Dehumidification	OFF	008=0: ON (controlled with the max between the cooling request and dehumidification request) 008=1: ON (dehumidification using the modulating or on/off dehumidifier).	OFF (if cooling request is higher than dehumidification request) ON (if cooling request is higher than dehumidification request, post heating is controlled by the supply sensor and the post-heating setpoint 179)	OFF

Humidity setpoint reached, temperature control:

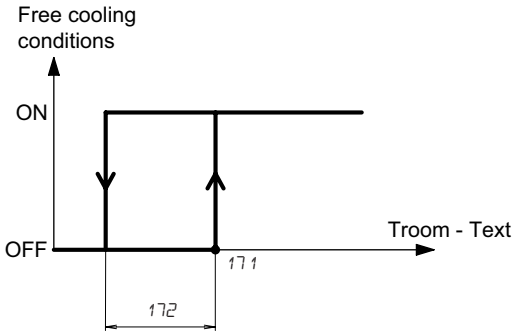
Temperature request	Humidity request	Heating battery	Cooling/ dehumidification battery	Post-heating battery	Humidifier
Heating	Humidification achieved	ON	OFF	006=0 (post only): OFF	OFF
				006=1 (post+integ) ON (controlled in integration through the control sensor and the WHS operating setpoint)	
Heating	Dehumidification achieved	ON	OFF	006=0 (post only): OFF	OFF
				006=1 (post+integ) ON (controlled in integration through the control sensor and the WHS operating setpoint)	
Cooling	Humidification achieved	OFF	008=0: ON (temperature-controlled)	OFF	OFF
			008=1 or 2: OFF (dehumidification using the modulating or on/off dehumidifier)		
Cooling	Dehumidification achieved	OFF	ON (controlled by temperature).	OFF	OFF
			008=1 or 2: OFF (dehumidification using the modulating or on/off dehumidifier)		

23. Free cooling/heating conditions

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

• Free cooling conditions:

Set the following parameters:
- 170=1 or 3 (enabling of free cooling operation indipendently of working season) or 170=4 or 6 (enabling of free cooling operation only in cooling mode),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2)) or use the internal sensor of AHS2 (002=1),
- configure an analogue input as an external sensor 021=3 (AI1) or 023=3 (AI2),
- select a controlled damper 012≠0,
- control the selected damper on free cooling 013=1 or 2,



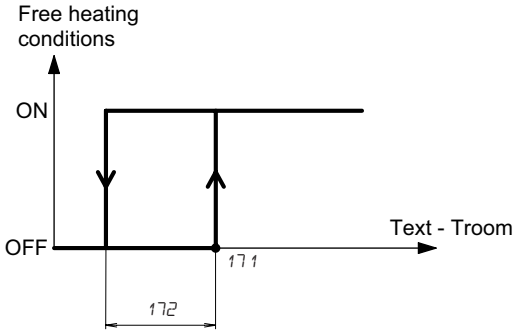
Troom: internal or return temperature
Text: external temperature
171: setpoint differential for free cooling/heating
172: proportional band for free cooling/heating

In order to be able to have the free cooling conditions, the following 4 conditions must be checked
Text >= 175
Troom >= 176
(Troom - Text) < 174
(Troom - Text) > 171

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

• Free heating conditions:

In order to have the free heating conditions, the following parameters must be set:
- 170=2 or 3 (enabling of free heating operation indipendently of working season) or 170=5 or 6 (enabling of free heating operation only in heating mode),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2)) or use the internal sensor of AHS2 (002=1),
- configure an analogue input as an external sensor 021=3 (AI1) or 023=3 (AI2),
- select a controlled damper 012≠0,
- control the selected damper on free heating 013=1 or 2.



Troom: internal 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 <= 177

Troom <= r78
(Text - Troom) < r74
(Text - Troom) > r71

If (Text - Troom) <= r71 - r72 now the free heating conditions are OFF.

If damper used is on/off regulated type (d12=1) or modulated type(d12=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 (d12=2) or modulated bypass for heat exchanger type(d12=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, d12=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.

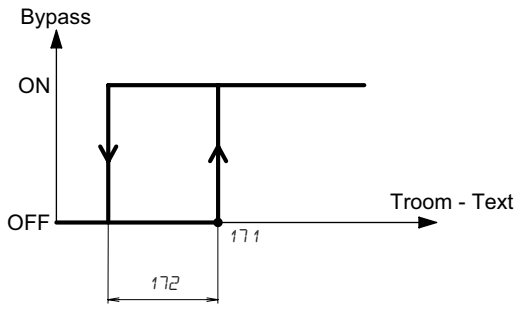
Note: If the frost protection alarm occurs, if the appliance is switched off, if the room sensor or external sensor is broken, free cooling/heating is disabled.
In case of regulation on supply sensor without considering room sensor, free cooling/heating is disabled. A 1-speed on/off ventilator or a ventilator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

24. Regulation with free cooling, free heating

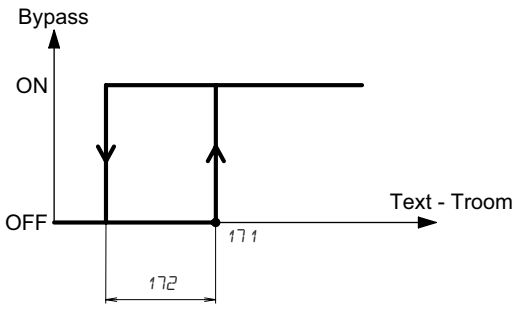
• Operation with on/off bypass damper for cross-flow heat exchanger

if the damper used is bypass for heat exchanger (based only on free heating/cooling, 012=5), the damper is regulated directly with free cooling and/or heating conditions defined in the previous paragraph, regardless request of cooling and/or heating.
The following settings must be done:
- 170=1 or 3 (authorization of free cooling regardless the working season), or 170=4 or 6 (authorization of free cooling in cooling mode only), or 170=2 or 3 (authorization of free heating regardless the working season), or 170=5 or 6 (authorization of free heating in heating mode only),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2)) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- set a digital output as on/off bypass for heat exchanger (based only on free c/h): 025=20 (DO1) or 026=20 (DO2) or 027=20 (DO3) or 028=20 (DO4) or 029=20 (DO5) or 030=20 (DO5), action on damper 013=1,
- set the type of heat exchanger to cross-flow heat exchanger 001=1.

Free cooling:



Free heating



Troom: internal sensor of regulator or return temperature
Text: external temperature
171: differential setpoint for free cooling/heating
172: proportional band for free cooling/heating

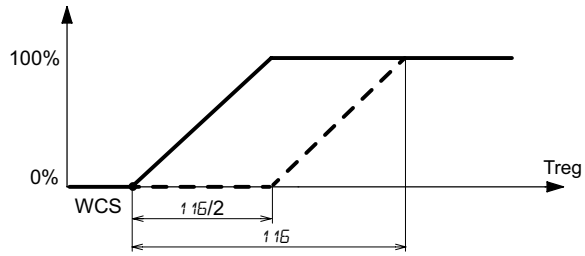
Using the free cooling conditions:
Text >= 175
Troom >= 176
(Troom - Text) < 174
If (Troom - Text) > 171 -> the bypass damper is activated (open).
If (Troom - Text) <= 171 - 172 the bypass damper is disabled (closed).

Using the free heating conditions:
Text <= 177
Troom <= 178
(Text - Troom) < 174
If (Text - Troom) > 171 the bypass damper is activated (open).
If (Text - Troom) <= 171 - 172 the bypass damper is disabled (closed).

• Cooling operation using free cooling:

Operation with modulating damper (or bypass) 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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2)) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- external modulating damper regulated on free c/h: 012=3, 013=1 or 2 and 031=9 (AO1) or 032=9 (AO2) or 033=9 (AO3),
or modulating bypass for heat exchanger 012=4, 013=1 and 014=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).
- modulating cooling valve 004=1 and 031=4 (AO1) or 032=4 (AO2) or 033=4 (AO3)
or modulating mixed-use cooling valve 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3).

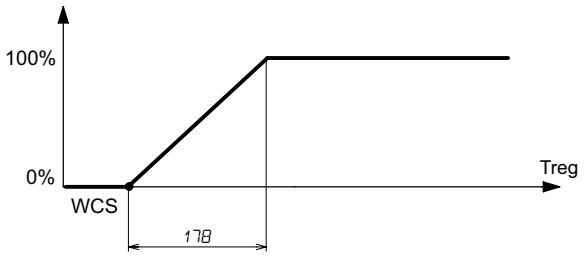


Treg: room/remote temperature if 002=0,1 or supply temperature if 002=2 and 021=2 (AI1) or 023=2 (AI2)
WCS: cooling operation setpoint
113: cooling proportional band
solid curve: modulating damper output
dashed curve: modulating cooling valve output

If the control temperature rises above WCS, the modulating damper in the presence of free cooling conditions goes from the minimum opening position (parameter 164) to the maximum opening position (parameter 165) in the band defined by the parameter 113/2.
The valve changes position from closed to open when Treg change from (WCS + 113/2) to (WCS + 113).

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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of regulator (021≠1 and 023≠1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- modulating bypass for heat exchanger 012=4, 013=1 and 014=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).

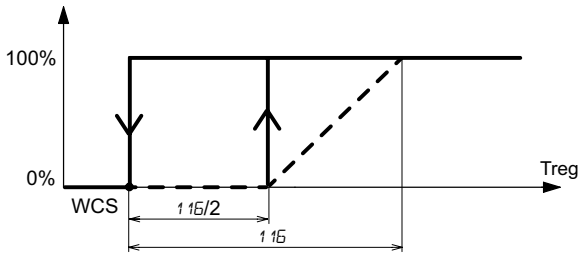


Treg: room/remote temperature independently from parameter 002
WCS: cooling operation setpoint
173 Hysteresis regulation free heating/cooling

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 164) to the maximum opening position (parameter 165) in the band defined by the parameter 173.

Operation with on/off damper (or bypass) 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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- external on/off damper controlled by free cooling/heating: 012=1 and 013=1 or 2, 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5),
or on/off bypass damper for heat exchanger 012=2, 013=1 and 014=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- modulating cooling valve 004=1 and 031=4 (AO1) or 032=4 (AO2) or 033=4 (AO3) or modulating mixed-use valve in cooling 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3).

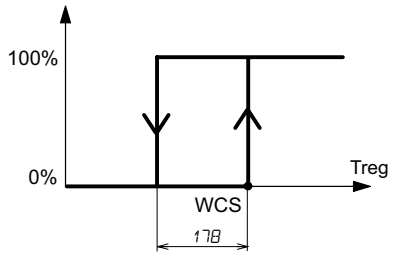


Treg: room/remote temperature if 002=0,1 or supply temperature if 002=2 and 021=2 (AI1) or 023=2 (AI2)
WCS: cooling operation setpoint
113: cooling proportional band
solid curve: on/off damper output
dashed curve: modulating cooling valve output

In the presence of free cooling conditions:
If Treg > (WCS + 113/2) the on/off damper controlled by the free cooling is activated.
If Treg <= WCS the on/off damper controlled by the cooling is disabled.
The valve changes position from closed to open when Treg change from (WCS + 113/2) to (WCS + 113).

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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
in case the remote sensor is used set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- on/off bypass damper for heat exchanger 012=2, 013=1 and 014=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),

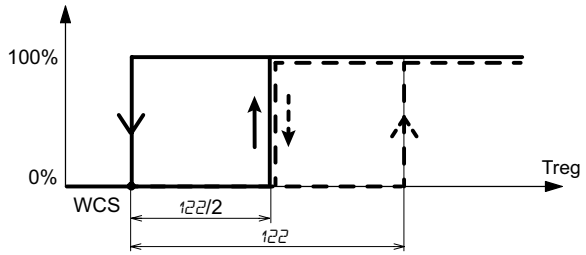


Treg: room/remote temperature independently from parameter 002
WCS: cooling operation setpoint
173 Hysteresis regulation free heating/cooling

With free cooling conditions:
If Treg > WCS the on/off bypass damper regulated on free cooling is activated.
If Treg <= (WCS - 173) the on/off bypass damper regulated on free cooling is deactivated.

Operation with on/off damper (or bypass) 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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- external on/off damper controlled by free cooling/heating: 012=1 and 013=1 or 2, 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5) or 030=11 (DO6),
or on/off bypass damper for heat exchanger 012=2, 013=1 and 014=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- on/off cooling valve 004=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) or 030=5 (DO6),
or on/off mixed-use valve in cooling 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).

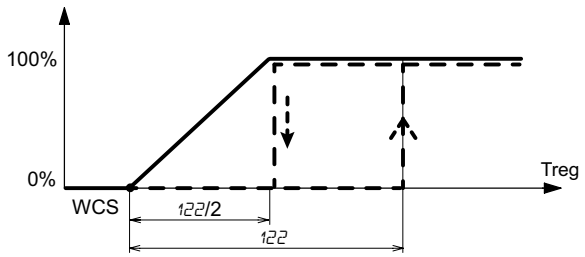


Treg: room/remote temperature independently from parameter 002
WCS: cooling operation setpoint
116: cooling hysteresis for on/off output
solid curve: on/off damper output
dashed curve: on/off cooling valve output

In the presence of free cooling conditions:
if Treg > (WCS + 116/2) the on/off damper is activated.
if Treg <= WCS the damper is deactivated.
if Treg > (WCS + 116) the cooling valve is activated.
if Treg <= (WCS + 116/2) the cooling valve is deactivated.

Operation with modulating damper (or bypass) 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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- external modulating damper regulated on free c/h: 012=3, 013=1 or 2 and 031=9 (AO1) or 032=9 (AO2) or 033=9 (AO3),
or modulating bypass for heat exchanger 012=4, 013=1 and 014=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).
- on/off cooling valve 004=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) or 030=5 (DO6),
or on/off mixed-use valve in cooling 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).

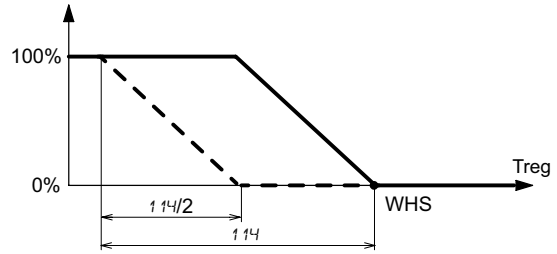


Treg: room/remote temperature if 002=0,1 or supply temperature if 002=2 and 021=2 (AI1) or 023=2 (AI2)
WCS: cooling operation setpoint
116: cooling hysteresis for on/off output
solid curve: modulating damper output
dashed curve: on/off cooling valve output
If temperature of regulation sensor rises above WCS, the modulating damper in the presence of free cooling conditions goes from the minimum opening position (parameter 164) to the maximum opening position (parameter 165) in the band defined by the parameter 116/2.
if Treg > (WCS + 116) the cooling valve is activated.
if Treg <= (WCS + 116/2) the cooling valve is deactivated.

• Heating operation using free heating:

Operation with modulating damper (or bypass) 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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- external modulating damper regulated on free c/h: 012=3, 013=1 or 2 and 031=9 (AO1) or 032=9 (AO2) or 033=9 (AO3),
or modulating bypass for heat exchanger 012=4, 013=1 and 014=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).
- modulating heating valve 003=2 and 031=3 (AO1) or 032=3 (AO2) or 033=3 (AO3)
or modulating mixed-use valve in heating 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3)
or modulating electrical resistance 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3)

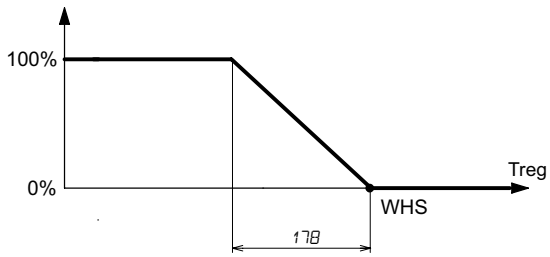


Treg: room/remote temperature if 002=0,1 or supply temperature if 002=2 and 021=2 (AI1) or 023=2 (AI2)
WHS: heating operation setpoint
111: heating proportional band
solid curve: modulating damper output
dashed curve: modulating heating valve output

If the control temperature drops below WHS, the modulating damper in the presence of free heating conditions goes from the minimum opening position (parameter 164) to the maximum opening position (parameter 165) in the band defined by the parameter 111/2.
The valve changes position from closed to open when Treg change from (WHS - 111/2) to (WHS - 111).

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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- serranda modulante bypass per recuperatore 012=4, 013=1 and 014=1 and 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).

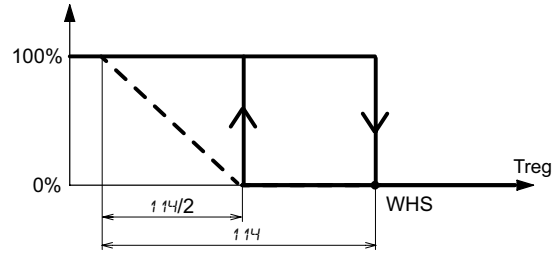


Treg: room/remote temperature independently from parameter 002
WHS: heating operation setpoint
173 hysteresis regulation free heating/cooling

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 164) to the maximum opening position (parameter 165) in the band defined by the parameter 173.

Operation with on/off damper (or bypass) 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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- external on/off damper controlled by free cooling/heating: 012=1 and 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5) or 030=11 (DO6),
or on/off bypass damper for heat exchanger 012=2, 013=1 and 014=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- modulating heating valve 003=2 and 031=3 (AO1) or 032=3 (AO2) or 033=3 (AO3)
or modulating mixed-use valve in heating 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3)
or modulating electrical resistance 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3)

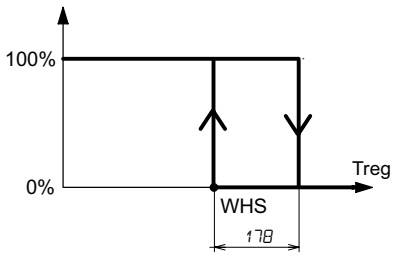


Treg: room/remote temperature if 002=0,1 or supply temperature if 002=2 and 021=2 (AI1) or 023=2 (AI2)
WHS: heating operation setpoint
111: heating proportional band
solid curve: on/off damper output
dashed curve: modulating heating valve output

In the presence of free heating conditions:
If Treg < (WHS - 111/2) the on/off damper is activated.
If Treg >= WHS the damper is disabled.
The valve changes position from closed to open when Treg change from (WHS - 111/2) to (WHS - 111).

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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- on/off bypass damper for heat exchanger 012=2, 013=1 and 014=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),

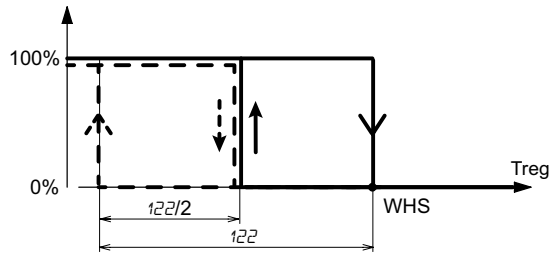


Treg: room/remote temperature independently from parameter 002
WHS: heating operation setpoint
173 Hysteresis regulation free heating/cooling

In the presence of free heating conditions:
If Treg < WHS the on/off damper is activated.
If Treg >= (WHS + 173) the damper is disabled.

Operation with on/off damper (or bypass) 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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- external on/off damper controlled by free cooling/heating: 012=1 and 013=1 or 2, 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5) or 030=11 (DO6),
or on/off bypass damper for heat exchanger 012=2, 013=1 and 014=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- heating valve on/off 003=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5) or 030=4 (DO6),
or electrical resistance on/off 003=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5) or 030=7 (DO6),
or on/off mixed-use valve in heating 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).

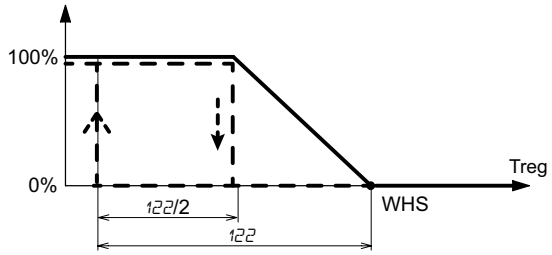


Treg: room/remote temperature if 002=0,1 or supply temperature if 002=2 and 021=2 (AI1) or 023=2 (AI2)
WHS: heating operation setpoint
115: hysteresis for on/off output
solid curve: on/off damper output
dashed curve: on/off heating valve output

In the presence of free heating conditions:
If Treg < (WHS - 115/2) the on/off damper is activated.
If Treg >= WHS the damper is disabled.
If Treg < (WHS - 115) the on/off valve is activated.
If Treg >= (WHS - 115/2) the on/off valve is disabled.

Operation with modulating damper (or bypass) 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),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- external modulating damper regulated on free c/h: 012=3, 013=1 or 2 and 031=9 (AO1) or 032=9 (AO2) or 033=9 (AO3),
or modulating bypass for heat exchanger 012=4, 013=1 and 014=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).
- heating valve on/off 003=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5) or 030=4 (DO6),
or electrical resistance on/off 003=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5) or 030=7 (DO6),
or on/off mixed-use valve in heating 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).



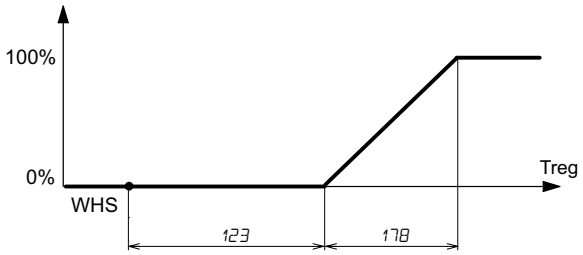
Treg: room/remote temperature if 002=0,1 or supply temperature if 002=2 and 021=2 (AI1) or 023=2 (AI2)
WCS: heating operation setpoint
115: hysteresis for on/off output
solid curve: modulating damper output
dashed curve: on/off heating valve output
If the control temperature drops below WHS, the modulating damper in the presence of free heating conditions goes from the minimum opening position (parameter 164) to the maximum opening position (parameter 165) in the band defined by the parameter 115/2.
If Treg < (WHS - 115) the on/off valve is activated.
If Treg >= (WHS - 115/2) 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 (or bypass):

Do following settings:
- 170=1 or 3 (authorization of free cooling regardless the season),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- external modulating damper regulated on free c/h: 012=3, 013=1 or 2 and 031=9 (AO1) or 032=9 (AO2) or 033=9 (AO3),
or modulating bypass for heat exchanger 012=4, 013=1 and 014=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).
If external modulating damper is used, the presence of the heating battery is mandatory:
heating valve on/off 003=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5) or 030=4 (DO6),
or electrical resistance on/off 003=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5) or 030=7 (DO6),
or on/off mixed-use valve in heating 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6),
or modulating heating valve 003=2 and 031=3 (AO1) or 032=3 (AO2) or 033=3 (AO3),
or modulating mixed-use valve in heating 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3),
or modulating electrical resistance 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3).
If modulating bypass damper for heat exchanger is used, the presence of the heating battery is not mandatory.

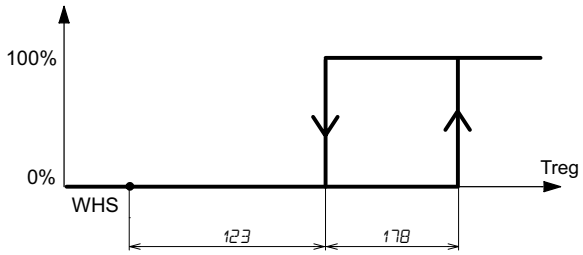


Treg: room/remote temperature if 002=0,1 or supply temperature if 002=2 and 021=2 (AI1) or 023=2 (AI2) with external modulating damper.
Treg: room/remote temperature independently from parameter 002 with modulating bypass.
WHS: heating operation setpoint
121: neutral zone
173: hysteresis for control of free heating/cooling

If the control temperature rises above WHS + 121 the modulating damper in the presence of free cooling goes from the minimum opening position (parameter 164) to the maximum opening position (parameter 165) in the band defined by the parameter 173.

Operation with on/off damper:

Do following settings:
- 170=1 or 3 (authorization of free cooling regardless the season),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- external on/off damper controlled by free cooling/heating: 012=1 and 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5) or 030=11 (DO6),



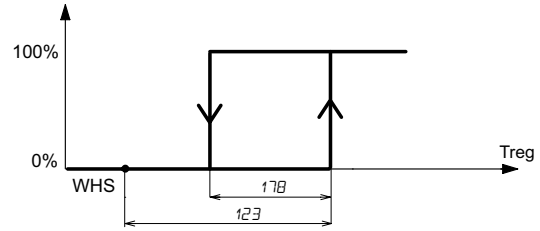
Treg: room/remote temperature if 002=0,1 or supply temperature if 002=2 and 021=2 (AI1) or 023=2 (AI2) with
WHS: heating operation setpoint
121: neutral zone
173: hysteresis for control of free heating/cooling

In the presence of free cooling conditions:
If Treg > (WHS + 121 + 173) the on/off damper is activated.
If Treg <= (WHS + 121) the damper is disabled.

Note: the presence of the heating battery is mandatory:
heating valve on/off 003=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 003=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5) or 030=7 (DO6),
or on/off mixed-use valve in heating 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6),
or modulating heating valve 003=2 and 031=3 (AO1) or 032=3 (AO2) or 033=3 (AO3),
or modulating mixed-use valve in heating 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3),
or modulating electrical resistance 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3).

Operation with on/off bypass damper:

Do following settings:
- 170=1 or 3 (authorization of free cooling regardless the season),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1);
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- on/off bypass damper for heat exchanger 012=2, 013=1 and 014=1 , 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),



Treg: control temperature
WHS: heating operation setpoint
121: neutral zone
173 hysteresis regulation free heating/cooling

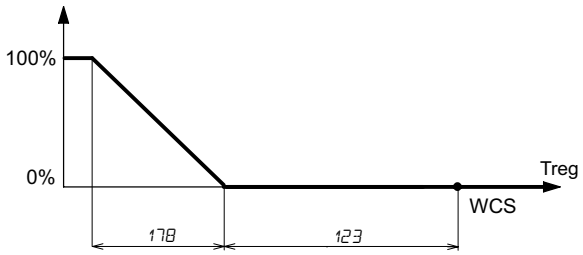
In the presence of free cooling conditions:
If Treg > (WHS + 121) the on/off bypass damper is activated.
If Treg <= (WHS + 121 - 173) the damper is disabled.

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

• Free heating in the summer:

Operation with modulating damper:

Do following settings:
- 170=2 or 3 (authorization of free heating regardless the season),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 021=3 (AI1) or 023=3 (AI2),
- external modulating damper regulated on free c/h: 012=3, 013=1 or 2 and 031=9 (AO1) or 032=9 (AO2) or 033=9 (AO3),
or modulating bypass for heat exchanger 012=4, 013=1 and 014=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).
if external modulating damper is used, the presence of the cooling battery is mandatory:
on/off cooling valve 004=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) or 030=5 (DO6),
or on/off mixed-use valve in cooling 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6),
or modulating cooling valve 004=1 and 031=4 (AO1) or 032=4 (AO2) or 033=4 (AO3),
or modulating mixed-use cooling valve 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3).
if modulating bypass damper is used, the presence of the cooling battery is not mandatory

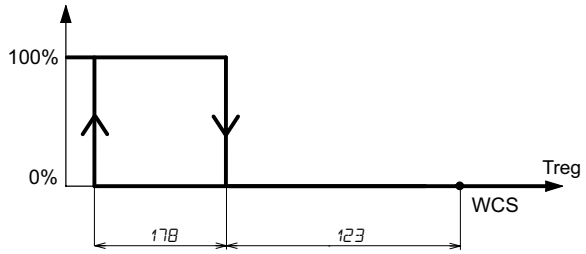


Treg: room/remote temperature if 002=0,1 or supply temperature if 002=2 and 021=2 (AI1) or 023=2 (AI2) with external modulating damper.
Treg: room/remote temperature independently from parameter 002 with modulating bypass.
WCS: cooling operation setpoint
121: neutral zone
173: hysteresis for control of free heating/cooling

If the control temperature drops below WCS - 121 the modulating damper in the presence of free heating goes from the minimum opening position (parameter 164) to the maximum opening position (parameter 165) in the band defined by the parameter 173.

Operation with on/off damper:

Do following settings:
- 170=2 or 3 (authorization of free heating regardless the season),
- set an analogue input as remote sensor 02 1=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 02 1=3 (AI1) or 023=3 (AI2),
- external on/off damper controlled by free cooling/heating: 0 12=1 and 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5) or 030=11 (DO6),



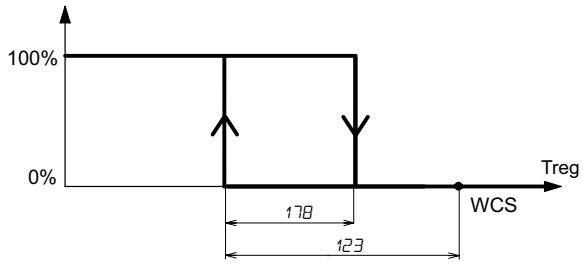
Treg: room/remote temperature if 002=0,1 or supply temperature if 002=2 and 02 1=2 (AI1) or 023=2 (AI2) with
WCS: cooling operation setpoint
12 1: neutral zone
173: hysteresis for control of free heating/cooling

In the presence of free heating conditions:
If Treg < (WCS - 12 1 - 173) the on/off damper is activated.
If Treg >= (WHS - 12 1) the damper is disabled.

Note: the presence of the cooling battery is mandatory:
on/off cooling valve 004=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) or 030=5 (DO6),
or on/off mixed-use valve in cooling 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6),
or modulating cooling valve 004=1 and 03 1=4 (AO1) or 032=4 (AO2) or 033=4 (AO3),
or modulating mixed-use cooling valve 003=2 004=1 and 03 1=5 (AO1) or 032=5 (AO2) or 033=5 (AO3).

Operation with on/off bypass:

Do following settings:
- 170=2 or 3 (authorization of free heating regardless the season),
- set an analogue input as remote sensor 02 1=1 (AI1) or 023=1 (AI2) or use the internal sensor of AHS2 (002=1),
- set an analogue input as external sensor 02 1=3 (AI1) or 023=3 (AI2),
- on/off bypass damper for heat exchanger 0 12=2, 0 13=1 and 0 14=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),



Treg: control temperature
WCS: cooling operation setpoint
115: neutral zone
173 hysteresis regulation free heating/cooling

In the presence of free heating conditions:
If Treg < (WCS - 12 1) the on/off bypass damper is activated.
If Treg >= (WCS - 12 1 + 173) the damper is disabled.

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

25. Operating mode of the ventilators

The controller can control up to 2 modulating 0..10 V ventilators (supply and extract) or an on/off type ventilator with one, two or three speeds. If ventilation is not controlled by the regulator but is present on the plant, set parameter 009 to 5. By this way functions that require the presence of ventilation will be authorized to work

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

To select the operation with a single-speed on/off ventilator, set the parameter 009=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) or 030=1 (DO6) for speed 1.

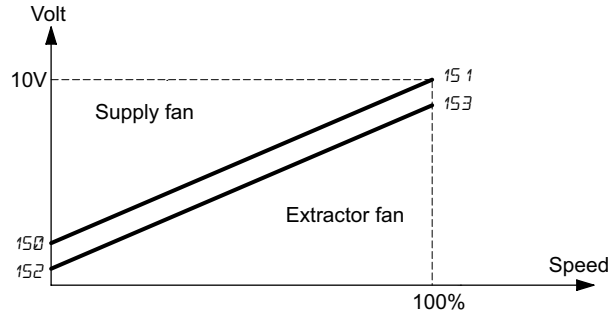
To select the operation with two-speed on/off ventilator, set the parameter 009=2, and two digital outputs corresponding to the first and second speed:
025=1 (DO1) or 026=1 (DO2) or 027=1 (DO3) or 028=1 (DO4) or 029=1 (DO5) or 030=1 (DO6) for speed 1,
025=2 (DO1) or 026=2 (DO2) or 027=2 (DO3) or 028=2 (DO4) or 029=2 (DO5) or 030=2 (DO6) for speed 2.

To select the operation with three-speed on/off ventilator, set the parameter 009=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) or 030=1 (DO6) for speed 1,
025=2 (DO1) or 026=2 (DO2) or 027=2 (DO3) or 028=2 (DO4) or 029=2 (DO5) or 030=2 (DO6) for speed 2,
025=3 (DO1) or 026=3 (DO2) or 027=3 (DO3) or 028=3 (DO4) or 029=3 (DO5) or 030=3 (DO6) for speed 3.

• Modulating ventilators:

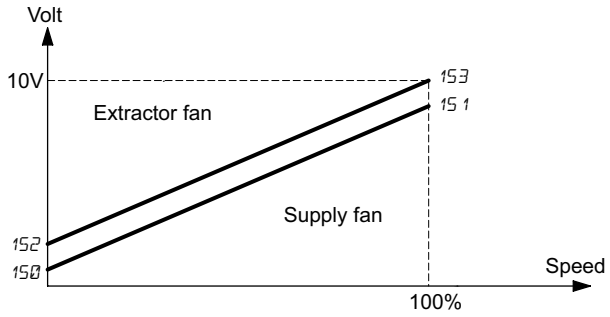
To select the operation with modulating ventilators, set the parameter 009=4:
a modulating output for the supply ventilator 031=1 (AO1) or 032=1 (AO2) or 033=1 (AO3) and/or
a modulating output for the extractor ventilator 031=2 (AO1) or 032=2 (AO2) or 033=2 (AO3).
If you need a digital output to enable the supply or extractor ventilator, set 025=19 (DO1) or 026=19 (DO2) or 027=19 (DO3) or 028=19 (DO4) or 029=19 (DO5) or 030=19 (DO6).
In case of the presence of the supply ventilator, set the minimum and maximum voltage applicable with the parameters 150 , 151.
In case of the presence of the extractor ventilator, set the minimum and maximum voltage applicable with the parameters 152, 153.
If the supply and extractor ventilators 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 ventilator voltage
151: maximum supply ventilator voltage
152: minimum extractor ventilator voltage
153: maximum extractor ventilator voltage

- application with underpressure in the room:



150: minimum supply ventilator voltage
151: maximum supply ventilator voltage
152: minimum extractor ventilator voltage
153: maximum extractor ventilator voltage

Based on the value of the parameter *010,* the type of ventilator control can then be selected:
010 = 0 for manual control (selection of speed 1, 2, 3 and also speed 0 for on/off ventilator),
010 = 1 for control based on CO_2,
010 = 2 for control based on the temperature (between minimum and maximum speed),
010 = 3 for on/off control based on the temperature,
010 = 4 for control based on temperature and CO_2,
010 = 5 for control of the differential pressure/flow rate (direct action) (only for modulating ventilators).
010 = 6 for control of the differential pressure/flow rate (reverse action) (only for modulating ventilators).
010 = 7 for control based on dehumidification (only for modulating ventilators)
010 = 8 for manual control with speed selectable between 0 and 100% of (speed 3 - speed 1) (only for modulating ventilators)

When the device is switched on, the ventilator 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 (*010*=0):

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

Press button ESC, the icon ✣ flashes with the indication of the ventilator operating mode on display B.

Press button ESC one or more times to select the ventilator operating mode:

- M *SPE0*=ventilation stopped (only for on/off ventilators),
- M *SPE 1*=control with speed 1,
- M *SPE2*=control with speed 2 (only visible for 2-speed ventilator),
- M *SPE3*=control with speed 3 (only visible for 3-speed ventilator).

The value is automatically saved.
To exit the menu, wait for 4 seconds until display B stops flashing.

Note: In case of operation without a ventilator (*009*=0), pressing the ESC button has no effect.

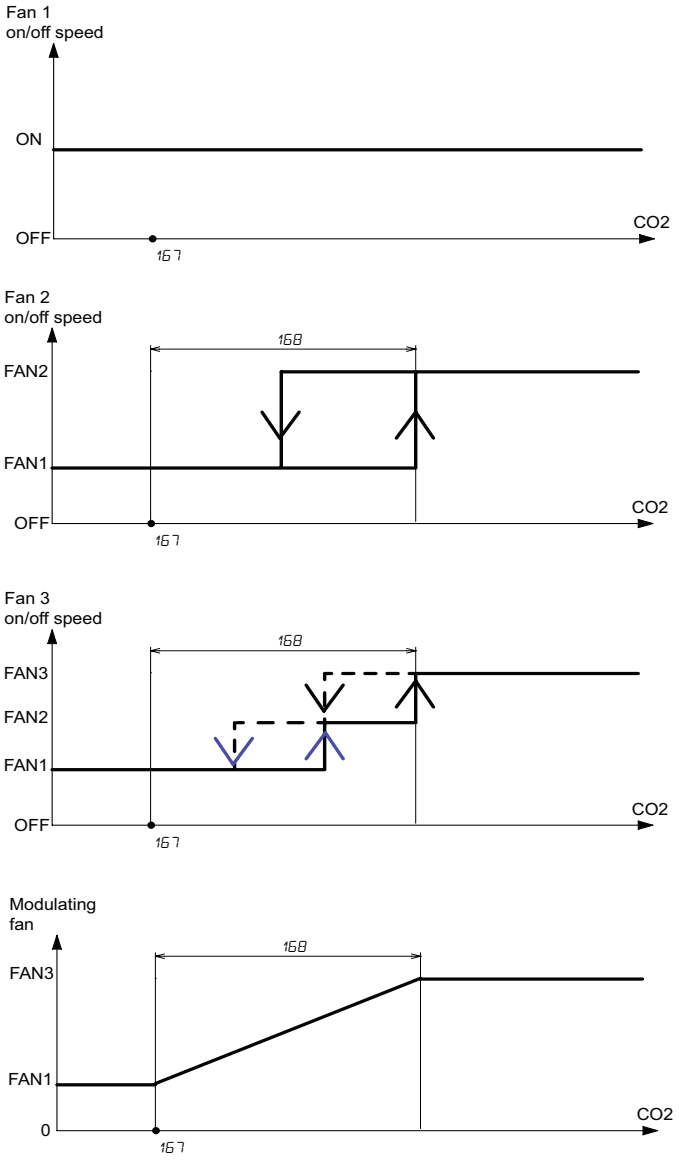
Control of speed based on CO_2 (010=1):

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

To control the speed of the ventilator based on the CO_2, set the parameter 010 to 1.
Select transmitter 1 or 2 for air quality; the corresponding scale is set at 0..2000 ppm.

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

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



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

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

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

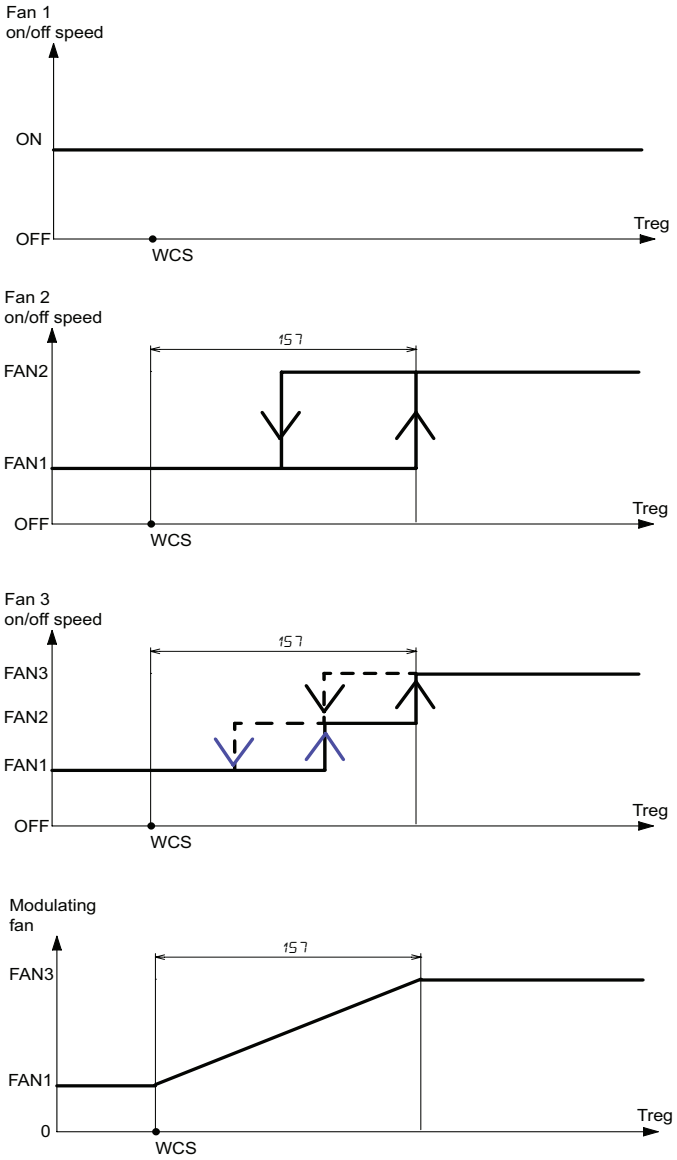
For the modulating ventilator:
If CO_2 > 157 the speed is modulated between speeds 1 and 3.

Control of speed based on temperature (010=2):

- Summer control:

Control of the ventilators is carried out based on the temperature of the room/return sensor (011=0) or the supply sensor (011=1), the cooling operating setpoint and the proportional band of the ventilator (parameter 157).

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



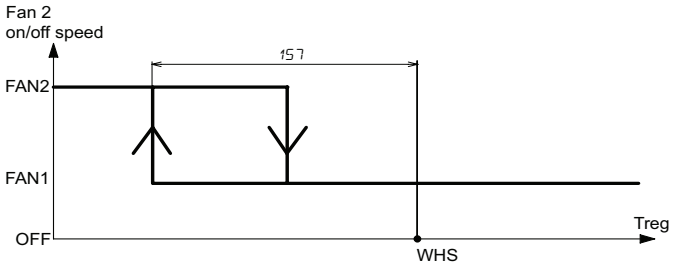
Treg: temperature of the room/return sensor (011=0) or the supply sensor (011=1)
WCS: cooling operation setpoint
157 proportional band of the ventilator
VEL1: speed 1= [(154 / 100) x (151 - 150)] + 150 *for the supply and* =[(154 / 100) x (153 - 152)] + 152 *for the extraction.*
VEL2: speed 2= [(155 / 100) x (151 - 150)] + 150 *for the supply and* =[(155 / 100) x (153 - 152)] + 152 *for the extraction.*
VEL3: speed 3= [(156 / 100) x (151 - 150)] + 150 *for the supply and* =[(156 / 100) x (153 - 152)] + 152 *for the extraction.*

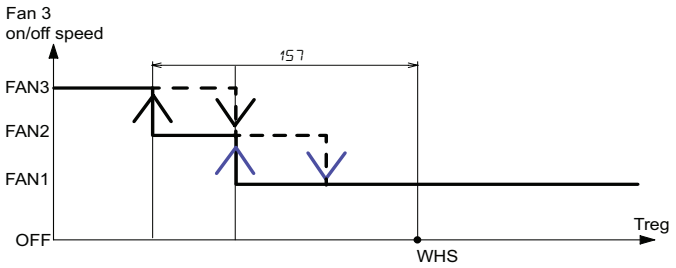
For the two-speed ventilator:
if Treg <= WCS, speed 1 is ON and if Treg increases when Treg > (WCS + 157), speed 2 is ON,
if Treg decreases and Treg <= (WCS + 157/2), speed 1 is ON,

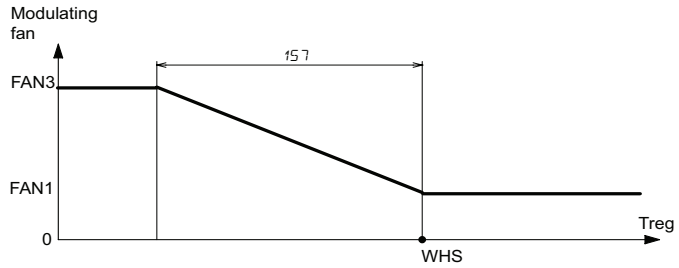
For the three-speed ventilator:
if Treg <= WCS, speed 1 is ON,
if Treg increases and Treg >= (WCS + (157*(2/3))) and Treg < (WCS + 157), speed 2 is ON,
if Treg > (WCS + 157), speed 3 is ON,
if Treg decreases and Treg <= (WCS + (157*(2/3))) and Treg > (WCS + (157*(1/3))), speed 2 is ON,
if Treg <= (WCS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

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

- Winter control:







Treg: temperature of the room/return sensor (011=0) or the supply sensor (011=1)
WCS: heating operation setpoint
157 proportional band of the ventilator
VEL1: speed 1= [(154 / 100) x (151 - 150)] + 150 *for the supply and* =[(154 / 100) x (153 - 152)] + 152 *for the extraction.*
VEL2: speed 2= [(155 / 100) x (151 - 150)] + 150 *for the supply and* =[(155 / 100) x (153 - 152)] + 152 *for the extraction.*
VEL3: speed 3= [(156 / 100) x (151 - 150)] + 150 *for the supply and* =[(156 / 100) x (153 - 152)] + 152 *for the extraction.*

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

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

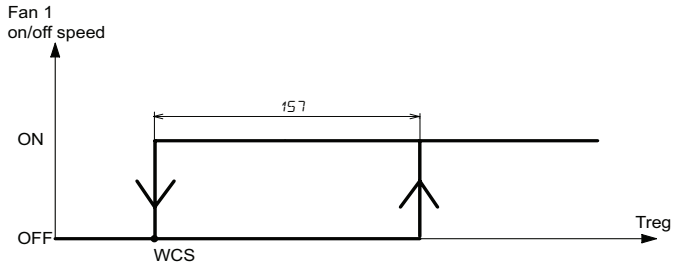
For the modulating ventilator:
If Treg < WHS, the speed is modulated between 1 and 3.

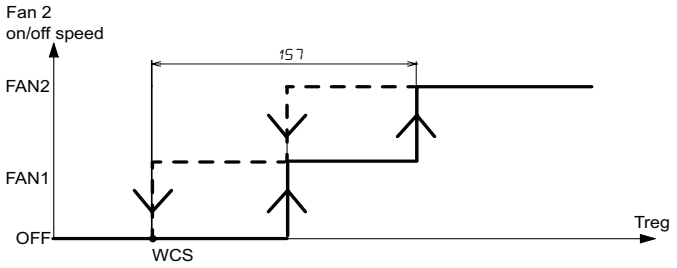
Control of speed based on temperature ON/OFF (010=3):

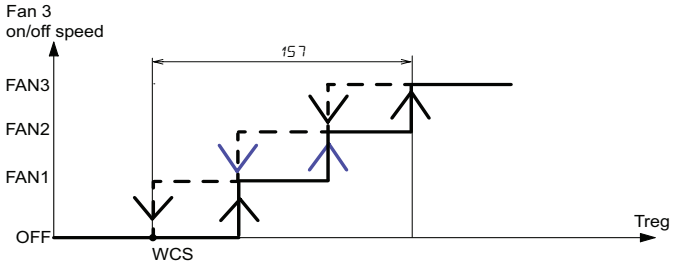
Control of the ventilators is based on the temperature of the room/return sensor (011=0) or the supply sensor (011=1), the operating setpoint and the proportional band of the ventilator defined by the parameter 157. When the temperature reaches the operating setpoint, the ventilator is switched off after the switch-off delay for the ventilator 160 has elapsed.

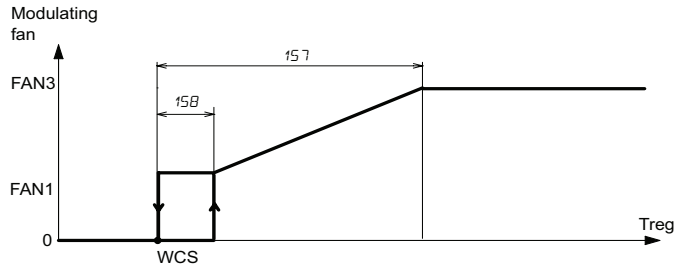
Depending on the type of ventilator, they will work according to the following chart:

- Summer control:









Treg: temperature of the room/return sensor (011=0) or the supply sensor (011=1)
WCS: cooling operation setpoint
157: proportional band of the ventilator
158: step enabling for supply ventilator
VEL1: speed 1= [(154 / 100) x (151 - 150)] + 150 for the supply and =[(154 / 100) x (153 - 152)] + 152 for the extraction.
VEL2: speed 2= [(155 / 100) x (151 - 150)] + 150 for the supply and =[(155 / 100) x (153 - 152)] + 152 for the extraction.
VEL3: speed 3= [(156 / 100) x (151 - 150)] + 150 for the supply and =[(156 / 100) x (153 - 152)] + 152 for the extraction.

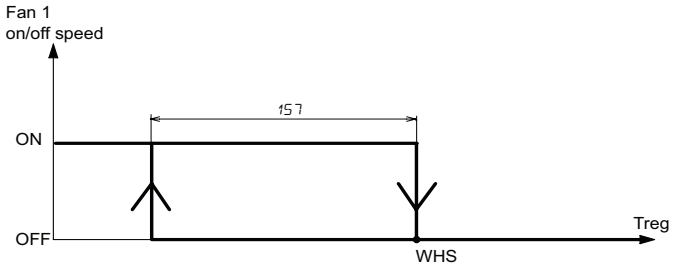
For the two-speed ventilator:
if Treg < WCS, the ventilator is off
if Treg increases and Treg > (WCS + (157/2)) and Treg < (WCS + 157), speed 1 is ON,
If Treg > (WCS + 157), speed 2 is ON,
if Treg decreases and Treg <= (WCS + (157/2)) and Treg > WCS, speed 1 is ON,
if Treg < WCS, the ventilator is off

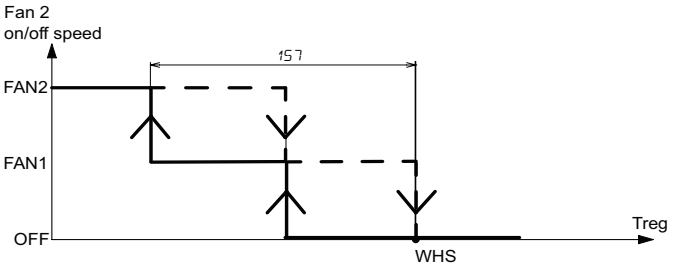
For the three-speed ventilator:
if Treg < WCS, the ventilator is off,
if Treg increases and Treg > (WCS + (157*(1/3))) and Treg < (WCS + (157*(2/3))), speed 1 is ON,

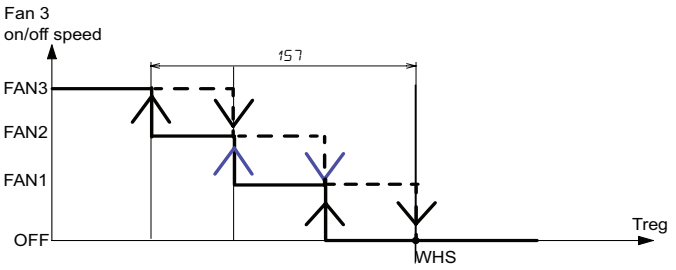
if Treg increases and Treg > (WCS + (157*(2/3))) and Treg < (WCS + 157), speed 2 is ON,
If Treg > (WCS + 157), speed 3 is ON,
if Treg decreases and Treg < (WCS + (157*(2/3))) and Treg > (WCS + (157*(1/3))), speed 2 is ON,
if Treg decreases and Treg < (WCS + (157*(1/3))) and Treg > WCS, speed 1 is ON,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

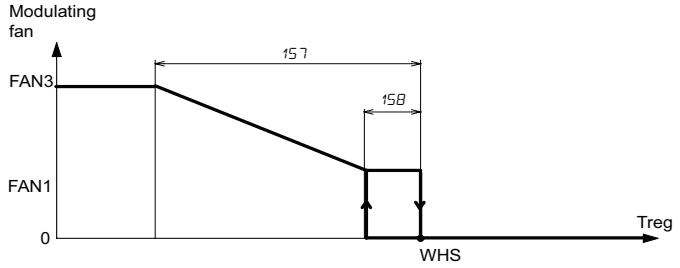
For the modulating ventilator:
if Treg < WCS, the ventilator is off,
If Treg > (WCS + 158), the speed starts at a speed between speeds 1 and 3.
The speed is modulated up to speed 3 if Treg continues to increase.
If Treg decreases and Treg < WCS, the ventilator is off.

- Winter control:









Treg: temperature of the room/return sensor (011=0) or the supply sensor (011=1)
WHS: heating operation setpoint
157: proportional band of the ventilator
158: step enabling for supply ventilator
VEL1: speed 1= [(154 / 100) x (151 - 150)] + 150 for the supply and =[(154 / 100) x (153 - 152)] + 152 for the extraction.
VEL2: speed 2= [(155 / 100) x (151 - 150)] + 150 for the supply and =[(155 / 100) x (153 - 152)] + 152 for the extraction.
VEL3: speed 3= [(156 / 100) x (151 - 150)] + 150 for the supply and =[(156 / 100) x (153 - 152)] + 152 for the extraction.

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

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

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

If a modulating electrical resistance is activated, the speed of the modulating ventilator follows the chart indicated above as long as the required heating power is lower than the parameter 195.
When the required heating power exceeds the parameter 195, the speed of the modulating ventilator is adjusted based on the power applied to the electrical resistance.
For example: if the parameter 195 = 80%, as long as the modulating ventilator 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 ventilator speed is upper than 80% the speed of the ventilator will have a percentage value equal to the percentage value of power applied to the electrical resistance.
In case of an on/off ventilator, if the heating power required exceeds the parameter 195, the speed of the ventilator switches to maximum speed.

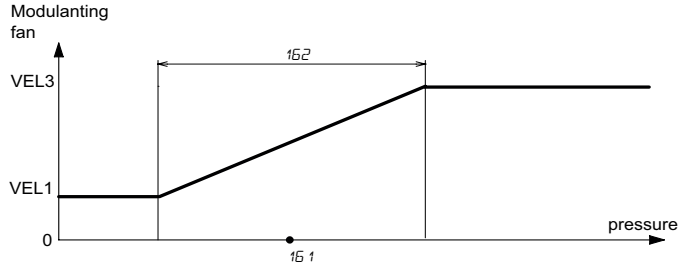
Control of speed based on temperature and CO_2 (010=4):

The ventilator 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 (010=2):" page 75*") and the theoretical control speed based on the CO_2 only (see the paragraph "*"Control of speed based on CO_2 (010=1):" page 74*").

Control of speed based on pressure/flow rate with direct action (010=5):

Based on parameter 197 regulation can be performed at constant pressure (197=0) or at constant flow rate (197≠0).
In case of constant flow rate regulation, flow rate is calculated based on formula F = k √ dp with
F=flow rate (m^3/hour)
k=parameter 197,
dp diffrential pressure (Pa) of differential pressure transducer of transmitter 1 or 2.

To regulate with constant pressure set 197=0, for constant flow rate set 197 to the flow rate coefficient required.
Then do other settings:
009=4 (modulating ventilator);
If required on plant select output for supply ventilator 031=1 or 032=1 or 033=1;
If required on plant select output for return ventilator 031=2 or 032=2 or 033=2.
Set type of regulation on modulating ventilator 010=5 (regulation based on pressure with direct action).
A pressure transmitter 1 or 2 must be used.
Define parameters of PI regulator (161: setpoint, 162: proportional band, 163: integral time).

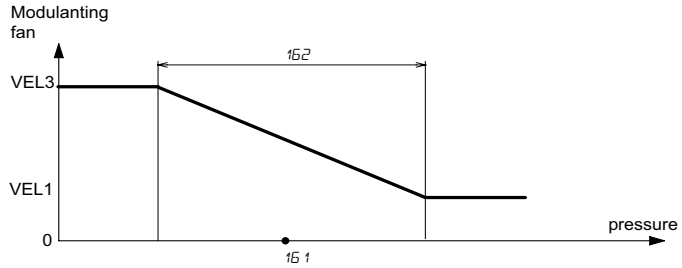


pressure: differential pressure detected by the transmitter
161: setpoint
162: proportional band

Control of speed based on pressure/flow rate with reverse action (010=6):

Based on parameter 197 regulation can be performed at constant pressure (197=0) or at constant flow rate (197≠0).
In case of constant flow rate regulation, flow rate is calculated based on formula F = k √ dp with
F=flow rate (m^3/hour)
k=parameter 197,
dp diffrential pressure (Pa) of differential pressure transducer of transmitter 1 or 2.

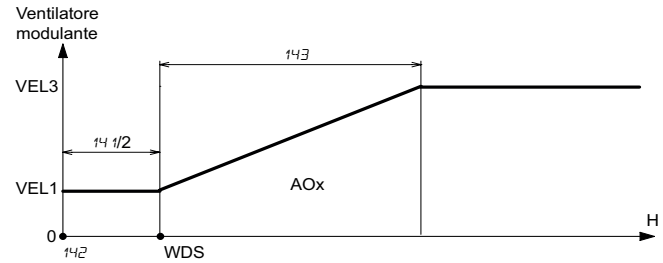
To regulate with constant pressure set 197=0, for constant flow rate set 197 to the flow rate coefficient required.
Then do other settings:
009=4 (modulating ventilator);
If required on plant select output for supply ventilator 031=1 or 032=1 or 033=1;
If required on plant select output for return ventilator 031=2 or 032=2 or 033=2.
Set type of regulation on modulating ventilator 010=6 (regulation based on pressure with reverse action).
A pressure transmitter 1 or 2 must be used.
Define parameters of PI regulator (161: setpoint, 162: proportional band, 163: integral time).



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

Control of speed based on dehumidification (010=7):

Modulating ventilator can be regulated based on dehumidification with built-in humidity sensor (139=1 or 4) or based on remote 0..10V humidity transmitter (139=2 or 5 for transmitter 1, 139=3 or 6 for transmitter 2).
Regulation can be done with PI regulator.
To use this function set the following parameters:
009=4 (modulating ventilator);
If required on plant select output for supply ventilator 031=1 or 032=1 or 033=1;
If required on plant select output for return ventilator 031=2 or 032=2 or 033=2.
Set type of regulation on modulating ventilator 010=7 (regulation based on dehumidifcation).
Set parameter 139 to select the type of humidity sensor used for dehumidification:
139=1 for built-in humidity sensor -> models AH-xxxSH1
139=2 for a remote 0..10V humidity transmitter (set 023=6 and position jumper JP1 on position “2-3“, then input sensor AI3 is set for 0..10V input transmitter, the corresponding range is set to 0..100 %r.H. (206=0 and 207=100) with unit set to %r,H. (208=1).
Set regulation parameters for dehumidification (142: set humidity, 141: neutral zone humidity, 143: proportional band humidity, 144: integral time humidity)
Speed of modulating ventilators is regulated between speed 1 and 3 as indicated on the figure below::



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

Speeds 1 and 3 of supply ventilator are defined based on parameters 150, 151, 154, 155, 156.
If return ventilator 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 (189=1), the ventilators are immediately stopped.
If the appliance is switched off, the ventilators are stopped after the switch-off delay for the ventilators 160 has elapsed.

Manual control of speed (010=8):

To select the speed, proceed as follows for modulating ventilator:

Press the button , icons flash together with the indication of the percentage of the current voltage applied to the ventilator on display B.
The percentage of the voltage applied to the ventilator is on the range 0 (corresponding to the voltage for speed 1) and 100% (corresponding to the voltage for speed 3).
Press the button o to increase or decrease the percentage of voltage applied.
The value is automatically saved.
To exit the menu, wait for 4 seconds until display B stops flashing.

Speeds 1 and 3 correspond to two percentage levels of the motor speed variation field. Set the parameters 154, 156 to configure the speeds 1, 3 respectively.
The parameters 150, 151 allow you to select the minimum and maximum voltage of the supply ventilator (supply ventilator speed variation field).
The parameters 152, 153 allow you to select the minimum and maximum voltage of the extractor ventilator (extractor ventilator speed variation field).

For the supply ventilator, the speeds 1 and 3 are calculated as follows:

speed 1=[(154 / 100) x (151 - 150)] + 150
speed 3=[(156 / 100) x (151 - 150)] + 150

For the extractor ventilator, the speeds 1 and 3 are calculated as follows:

speed 1=[(154 / 100) x (153 - 152)] + 152
speed 3=[(156 / 100) x (153 - 152)] + 152

Note: In case of operation without a ventilator (009=0), pressing the button has no effect.

26. Damper control

The damper is either: on/off or modulating.

- **On/off damper:**

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

On/off damper type	Regulation type and settings
External damper (not regulated) (*)	Damper is open when air handling unit is switched on and closed with delay 166 after ventilation is OFF. Select the output for damper 025=12 (DO1) or 026=12 (DO2) or 027=12 (DO3) or 028=12 (DO4) or 029=12 (DO5) or 030=12 (DO6)
External damper regulated	It can be regulated based on CO_2, on free cooling and/or heating, on free cooling and/or heating + CO_2, or on humidity. 012 = 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) or 030=11 (DO6)
	Regulation on CO_2: 013=0 (regulation on CO_2) Define transmitter used for CO_2 Set regulation parameters from 167 to 169 (setpoint, proportional band and integral time CO_2)
	Regulation on free cooling/heating: 013=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 *"38. Configuration of installer parameters (level 2 password)" page 134*)
	Regulation on free cooling/heating and CO_2: 013=2 (regulation on free cooling/heating and CO_2) Activate free cooling and/or heating with parameter 170 Set parameters of free cooling and/or heating from 171 to 178 (see *"38. Configuration of installer parameters (level 2 password)" page 134*) Define transmitter used for CO_2 Set regulation parameters from 167 to 169 (setpoint, proportional band and integral time CO_2)
	Regulation on humidity (dehumidification): 013=3 (regulation based on humidty) Activate dehumidification: with internal humidity sensor of AHS2 139=1 or 139=4 in cooling only or with remote humidity transmitter 1 139=2 or 139=5 in cooling only, or with remote humidity transmitter 2 139=3 or 139=6 in cooling only. Set following regulation parameters: - neutral zone humidity 141, - humidity setpoint 142, - proportional band humidity 143,
Bypass for heat exchanger	It is regulated based on free cooling and/or heating based on cooling and/or heating request 013=1 (regulation on free cooling/heating) Select heat exchanger type (014≠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) or 030=13 (DO6)

Bypass for cross-flow heat exchanger (based on free cooling/heating only)	It is regulated based on free cooling and/or heating without considering cooling and/or heating request 013=1 (regulation on free cooling/heating) 014=1 (cross-flow heat exchanger) Select output for bypass of cross-flow heat exchanger (based on free cooling/heating only) 025=20 (DO1) or 026=20 (DO2) or 027=20 (DO3) or 028=20 (DO4) or 029=20 (DO5) or 030=20 (DO6)

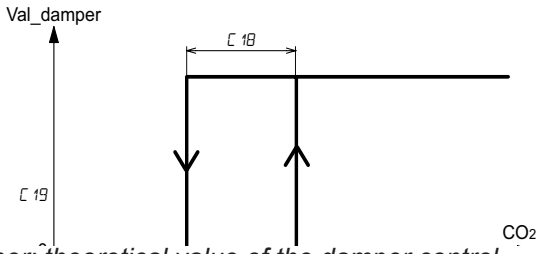
(*) external damper not regulated can be used together with other type of damper defined by parameter 012 (012 =1 or 2 or 3 or 4).

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

External on/off damper can be used as external regulated damper 012=1, or as bypass damper for heat exchanger 012=2, or as bypass damper for cross-flow heat exchanger (based on free cooling/heating only) 012=5.
Set type of regulation on damper 013=1 (regulation based on free cooling/heating with cooling/heating request).
Define which output is the external regulated damper: 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5) or 030=11 (DO6). or the bypass for heat exchanger 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6) or the bypass for cross-flow heat exchanger (based on free cooling/heating only) 025=20 (DO1) or 026=20 (DO2) or 027=20 (DO3) or 028=20 (DO4) or 029=20 (DO5) or 030=20 (DO6).
Activate free cooling and/or free heating setting parameter 170.
The damper is regulated based on graphs depicted on paragraph *"24. Regulation with free cooling, free heating" page 59* when conditions of free cooling/heating are present and there is a cooling or heating request (this request is not considered if a bypass damper for cross-flow heat exchanger, based only on free cooling/heating, is used).

Regulation of on/off damper based on air quality

In rooms where a lot of people are present, it is necessary to regulate the air quality to ensure fresh air when the CO_2 concentration exceeds a given threshold. A on/off damper can be used.
In order to carry out this operation, define transmitter used for CO_2.
Select type of damper 012=1 (external damper regulated).
Select type of regulation on damper 013=0 (regulation on CO_2).
Defines which output is the external damper regulated: 025=11 (DO1) or 026=11 (DO2) or 027=11 (DO3) or 028=11 (DO4) or 029=11 (DO5) or 030=11 (DO6)
Define the parameters for reduction of the CO_2 concentration (167: setpoint, 168: proportional band).
The damper is regulated as following graph:



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

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

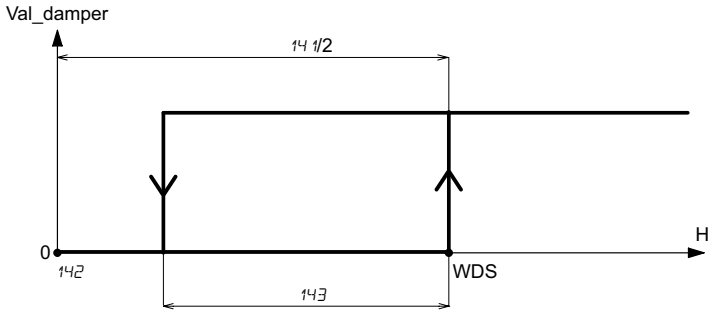
Note: If the frost protection alarm is activated (189=1) or if the appliance is switched off or if ventilation is absent, the on/off damper is deactivated.

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

The regulation corresponds to paragraph *"Regulation of on/off damper based on air quality" page 83* for CO_2 part and to paragraph *"Regulation of on/off damper based on free cooling/heating" page 83* for free cooling/heating part.
The external on/off regulated damper is activated if one of the previous paragraphs would activate the output.
The external on/off regulated damper is deactivated if none of the previous two paragraphs would activates the output.

Regulation of on/off damper based on dehumidification

It can be used in rooms with humidity that is ALWAYS higher than external humidity (overcrowded places, health farms, sauna, swimming pools, ...) or in winter when external humidity is ALWAYS lower than internal humidity. An external on/off damper can be used for such a situation.
To use this function set following parameters:
set parameter *139* to activate dehumidification:
139=1 or *139*=4 (in cooling only) with built-in humidity sensor of AHS2,
139=2 or *139*=5 (in cooling only) with the remote humidity transmitter 1,
139=3 or *139*=6 (in cooling only) with the remote humidity transmitter 2.
Select the type of regulated damper *012*=1 (external regulated on/off damper),
select the type of regulation applied to damper *013*=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) or *030*=11 (DO6),
define regulation parameters for dehumidification (*142*: set humidity, *141*: neutral zone humidity, *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
141: humidity neutral zone
142: humidity setpoint
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 (*189*=1) or if the appliance is switched off or if ventilation is absent, the on/off damper is deactivated.

• Modulating damper:

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

Modulanting type damper	Regulation type and settings
External regulated damper	It can be regulated based on CO_2, free cooling and/or heating, free cooling and/or heating + CO_2, or humidity 012 = 3 (external modulating damper). Select output for modulating damper 031=9 (AO1) or 032=9 (AO2) or 033=9 (AO3).
	Regulation on CO_2: 013=0 (regulation based on CO_2) Define transmitter used for CO_2 Set regulation parameters from 167 to 169 (setpoint, proportional band and integral time CO_2)
	Regulation on free cooling/heating: 013=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>*"38. Configuration of installer parameters (level 2 password)" page 134*</u>)
	Regulation on free cooling/heating and CO_2: 013=2 (azione basato sul free cooling/heating e CO_2) 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>*"38. Configuration of installer parameters (level 2 password)" page 134*</u>) Define transmitter used for CO_2 Set regulation parameters from 167 to 169 (setpoint, proportional band and integral time CO_2)
	Regulation on humidity (dehumidification): 013=3 (regulation based on humidity) Activate dehumidification: with internal humidity sensor of AHS2 139=1 or 139=4 in cooling only or with remote humidity transmitter 1 139=2 or 139=5 in cooling only, or with remote humidity transmitter 2 139=3 or 139=6 in cooling only, Set following regulation parameters: - neutral zone humidity 141, - humidity setpoint 142, - proportional band humidity 143, - integral time humidity 144.
Bypass for heat exchanger	it is regulated based on free cooling and/or free heating and on cooling/heating request 013=1 (regulation based on free cooling/heating) Select type of heat exchanger (014≠0) Select output for modulating bypass damper of heat exchanger 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).

(*) external damper not regulated can be used together with other type of damper defined by parameter 012 (012 =1 or 2 or 3 or 4).

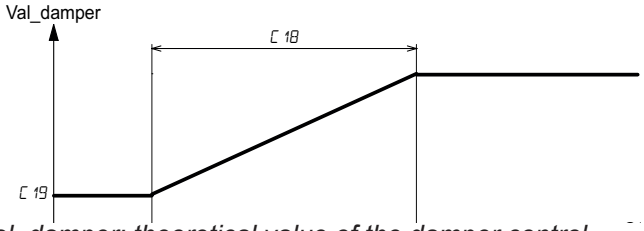
Regulation of modulating damper based on free cooling/heating

The modulating damper can be used as an external damper or as bypass damper for heat exchanger.
Select the type of modulating damper *012*=3 (modulating damper) or *012*=4 (modulating bypass damper for heat exchanger)
Select the minimum opening position (parameter *164*) and the maximum opening position (parameter *165*) of the damper.
Select the regulation type of damper *013*=1 (control based on the cooling/heating request with free cooling/heating conditions).
Define which analogue output is the modulating damper: *031*=9 (AO1) or *032*=9 (AO2) or *033*=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 *"24. Regulation with free cooling, free heating" page 59* when the free cooling/heating conditions and cooling/heating requests are present.

Regulation of modulating damper based on CO_2

In rooms where a lot of people are present, it is necessary to regulate the air quality to ensure fresh air when the CO_2 concentration exceeds a given threshold.
An external modulating damper is used with a PI-type control for this purpose.
In order to carry out this operation, define transmitter used for CO_2
Select the type of modulating damper *012*=3 (modulating damper).
Select the minimum opening position (parameter *164*) and the maximum opening position (parameter *165*) of the damper.
Select the type of damper regulation *013*=0 (regulation based on CO_2).
Define which analogue output is the modulating damper: *031*=9 (AO1) or *032*=9 (AO2) or *033*=9 (AO3).
Define the parameters of the PI controller for the reduction of the CO_2 concentration (*167*: setpoint, *168*: proportional band, *169*: integral time).

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



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

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

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

Note: If the frost protection alarm is activated (*89*=1) or if the appliance is switched off or if ventilation is absent, the modulating damper is completely closed.

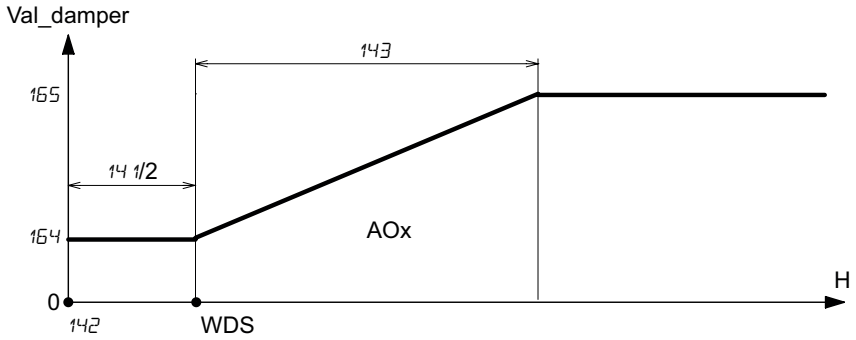
Regulation of modulating damper based on free cooling/heating and CO_2

The regulation corresponds to paragraph *"Regulation of modulating damper based on CO_2" page 86* for CO_2 part and to paragraph *"Regulation of modulating damper based on free cooling/heating" page 86* 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, define transmitter used for CO_2
Select the type of modulating damper *012*=3 (modulating damper).
Select the minimum opening position (parameter *164*) and the maximum opening position (parameter *165*) of the damper.
Select the type of damper regulation *013*=2 (regulation based on free cooling/heating and CO_2).
Define which analogue output is the modulating damper: *031*=9 (AO1) or *032*=9 (AO2) or *033*=9 (AO3).
Define the parameters of the PI controller for the reduction of the CO_2 concentration (*167*: setpoint, *168*: proportional band, *169*: integral time).
Activate the free cooling and/or free heating by setting the parameter *170*.
Set parameters from *171* to *178*.

Regulation of modulating damper based on dehumidification

It can be used in rooms with humidity that is ALWAYS higher than external humidity (overcrowded places, health farms, sauna, swimming pools, ...) or in winter when external humidity is ALWAYS lower than internal humidity. An external modulating damper is used with a PI regulation for such a situation.
To use this function set following parameters:
set parameter 139 to activate dehumidification,
- 139=1 or 139=4 (in cooling only) with built-in humidity sensor of AHS2
- 139=2 or 139=5 (in cooling only) with a remote humidity transmitter 1,
- 139=3 or 139=6 (in cooling only) with a remote humidity transmitter 2,

select the type of regulated damper 012=3 (modulating damper),
select the type of regulation applied to damper 013=3 (dehumidification),
select the minimum opening position (parameter 164) and the maximum opening position (parameter 165) of the damper,
select the type of damper control 013=3 (control based on dehumidication),
define which analogue output is the modulating damper: 031=9 (AO1) or 032=9 (AO2) or 033=9 (AO3),
define PI regulation parameters for dehumidification (141: neutral zone humidity, 142: humidity setpoint, 143: proportional band humidity, 144: integral time humidity)
The modulating damper is regulated between minimum and maximum opening positions as indicated on the following figure:



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

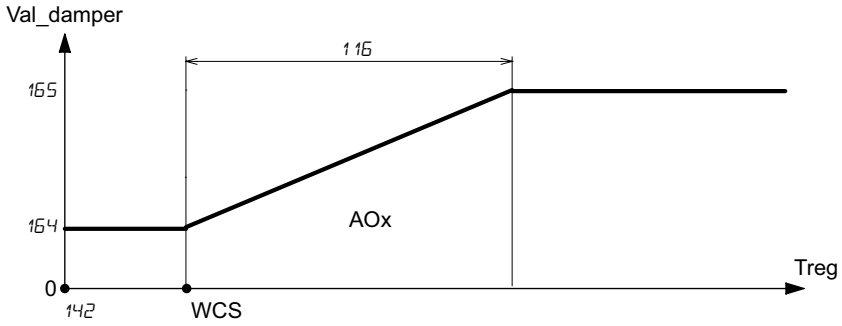
The percentage output of the PI controller is applied between the minimum and maximum opening positions of the damper 164 and 165.

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

Note: If the frost protection alarm is activated (189=1) or if the appliance is switched off or if ventilation is absent, the modulating damper is completely closed.

Regulation of modulating diffuser damper based on cooling

It is possible to use a diffuser damper for cooling, the air must be pre-treated to create cooling air.



Treg: regulation temperature
Val_damper: theoretical value of the damper control
WCS: working cooling setpoint
164: minimum modulating damper opening
165: maximum modulating damper opening
113: proportional cooling band

Select the type of modulating damper *012*=3 (modulating damper) and set *004*=3.
Select the minimum opening position (parameter *164*) and the maximum opening position (parameter *165*) of the damper.
Select the type of damper regulation *013*=4 (regulation based on cooling).
Define which analogue output is the modulating damper: *031*=9 (AO1) or *032*=9 (AO2) or *033*=9 (AO3).
The damper is modulated between the minimum opening position (parameter *164*) and the maximum opening position (parameter *165*) when the PI cooling regulation changes from 0 to 100%.

If the operating temperature rises above *WCS*, the modulating damper starts to be modulated. The ❄ icon is displayed.
The damper can be controlled with PI action if the integral time *114* does not equal 0 or with proportional action only if *114*=0.
The ❄ icon switches off if the damper reaches the minimum position defined by parameter *164*.

Note: If the frost protection alarm is activated (*189*=1) or if the appliance is switched off or if condensation alarm is on, the modulating damper is completely closed.

Regulation of modulating diffuser damper based on cooling and CO_2

It is possible to use a diffuser damper for CO_2 and cooling, the air must be pre-treated to create cooling air.
The regulation considers the maximum value between theoretical value of temperature regulation as per last paragraph and CO_2 regulation as per paragraph *"Regulation of modulating damper based on CO_2" page 86*.

In order to carry out this operation, define transmitter used for CO_2
Select the type of modulating damper *012*=3 (modulating damper) and set *004*=3.
Select the minimum opening position (parameter *164*) and the maximum opening position (parameter *165*) of the damper.
Select the type of damper regulation *013*=5 (regulation based on cooling and CO_2).
Define which analogue output is the modulating damper: *031*=9 (AO1) or *032*=9 (AO2) or *033*=9 (AO3).
Define the parameters of the PI controller for the reduction of the CO_2 concentration (*167*: setpoint, *168*: proportional band, *169*: integral time) and the PI controller for cooling.
The damper is modulated between the minimum opening position (parameter *164*) and the maximum opening position (parameter *165*) considering the maximum theoretical value between the CO_2 and cooling signals.
if the CO_2 signal is greater than the temperature regulation signal and 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.
If the temperature signal is greater than the CO_2 signal and the cooling 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 (*189*=1) or if the appliance is switched off or if condensation alarm is on, the modulating damper is completely closed.

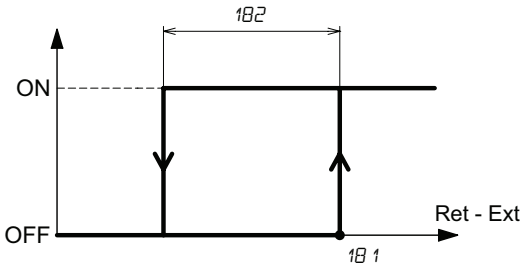
27. Heat exchanger

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 014 the selection can be done:
For cross-flow heat exchanger set 014=1.
For double battery heat exchanger set 014=2.
For on/off rotary heat exchanger set 014=3.
For modulating rotary heat exchanger set 014=4.
For no heat exchanger set 014=0.

• Conditions for recovery:

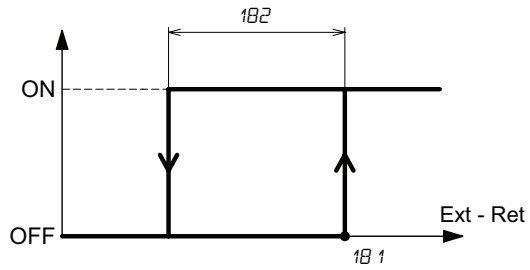
The heat exchanger (excluded cross-flow heat exchanger) is not always active, it is activated in heating if there is a heating request and if the following condition of activation in heating is verified:



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

If Ret - Ext > heat exchanger setpoint 182, the heat exchanger is authorized to run if necessary.
If Ret - Ext <= (heat exchanger setpoint 182 - heat exchanger differential 183) 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
182: *setpoint del recuperatore*
183: *differenziale del recuperatore*

If Ext - Ret > heat exchanger setpoint 182, the heat exchanger is authorized to run if necessary.
If Ext - Ret <= (heat exchanger setpoint 182 - heat exchanger differential 183) the heat exchanger is not authorized to run.

• Cross-flow heat exchanger:

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

Bypass type of heat exchanger	Activation and parameters setting and operating
On/off	Activation: - during cooling and/or heating request when conditions of free cooling and/or free heating are present. - during exchanger frost protection alarm if 187=1 or 3 (*)
	Parameter setting and operating: 012 = 2 (bypass on/off). 013 = 1 (damper regulated on free cooling/heating) 014 = 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) or 030=13 (DO6) Activate free cooling and/or heating with parameter 170. Set an analogue output as external sensor 021=3 (AI1) or 023=3 (AI2) Set parameters of free cooling and/or heating from 171 to 178 (see *"38. Configuration of installer parameters (level 2 password)" page 134*) For operating mode of Bypass damper see paragraph *"24. Regulation with free cooling, free heating" page 59*
On/off (based on free cooling/heating only)	Activation: - during conditions of free cooling and/or heating **without considering** cooling and/or heating request. - during exchanger frost protection alarm if 187=1 or 3 (*)
	Parameter setting and operating: 012 = 5 (bypass on/off based on free cooling/heating only). 013 = 1 (damper regulated on free cooling/heating) 014 = 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) or 030=20 (DO6) Activate free cooling and/or heating with parameter 170. Set an analogue output as external sensor 021=3 (AI1) or 023=3 (AI2) Set parameters of free cooling and/or heating from 171 to 178 (see *"38. Configuration of installer parameters (level 2 password)" page 134*) For operating of bypass see paragraph *"Operation with on/off bypass damper for cross-flow heat exchanger" page 59*
Modulating	Activation: - during cooling and/or heating request when conditions of free cooling and/or free heating are present, the damper is modulated. - during exchanger frost protection alarm if 187=1 or 3 (*)
	Parameter setting and operating: 012 = 4 (modulating bypass) 013 = 1 (damper regulated on free cooling/heating) 014 = 1 (cross-flow heat exchanger). Select output for damper 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3). Activate free cooling and/or heating with parameter 170. Set an analogue output as external sensor 021=3 (AI1) or 023=3 (AI2) Set parameters of free cooling and/or heating from 171 to 178 (see *"38. Configuration of installer parameters (level 2 password)" page 134*) For operating mode of Bypass damper see paragraph *"24. Regulation with free cooling, free heating" page 59*

(*) 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 187=1)

By Modbus, it is also possible to see the status of the heat exchanger (see the Modbus variables table *"48. AHS2-0MM Modbus variables on CN5" page 155*).

• Double battery heat exchanger:

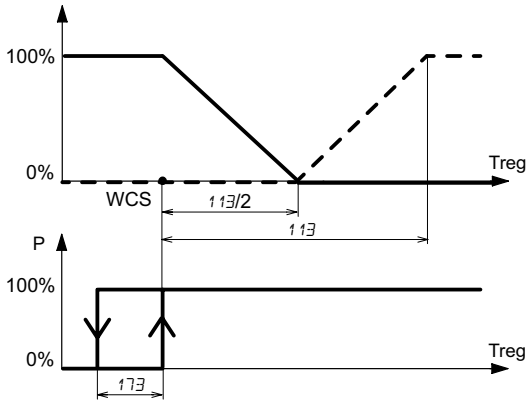
The double battery heat exchanger is activated by a fluid circulation pump placed between the two batteries.
If a cooling/heating request is present and conditions of recovery are satisfied, the pump is activated.
If a bypass damper is present it operates opposed to the pump.
If a modulating bypass damper 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 *014*=2,
- select a digital output for the pump *025*=14 (DO1) or *026*=14 (DO2) or *027*=14 (DO3) or *028*=14 (DO4) or *029*=14 (DO5) or *030*=14 (DO6)
- set an analogue input as remote sensor *021*=1 (AI1) or *023*=1 (AI2) (*002*=0) or use the internal sensor of AHS2 (*002*=1) for regulation,
- define external sensor *021*=3 (AI1) or *023*=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger *012*=4, *013*=1, *031*=13 (AO1) or *032*=13 (AO2) or *033*=13 (AO3).
- modulating cooling valve *004*=1 and *031*=4 (AO1) or *032*=4 (AO2) or *033*=4 (AO3)

or modulating mixed-use cooling valve *003*=2 *004*=1 and *031*=5 (AO1) or *032*=5 (AO2) or *033*=5 (AO3).



Treg: control temperature
WCS: cooling operation setpoint
113: cooling proportional band
173: 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

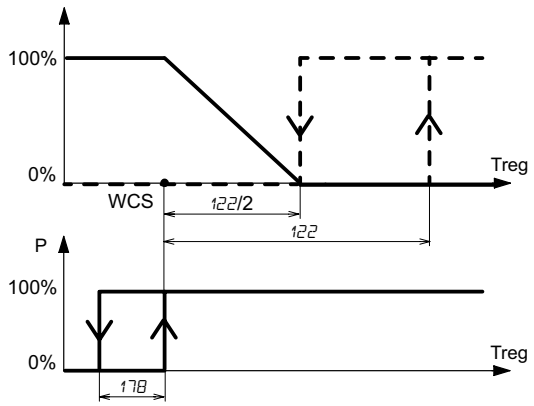
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the pump is activated and the modulating bypass damper goes from the maximum opening position (parameter *165*) to the minimum opening position (parameter *164*) in the band defined by *113*/2. The cooling valve goes from closed position to open position when Treg changes from (WCS + *113*/2) to (WCS + *113*).
The pump is deactivated if Treg <= (WCS - *173*). The icon ❄ is switched off.

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

Do following settings:
- set type of heat exchanger *014*=2,
- select a digital output for the pump *025*=14 (DO1) or *026*=14 (DO2) or *027*=14 (DO3) or *028*=14 (DO4) or *029*=14 (DO5) or *030*=14 (DO6)
- set an analogue input as remote sensor *021*=1 (AI1) or *023*=1 (AI2) (*002*=0) or use the internal sensor of AHS2 (*002*=1) for regulation
- define external sensor *021*=3 (AI1) or *023*=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger *012*=4, *013*=1, *031*=13 (AO1) or *032*=13 (AO2) or *033*=13 (AO3).
- on/off cooling valve *004*=2 and *025*=5 (DO1) or *026*=5 (DO2) or *027*=5 (DO3) or *028*=5 (DO4) or *029*=5 (DO5) or *030*=5 (DO6),

or on/off mixed-use valve in cooling *003*=4, *004*=2 and *025*=6 (DO1) or *026*=6 (DO2) or *027*=6 (DO3) or *028*=6 (DO4) or *029*=6 (DO5) or *030*=6 (DO6).

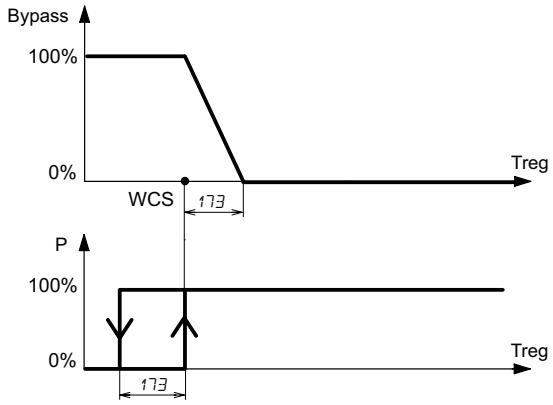


Treg: control temperature
WCS: cooling operation setpoint
116: cooling hysteresis for on/off output
173: hysteresis regulation free heating/cooling
solid curve upper part: modulating bypass damper output
dashed curve: on/off cooling valve output
P: pump of double coil heat exchanger output

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 165) to the minimum opening position (parameter 164) in the band defined by 116/2. The cooling valve is activated if Treg > (WCS + 116) and deactivated if Treg <= (WCS + 116/2).
The pump is deactivated if Treg <= (WCS - 173). The icon ❄ is switched off.

Operation with modulating bypass heat exchanger without cooling valve:

Do following settings:
- set type of heat exchanger 014=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 012=4, 013=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).

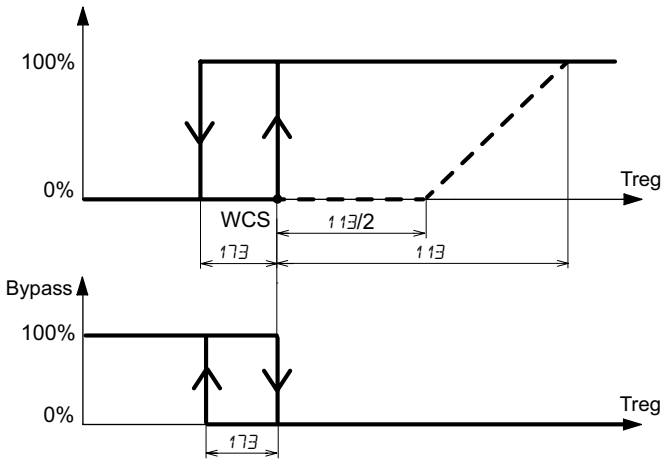


Treg: control temperature
WCS: cooling operation setpoint
173: hysteresis regulation free heating/cooling
Bypass: modulating bypass damper output
P: pump of double coil heat exchanger output

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 165) to the minimum opening position (parameter 164) in the band defined by 173.
The pump is deactivated if Treg <= (WCS - 173). The icon ❄ is switched off.

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

Do following settings:
- set type of heat exchanger 014=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- modulating cooling valve 004=1 and 031=4 (AO1) or 032=4 (AO2) or 033=4 (AO3)
or modulating mixed-use cooling valve 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3).

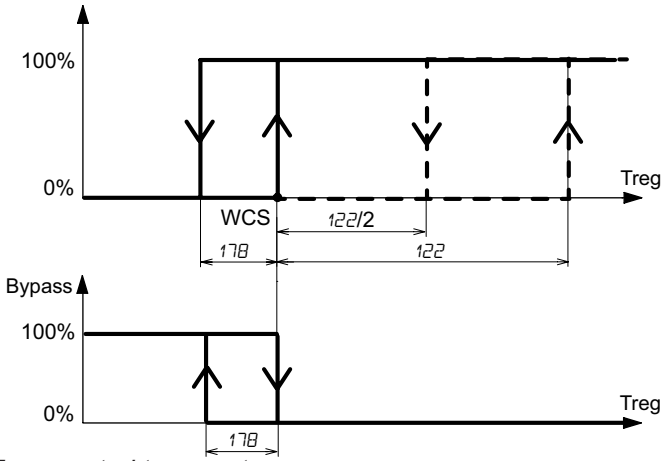


Treg: control temperature
WCS: cooling operation setpoint
113: cooling proportional band
173: hysteresis regulation free heating/cooling
solid curve upper part: pump of double coil heat exchanger output
dashed curve: modulating cooling valve output
Bypass: on/off bypass damper output

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 + 113/2) to (WCS + 113).
The pump is deactivated and the bypass damper activated if Treg <= (WCS - 173). 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 014=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- on/off cooling valve 004=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) or 030=5 (DO6),
or on/off mixed-use valve in cooling 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).

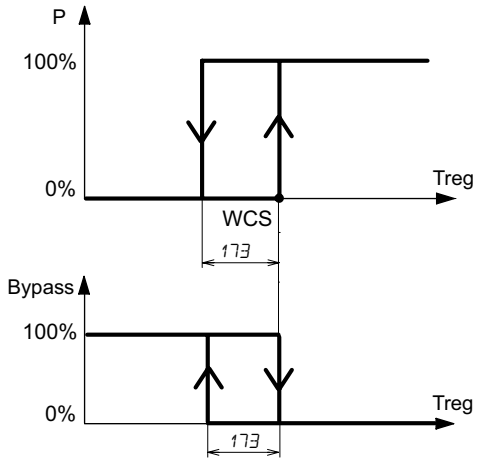


Treg: control temperature
WCS: cooling operation setpoint
116: cooling hysteresis for on/off output
173: hysteresis regulation free heating/cooling
solid curve upper part: pump of double coil heat exchanger output
dashed curve: on/off cooling valve output
Bypass: bypass damper for heat exchanger output

With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the pump is activated and the on/off bypass is deactivated. The cooling valve is activated if Treg > (WCS + 116) and deactivated if Treg <= (WCS + 116/2)
The pump is deactivated and the bypass damper activated if Treg <= (WCS - 173). The icon ❄ is switched off.

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

Do following settings:
- set type of heat exchanger 014=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6).



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

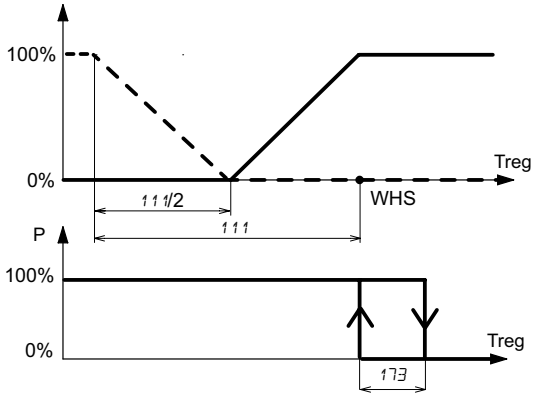
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the pump is activated and the on/off bypass is deactivated. The pump is deactivated and the bypass damper activated if Treg <= (WCS - 173). The icon ❄ is switched off.

Operation with modulating bypass heat exchanger and modulating heating valve:

Do following settings:
- set type of heat exchanger 014=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 012=4, 013=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3),
- modulating heating valve 003=2 and 031=3 (AO1) or 032=3 (AO2) or 033=3 (AO3)

or modulating mixed-use valve in heating 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3)
or modulating electrical resistance 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3)



Treg: control temperature
WHS: heating operation setpoint
111: heating proportional band
173: 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

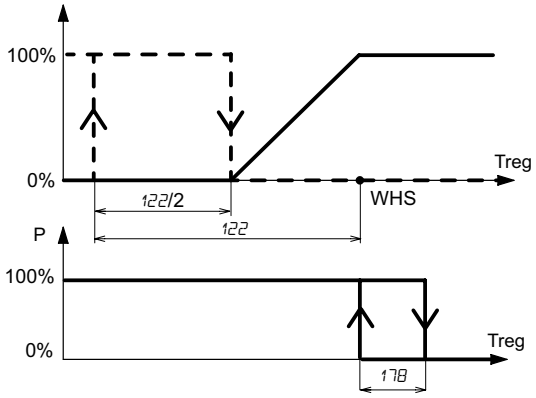
With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon is switched on, the pump is activated and the modulating bypass damper goes from the maximum opening position (parameter 165) to the minimum opening position (parameter 164) in the band defined by 111/2. The heating valve goes from closed position to open position when Treg changes from (WHS - 111/2) to (WHS - 111).
The pump is deactivated if Treg >= (WHS + 173). The icon is switched off.

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

Do following settings:
- set type of heat exchanger 014=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 012=4, 013=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3),
- heating valve on/off 003=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5) or 030=4 (DO6),

or electrical resistance on/off 003=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5) or 030=7 (DO6),
or on/off mixed-use valve in heating 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).



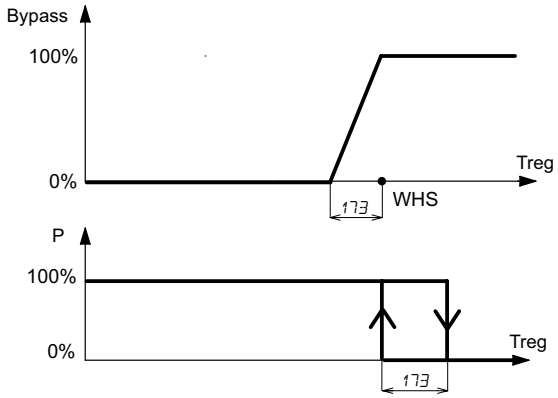
Treg: control temperature
WHS: heating operation setpoint
115: heating hysteresis for on/off output
173: hysteresis regulation free heating/cooling
solid curve upper part: modulating bypass damper for heat exchanger output
dashed curve: on/off heating valve output
P: pump of double coil heat exchanger 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 165) to the minimum opening position (parameter 164) in the band defined by 115/2. The heating valve is activated when Treg < (WHS - 115) and deactivated when Treg >= (WHS - 115/2). The pump is deactivated if Treg >= (WHS + 173). The icon is switched off.

Operation with modulating bypass heat exchanger without heating valve:

Do following settings:
- set type of heat exchanger 014=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 012=4, 013=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3),



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

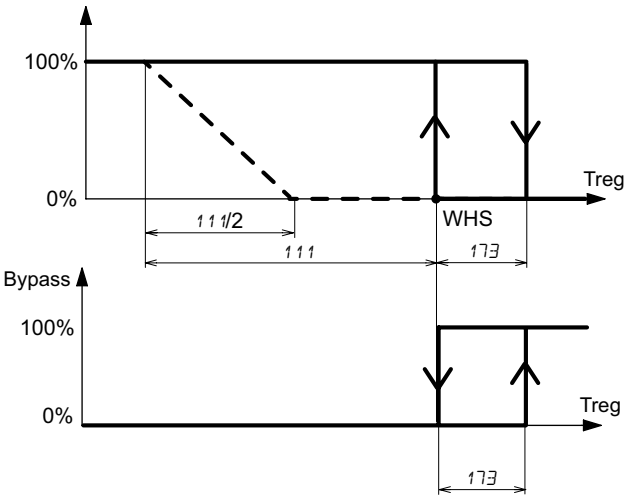
With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon is switched on, the pump is activated and the modulating bypass damper goes from the maximum opening position (parameter 165) to the minimum opening position (parameter 164) in the band defined by 173.
The pump is deactivated if Treg >= (WHS + 173). The icon is switched off.

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

Do following settings:
- set type of heat exchanger 014=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5) or 030=14 (DO6),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- modulating heating valve 003=2 and 031=3 (AO1) or 032=3 (AO2) or 033=3 (AO3)

or modulating mixed-use valve in heating 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3)
or modulating electrical resistance 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3)



Treg: control temperature
WHS: heating operation setpoint
111: heating proportional band
173: 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

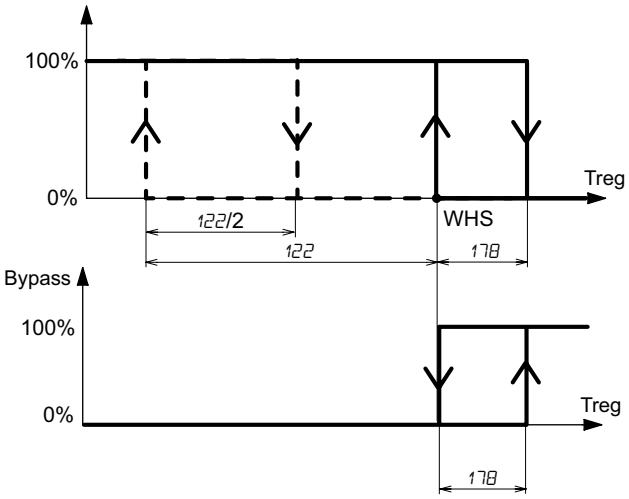
With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon ♨ is switched on, the pump is activated and the on/off bypass damper is deactivated.
The heating valve goes from closed position to open position when Treg changes from (WHS - 111/2) to (WHS - 111).
The pump is deactivated and bypass activated if Treg >= (WHS + 173). 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 014=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5),
- heating valve on/off 003=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5) or 030=4 (DO6),

or electrical resistance on/off 003=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5) or 030=7 (DO6),
or on/off mixed-use valve in heating 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).

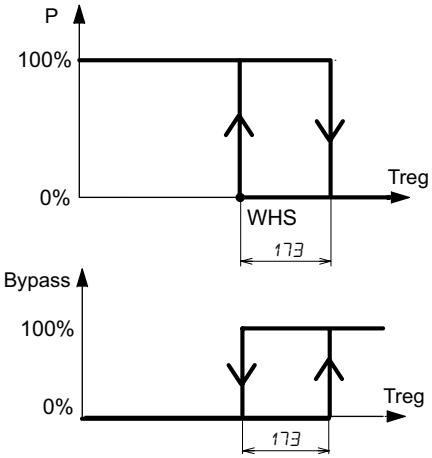


Treg: control temperature
WHS: heating operation setpoint
115: heating hysteresis for on/off output
173: hysteresis regulation free heating/cooling
solid curve upper part: pump of double coil heat exchanger output
dashed curve: on/off heating valve output
Bypass: bypass damper for heat exchanger output

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 - 115) and deactivated if Treg >= (WHS - 115/2).
The pump is deactivated and bypass activated if Treg >= (WHS + 173). The icon is switched off.

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

Do following settings:
- set type of heat exchanger 014=2,
- select a digital output for the pump 025=14 (DO1) or 026=14 (DO2) or 027=14 (DO3) or 028=14 (DO4) or 029=14 (DO5) or 030=14 (DO6),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6)



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

With heating recovery conditions If temperature of regulation sensor drops below WHS, icon is switched on, the pump is activated and the on/off bypass damper is deactivated. The pump is deactivated and bypass activated if Treg >= (WHS + 173). 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 *"48. AHS2-0MM Modbus variables on CN5" page 155*).

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.

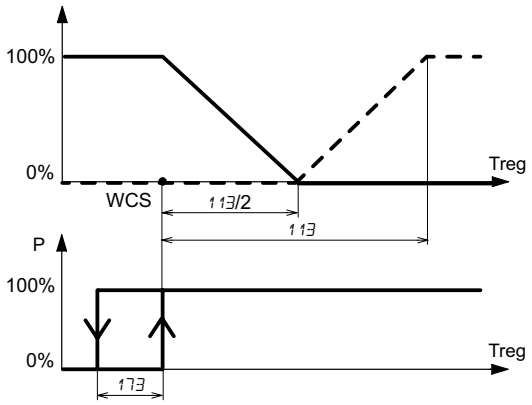
if a request of cooling/heating is present with cooling recovery/heating recovery conditions, the rotary on/off heat exchanger is activated.
If a on/off bypass damper is present, it operates opposite to heat exchanger.
If a modulating bypass damper is present, the modulating damper modulates the recovery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

Operation with modulating bypass heat exchanger and modulating cooling valve:

Do following settings:
- set type of heat exchanger *0 14*=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) or *030*=14 (DO6)
- set an analogue input as remote sensor *02 1*=1 (AI1) or *023*=1 (AI2) (*002*=0) or use the internal sensor of AHS2 (*002*=1) for regulation
- define external sensor *02 1*=3 (AI1) or *023*=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger *0 12*=4, *0 13*=1, *03 1*=13 (AO1) or *032*=13 (AO2) or *033*=13 (AO3).
- modulating cooling valve *004*=1 and *03 1*=4 (AO1) or *032*=4 (AO2) or *033*=4 (AO3)

or modulating mixed-use cooling valve *003*=2 *004*=1 and *03 1*=5 (AO1) or *032*=5 (AO2) or *033*=5 (AO3).



Treg: control temperature
WCS: cooling operation setpoint
113: cooling proportional band
173: 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

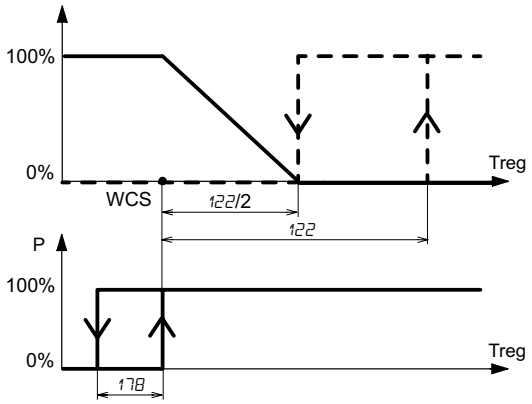
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the rotary on/off heat exchanger is activated and the modulating bypass damper goes from the maximum opening position (parameter *165*) to the minimum opening position (parameter *164*) in the band defined by *113*/2. The cooling valve goes from closed position to open position when Treg changes from (WCS + *113*/2) to (WCS + *113*).
The rotary on/off heat exchanger is deactivated if Treg <= (WCS - *173*). The icon ❄ is switched off.

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

Do following settings:
- set type of heat exchanger 014=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) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 012=4, 013=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).
- on/off cooling valve 004=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) or 030=5 (DO6),

or on/off mixed-use valve in cooling 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).



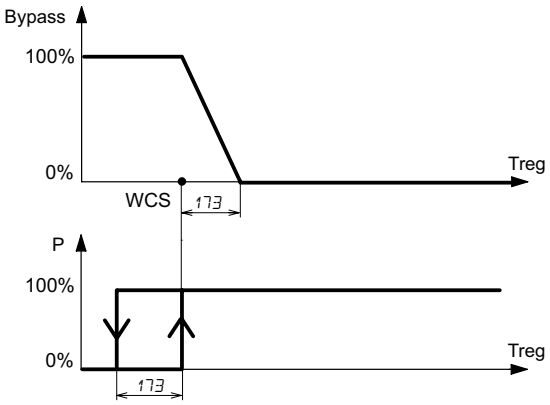
Treg: control temperature
WCS: cooling operation setpoint
116: cooling hysteresis for on/off output
173: hysteresis regulation free heating/cooling
solid curve upper part: modulating bypass damper output
dashed curve: on/off cooling valve output
P: rotary on/off heat exchanger output

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 116/2. The cooling valve is activated if Treg > (WCS + 116) and deactivated if Treg <= (WCS + 116/2).
The rotary on/off heat exchanger is deactivated if Treg <= (WCS - 173). The icon ❄ is switched off.

Operation with modulating bypass heat exchanger without cooling valve:

Do following settings:
- set type of heat exchanger 014=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) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define the return air sensor 021=1 (AI1) or 023=1 (AI2),
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 012=4, 013=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3).



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

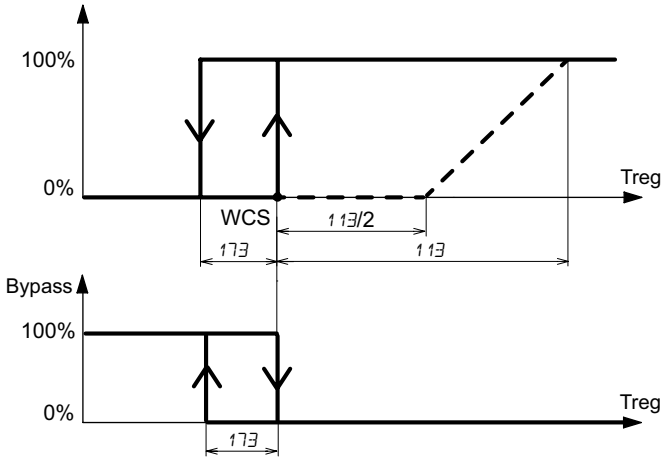
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the rotary on/off heat exchanger is activated and the modulating bypass damper goes from the maximum opening position (parameter 165) to the minimum opening position (parameter 164) in the band defined by 173.
The rotary on/off heat exchanger is deactivated if Treg <= (WCS - 173). The icon ❄ is switched off.

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

Do following settings:
- set type of heat exchanger 014=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) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- modulating cooling valve 004=1 and 031=4 (AO1) or 032=4 (AO2) or 033=4 (AO3)

or modulating mixed-use cooling valve 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3).



Treg: control temperature
WCS: cooling operation setpoint
113: cooling proportional band
173: 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

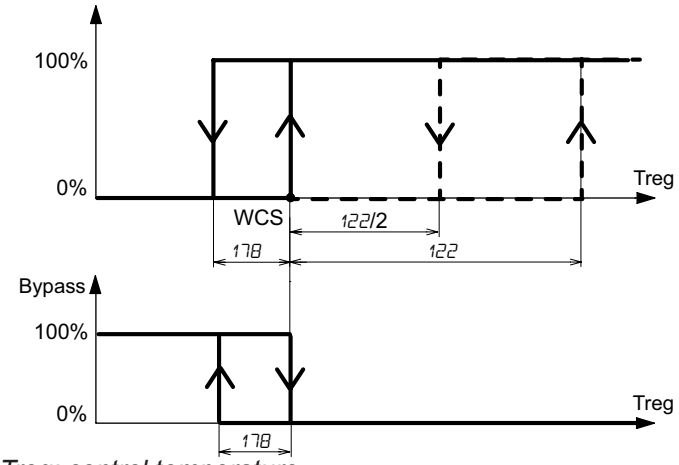
and the on/off bypass is deactivated.
The cooling valve goes from closed position to open position when Treg changes from (WCS + 113/2) to (WCS + 113).
The rotary on/off heat exchanger is deactivated and the bypass damper activated if Treg <= (WCS - 173). The icon ❄ is switched off.

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

Do following settings:
- set type of heat exchanger 014=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) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- on/off cooling valve 004=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) or 030=5 (DO6),

or on/off mixed-use valve in cooling 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).



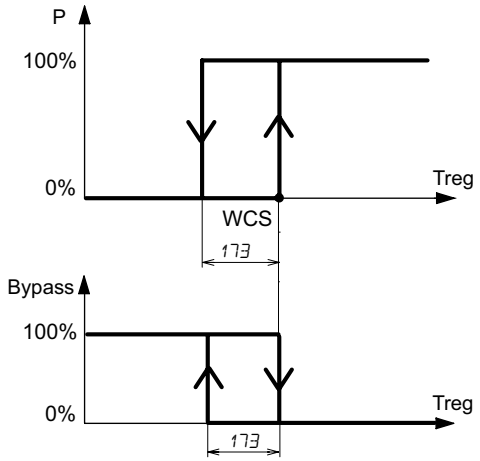
Treg: control temperature
WCS: cooling operation setpoint
116: cooling hysteresis for on/off output
173: hysteresis regulation free heating/cooling
solid curve upper part: rotary on/off heat exchanger output
dashed curve: on/off cooling valve output
Bypass: bypass damper for heat exchanger output

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 + 116) and deactivated if Treg <= (WCS + 116/2)
The rotary on/off heat exchanger is deactivated and the bypass damper activated if Treg <= (WCS - 173). The icon ❄ is switched off.

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

Do following settings:
- set type of heat exchanger 014=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) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6).



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

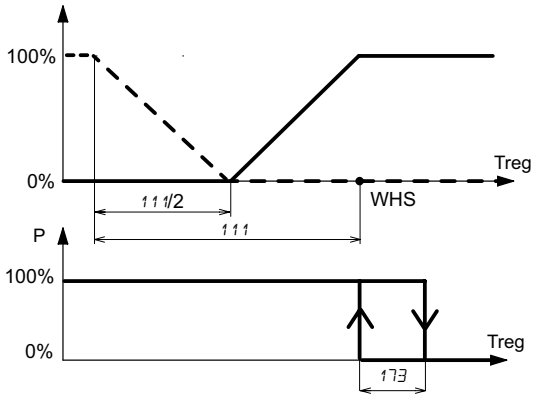
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, icon ❄ is switched on, the rotary on/off heat exchanger is activated and the on/off bypass is deactivated. The rotary on/off heat exchanger is deactivated and the bypass damper activated if Treg <= (WCS - 173). The icon ❄ is switched off.

Operation with modulating bypass heat exchanger and modulating heating valve:

Do following settings:
- set type of heat exchanger 014=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) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 012=4, 013=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3),
- modulating heating valve 003=2 and 031=3 (AO1) or 032=3 (AO2) or 033=3 (AO3)

or modulating mixed-use valve in heating 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3)
or modulating electrical resistance 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3)



Treg: control temperature
WHS: heating operation setpoint
111: heating proportional band
173: 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 165) to the minimum opening posi-

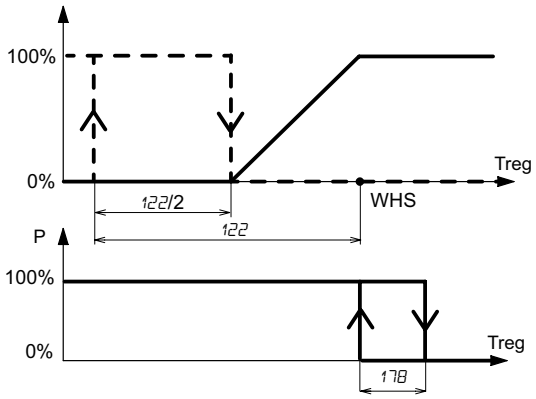
tion (parameter 164) in the band defined by 111/2. The heating valve goes from closed position to open position when Treg changes from (WHS - 111/2) to (WHS - 111).
The rotary on/off heat exchanger is deactivated if Treg >= (WHS + 173). The icon ♨ is switched off.

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

Do following settings:
- set type of heat exchanger 014=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) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 012=4, 013=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3),
- heating valve on/off 003=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5) or 030=4 (DO6) or electrical resistance on/off 003=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5) or 030=7 (DO6)

or on/off mixed-use valve in heating 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6)



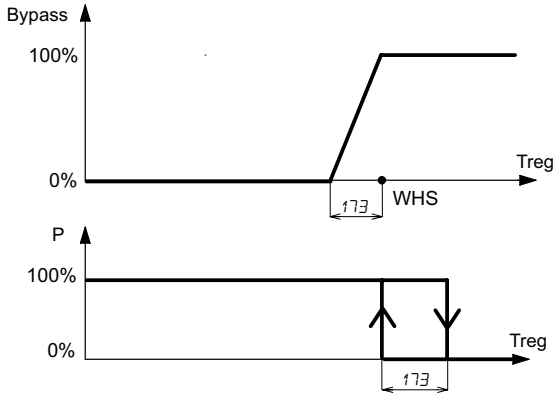
Treg: control temperature
WHS: heating operation setpoint
115: heating hysteresis for on/off output
173: hysteresis regulation free heating/cooling
solid curve upper part: modulating bypass damper for heat exchanger output
dashed curve: on/off heating valve output
P: rotary on/off heat exchanger output

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 165) to the minimum opening position (parameter 164) in the band defined by 115/2. The heating valve is activated when Treg < (WHS - 115) and deactivated when Treg >= (WHS - 115/2).
The rotary on/off heat exchanger is deactivated if Treg >= (WHS + 173). The icon ♨ is switched off.

Operation with modulating bypass heat exchanger without heating valve:

Do following settings:
- set type of heat exchanger 014=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) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- Modulating bypass damper for heat exchanger 012=4, 013=1, 031=13 (AO1) or 032=13 (AO2) or 033=13 (AO3),

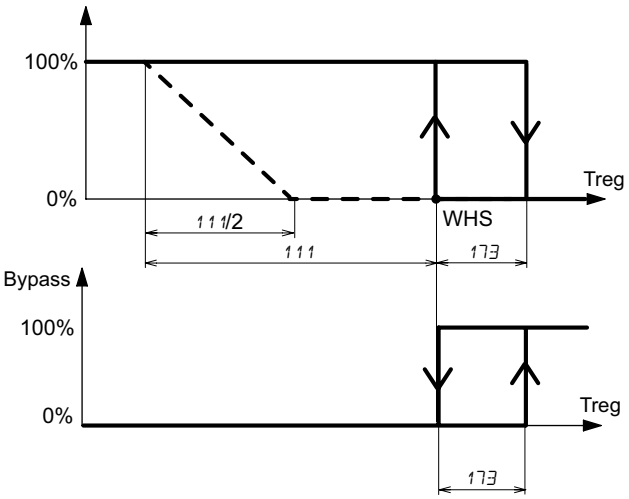


Treg: control temperature
WHS: heating operation setpoint
173: hysteresis regulation free heating/cooling
Bypass: modulating bypass damper for heat exchanger output
P: rotary on/off heat exchanger output

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 165) to the minimum opening position (parameter 164) in the band defined by 173.
The rotary on/off heat exchanger is deactivated if Treg >= (WHS + 173). The icon is switched off.

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

Do following settings:
- set type of heat exchanger 014=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) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- modulating heating valve 003=2 and 031=3 (AO1) or 032=3 (AO2) or 033=3 (AO3)
or modulating mixed-use valve in heating 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3)
or modulating electrical resistance 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3)

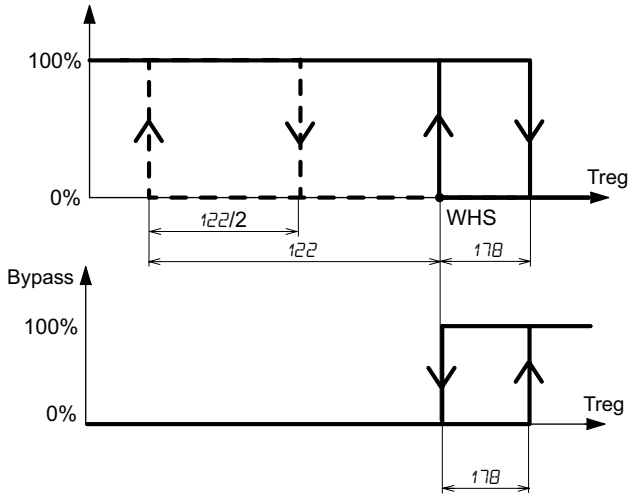


Treg: control temperature
WHS: heating operation setpoint
111: heating proportional band
173: hysteresis regulation free heating/cooling
solid curve upper part: rotary on/off heat exchanger output
dashed curve: modulating heating valve output
Bypass: on/off bypass damper output

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 - 111/2) to (WHS - 111).
The rotary on/off heat exchanger is deactivated and bypass activated if Treg >= (WHS + 173). 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 014=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) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- heating valve on/off 003=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5) or 030=4 (DO6) or electrical resistance on/off 003=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5) or 030=7 (DO6)
or on/off mixed-use valve in heating 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6)

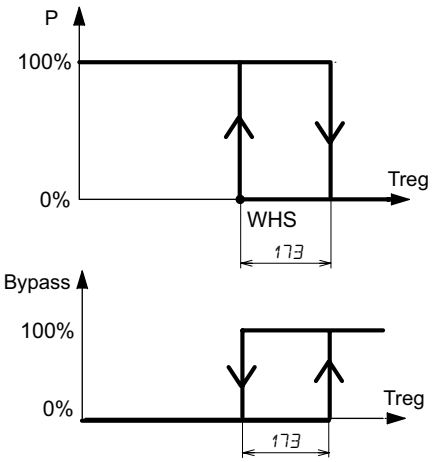


Treg: control temperature
WHS: heating operation setpoint
115: heating hysteresis for on/off output
173: hysteresis regulation free heating/cooling
solid curve upper part: rotary on/off heat exchanger output
dashed curve: on/off heating valve output
Bypass: bypass damper for heat exchanger output

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 - 115) and deactivated if Treg >= (WHS - 115/2).
The rotary on/off heat exchanger is deactivated and bypass activated if Treg >= (WHS + 173). The icon is switched off.

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

Do following settings:
- set type of heat exchanger 014=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) or 030=14 (DO6)
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6)



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

With heating recovery conditions:
If temperature of regulation sensor drops below WHS, icon is switched on, the rotary on/off heat exchanger is activated and the on/off bypass damper is deactivated.
The rotary on/off heat exchanger is deactivated and bypass activated if Treg >= (WHS + 173). 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 *"48. AHS2-0MM Modbus variables on CN5" page 155*).

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 187 ≠ 1 and 3, on/off bypass is forced to OFF, modulating bypass is forced to minimum opening position defined by parameter 164.
If parameter 187=1 or 3, on/off bypass is forced to ON, modulating bypass is forced to maximum opening position defined by parameter 165.

• Modulating rotary heat exchanger:

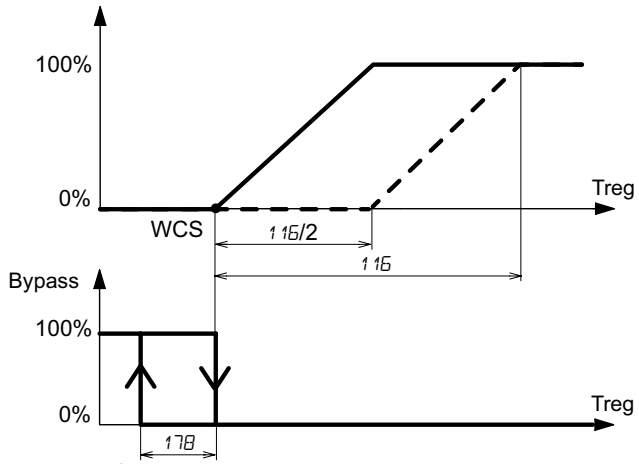
To be able to operate, ventilation must be activated; otherwise, it is always disabled.

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 184 to the maximum defined by parameter 185
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 014=4,
- select an analogue output for the modulating rotary heat exchanger 031=12 (AO1) o 032=12 (AO2) o 033=12 (AO3),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- modulating cooling valve 004=1 and 031=4 (AO1) or 032=4 (AO2) or 033=4 (AO3),

or modulating mixed-use cooling valve 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3).

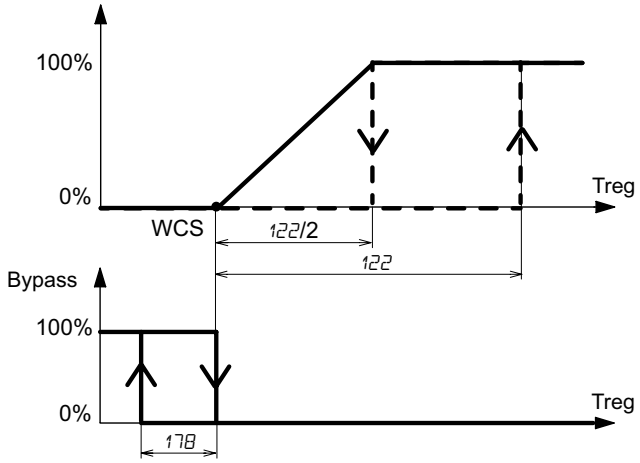


Treg: control temperature
WCS: cooling operation setpoint
113: cooling proportional band
173: hysteresis regulation free heating/cooling
solid curve upper part: modulating rotary heat exchanger output
dashed curve: modulating cooling valve output
Bypass: on/off bypass damper output with 184=0 (with 184≠0, 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 184=0), icon ❄ is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WCS to (WCS + 113/2). The cooling valve goes from closed position to open position when Treg changes from (WCS + 113/2) to (WCS + 113).
The modulating rotary heat exchanger reaches its minimum speed if Treg <= WCS:
if minimum speed is different from 0 (184≠0), icon ❄ is switched off and the bypass remains OFF.
if minimum speed is equal to 0 (184=0), and if Treg <= (WCS - 173) 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 014=4,
- select an analogue output for the modulating rotary heat exchanger 031=12 (AO1) o 032=12 (AO2) o 033=12 (AO3),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- on/off cooling valve 004=2 and 025=5 (DO1) or 026=5 (DO2) or 027=5 (DO3) or 028=5 (DO4) or 029=5 (DO5) or 030=5 (DO6),
or on/off mixed-use valve in cooling 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).



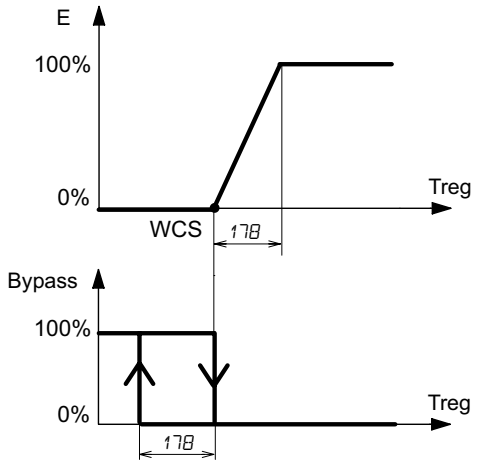
Treg: control temperature
WCS: cooling operation setpoint

116: cooling hysteresis for on/off output
173: 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 184=0 (with 184≠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 184=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 on/off cooling valve is activated if Treg > (WCS + 116) and is deactivated if Treg <= (WCS + 116/2).
The modulating rotary heat exchanger reaches its minimum speed if Treg <= WCS:
if minimum speed is different from 0 (184≠0), icon ❄ is switched off and the bypass remains OFF.
if minimum speed is equal to 0 (184=0), and if Treg <= (WCS - 173) 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 014=4,
- select an analogue output for the modulating rotary heat exchanger 031=12 (AO1) o 032=12 (AO2) o 033=12 (AO3),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6).



Treg: control temperature
WCS: cooling operation setpoint
173: hysteresis regulation free heating/cooling
E: modulating rotary heat exchanger output
Bypass: on/off bypass damper output with 184=0 (with 184≠0, the bypass is always OFF)

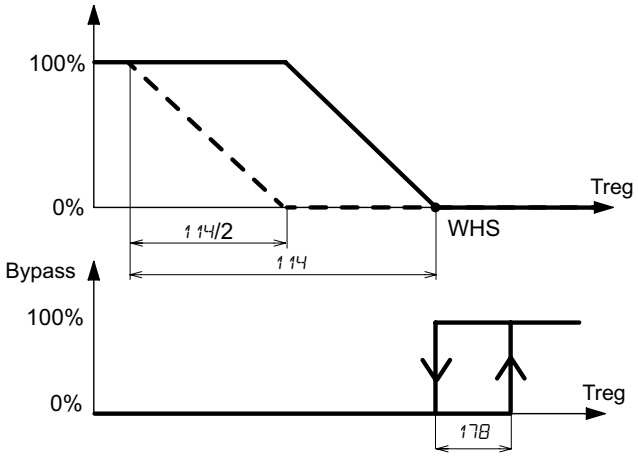
With cooling recovery conditions:
If temperature of regulation sensor rises above WCS, the on/off bypass damper is deactivated (with 184=0), icon ❄ is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WCS to (WCS + 173).
The modulating rotary heat exchanger reaches its minimum speed if Treg <= WCS:
- with 184=0 minimum speed of modulating rotary heat exchanger is equal to 0. The bypass is activated if Treg <= (WCS - 173), icon ❄ is switched off,
- with 184≠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 014=4,
- select an analogue output for the modulating rotary heat exchanger 031=12 (AO1) o 032=12 (AO2) o 033=12 (AO3),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- modulating heating valve 003=2 and 031=3 (AO1) or 032=3 (AO2) or 033=3 (AO3)

or modulating mixed-use valve in heating 003=2 004=1 and 031=5 (AO1) or 032=5 (AO2) or 033=5 (AO3)
or modulating electrical resistance 003=1 and 031=6 (AO1) or 032=6 (AO2) or 033=6 (AO3)



Treg: control temperature
WHS: heating operation setpoint
111: heating proportional band
173: 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 184=0 (with 184≠0, the bypass is always OFF)

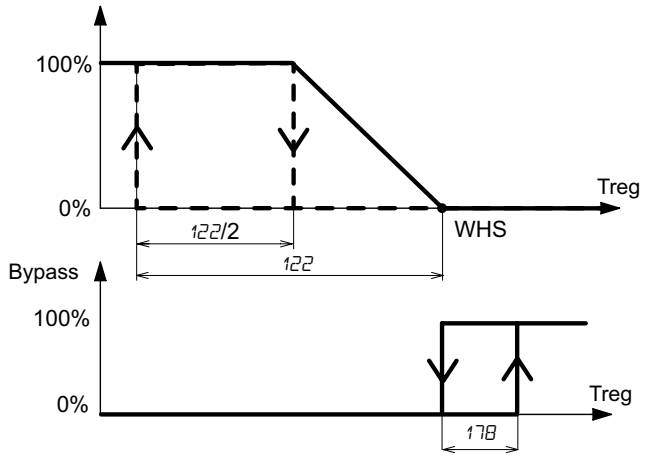
With heating recovery conditions:
If temperature of regulation sensor drops below WHS, the on/off bypass damper is deactivated (with 184=0), icon is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WHS to (WHS - 111/2). The heating valve goes from closed position to open position when Treg changes from (WHS - 111/2) to (WHS - 111).
The modulating rotary heat exchanger reaches its minimum speed if Treg >= WHS:
if minimum speed is different from 0 (184≠0), icon is switched off and the bypass remains OFF.
if minimum speed is equal to 0 (184=0), and if Treg <= (WHS + 173) 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 014=4,
- select an analogue output for the modulating rotary heat exchanger 031=12 (AO1) o 032=12 (AO2) o 033=12 (AO3),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).

If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6),
- heating valve on/off 003=4 and 025=4 (DO1) or 026=4 (DO2) or 027=4 (DO3) or 028=4 (DO4) or 029=4 (DO5) or 030=4 (DO6)

or electrical resistance on/off 003=3 and 025=7 (DO1) or 026=7 (DO2) or 027=7 (DO3) or 028=7 (DO4) or 029=7 (DO5) or 030=7 (DO6)
or on/off mixed-use valve in heating 003=4, 004=2 and 025=6 (DO1) or 026=6 (DO2) or 027=6 (DO3) or 028=6 (DO4) or 029=6 (DO5) or 030=6 (DO6).

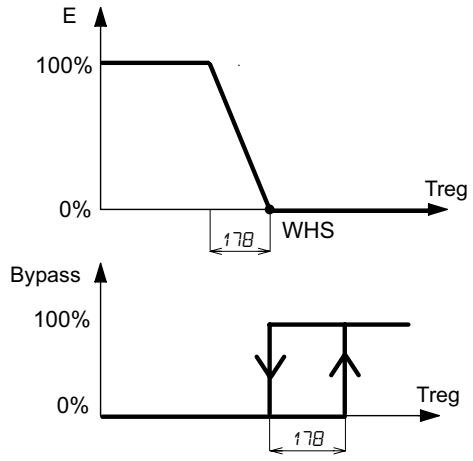


Treg: control temperature
WHS: heating operation setpoint
115: heating hysteresis for on/off output
173: hysteresis regulation free heating/cooling
solid curve upper part: modulating rotary heat exchanger output
dashed curve: on/off heating valve output
Bypass: on/off bypass damper output with 184=0 (with 184≠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 184=0), icon is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WHS to (WHS - 115/2).
The on/off heating valve is activated if Treg < (WHS - 115) and is deactivated if Treg >= (WHS - 115/2).
The modulating rotary heat exchanger reaches its minimum speed if Treg >= WHS:
if minimum speed is different from 0 (184≠0), icon is switched off and the bypass remains OFF.
if minimum speed is equal to 0 (184=0), and if Treg >= (WHS + 173) 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 014=4,
- select an analogue output for the modulating rotary heat exchanger 031=12 (AO1) o 032=12 (AO2) o 033=12 (AO3),
- set an analogue input as remote sensor 021=1 (AI1) or 023=1 (AI2) (002=0) or use the internal sensor of AHS2 (002=1) for regulation
- define external sensor 021=3 (AI1) or 023=3 (AI2).
If return sensor or external sensor is broken (open or short-circuit), heat exchanger is deactivated.
- On/off bypass damper for heat exchanger 012=2, 013=1, 025=13 (DO1) or 026=13 (DO2) or 027=13 (DO3) or 028=13 (DO4) or 029=13 (DO5) or 030=13 (DO6).



Treg: control temperature
WHS: heating operation setpoint
173: hysteresis regulation free heating/cooling
E: modulating rotary heat exchanger output
Bypass: on/off bypass damper output with 184=0 (with 184≠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 184=0), icon ♨ is switched on, the modulating rotary heat exchanger changes speed from the minimum to maximum when Treg changes from WHS to (WHS - 173).
The modulating rotary heat exchanger reaches its minimum speed if Treg >= WHS:
- with 184=0 minimum speed of modulating rotary heat exchanger is equal to 0. The bypass is activated if Treg >= (WCS + 173), icon ♨ is switched off,
- with 184≠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 *"48. AHS2-0MM Modbus variables on CN5" page 155*).

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 187 ≠ 1 and 3, on/off bypass is forced to OFF.
If parameter 187=1 or 3, on/off bypass is forced to ON.

28. 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 017=13 (DI1) or 019=13 (DI2) or an analogue input configured as a “frost protection heat exchanger contact” 021=19 (AI1) or 023=19 (AI2).
To activate the detection using a frost protection sensor on the heat exchanger, set 021=4 (AI1) or 023=4 (AI2).

In case of a frost protection on heat exchanger, it is possible to select, by parameter 187, which action to do for defrosting.
If 187=0 the speed of the supply ventilator is reduced relative to the extract ventilator. The parameter 188 allows you to select the percentage of the speed reduction.
If 187=1 the bypass is open, allowing the heat recovery air to heat the heat exchanger device plates.
If 187=2 a pre-heating electrical resistance placed on the heat exchanger is activated.
If 187=3 the speed of the supply ventilator is reduced relative to the extract ventilator and the bypass is open. The parameter 188 allows you to select the percentage of the speed reduction. The bypass is open, allowing the heat recovery air to heat the heat exchanger device plates
Se 187=4 the speed of the supply ventilator is reduced relative to the extract ventilator and a pre-heating electric heater placed on the heat exchanger is activated. The parameter 188 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) or 030=15 (DO6)
- select a sensor with frost protection function for the heat exchanger 021=4 (AI1) or 023=4 (AI2).

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

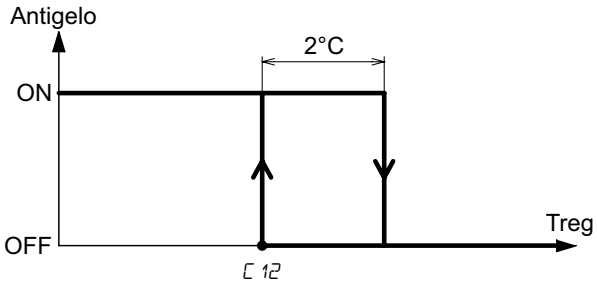
Res.: pre-heating electrical resistance
Texch.: frost protection temperature sensor of the heat exchanger
186: heat exchanger frost protection setpoint
If Texch < 186 is activated, the pre-heating resistance is activated and the icon is displayed, the and icons flash and the message ALC is displayed on the alarms page.

If Texch >= (186 + 191), 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.

29. 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 189=1.
To use a frost protection contact, select 017=5 (DI1) or 019=5 (DI2).
To use a sensor as antifreeze heating battery sensor select 021=5 (AI1) or 023=5 (AI2).
If no digital contact is configured for frost protection 017≠5 (DI1) and 019≠5 (DI2), no analogue input is configured for “frost protection” 021≠5 (AI1) and 023≠5 (AI2) then the control sensor is used for this operation.



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

If Treg < 190 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 192. If a digital output is set as antifreeze heating coil alarm relay 025=21 (DO1) or 026=21 (DO2) or 027=21 (DO3) or 028=21 (DO4) or 029=21 (DO5) or 030=21 (DO6), the corresponding relay is activated.

If Treg >= (190 + 191), the frost protection alarm is disabled and the and icons turn off. If a digital output is set as anti-freeze heating coil alarm relay 025=21 (DO1) or 026=21 (DO2) or 027=21 (DO3) or 028=21 (DO4) or 029=21 (DO5) or 030=21 (DO6), the corresponding relay is deactivated.

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

30. Anti-condensation function

If one of the digital inputs is configured as a condensation alarm contact 017=7 (DI1) or 019=7 (DI2) or an analogue input is configured as a “condensation contact” 021=13 (AI1) or 023=13 (AI2), and condensation alarm is activated, the cooling valve is closed while the other functions remain active and the and icons flash.

31. Timer extension or forced presence modes

If timer periods are used for the “economy” function (310=0) in the event that the “economy” or “non-occupied holiday” functions are used, the operating setpoints are calculated considering parameters 119 (economy offset) and 120 (“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 309).

To bypass these functions, set the timer extension manually using the MODE button or ESC and MODE buttons (see *“5. Quick access parameter setting” page 11*.

If the timer periods are used to switch on/off the appliance310=1, and the timer extension function is activated by the MODE button or ESC and MODE buttons, the unit does not consider the timer periods and keeps the appliance switched on for the time corresponding to the parameter 309.

To activate the timer extension function manually, set the parameter MOC to OC (see *“MODE button functionality” page 13*). Once activated, a delay equal to the value of the parameter309 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.

32. Dirty filter

The dirty filter function counts the ventilator's hours of operation and displays a flashing warning message with the icon when it exceeds the maximum number of hours defined by parameter 193.
In this case, the ventilator 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 193 (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 ventilator's hours of operation is saved to the memory every 2 hours. To reset the counter, set the parameter 209 to 1. The counter is reset and parameter 209 changes to 0 automatically and the icon stops flashing until the counter again exceeds the value of parameter 193.

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

33. 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 308 to 1 if the controller is used in Europe,

For all regions different from Europe and USA, set the parameter 308 to 0. In this case, the summertime change cannot be updated automatically. Update the time appropriately for the country concerned.

34. Forcing operating way of AHS2-0MM

From supervisor connected to CN5 it is possible to control the following variables for operating way:

12083	**ADR_MOD_FORCE_MODE**→ Force mode of operating (equivalent of parameter Mod of AHS2) 0=operating without time bands 1=operating with time bands 2=mode unoccupied, holiday		0	0	2	R/W
12084	**ADR_MOD_FORCE_ECONOMY** → Force economy mode Forcing by supervisor is not considered if a digital input of AHS2 is set as economy function (priority max) and is considered if a digital input of AHS2-0MM is set as economy function (medium priority) or no digital input at all is set as economy function. 300=forced value not considered. It releases any forcing of the variable by supervisor. 0=force no economy 1=force economy 2=force economy outside time bands (not considered if a digital or analogue input is set as economy contact) 10=(read only value) force no economy by AHS2 when a digital input of AHS2 is set as economy and is on position no economy 11=(read only value) force economy by AHS2 when a digital input of AHS2 is set as economy and is on position economy		300	0	2	R/W
12085	**ADR_MOD_FORCE_HOLIDAY** → Force unoccupied holidays mode Forcing by supervisor is not considered if a digital input of AHS2 is set as unoccupied function (priority max) and is considered if a digital input of AHS2-0MM is set as unoccupied function (medium priority) or no digital input at all is set as unoccupied function. 300=forced value not considered. It releases any forcing of the variable by supervisor. 0=force unoccupied, holidays mode 1=force occupied mode 2=force unoccupied, holidays from AHS2 keyboard (not considered if a digital or analogue input is set as economy contact) 10=(read only value not changeable) force unoccupied, holidays mode by AHS2 when a digital input of AHS2 is set as unoccupied holidays contact and is on position unoccupied, holidays 11=(read only value not changeable) force occupied mode by AHS2 when a digital input of AHS2 is set as unoccupied holidays contact and is on position occupied		300	0	2	R/W

12086	**ADR_MOD_FORCE_STA** → Force current operating season (2-pipe only) Forcing by supervisor is not considered if a digital input of AHS2 is set as changeover season function (priority max) and is considered if a digital input of AHS2-0MM is set as changeover season function (medium priority) or no digital input at all is set as changeover season function. 300=forced value not considered. It releases any forcing of the variable by supervisor. 0=force 2-pipe heating 1=force 2-pipe cooling 10=(read only value not changeable) force 2-pipe heating by AHS2 when a digital input of AHS2 is set as remote changeover and is on position heating 11=(read only value not changeable) force 2-pipe cooling by AHS2 when a digital input of AHS2 is set as remote changeover and is on position cooling		300	0	1	R/W
12087	**ADR_MOD_FORCE_COMFORT** → Force comfort mode (equivalent to parameter MOC of AHS2). 300=forced value not considered. It releases any forcing of the variable by supervisor. 0=force no comfort, it corresponds to MOC=noOC 1,2=force comfort mode, it corresponds to MOC=OC (regulation with based setpoint without considering timer extension 309)		300	0	2	R/W
12088	**ADR_MOD_FORCE_GLOBALONOFF** → On/off forced value for on/off (equivalent to manual on/off done on AHS2 from keyboard) The variable can't be forced if a contact set as on/off function is set on AHS2 or AHS2-0MM. 300=forced value not considered. It releases any forcing of the variable by supervisor. 0=forced to off 1=forced to on		300	0	1	R/W
12089	**ADR_MOD_FORCE_OFFSET_VARIATOR** → Force value of offset variator multiplied by 10 (°C). The variable override the current offset variator calculated even if 021=6 (AI1) or 023=6 (AI2) and is added to the current setpoint. 300=forced value not considered. It releases any forcing of the variable by supervisor. - 194 x 10... 194 x 10 forced value considered		300	- 194 x 10	194 x 10	R/W
12090	**ADR_MOD_FORCE_TEMP_AHS2** → Force temperature transmitted by AHS2 multiplied by 10. It allows supervisor to transmit its own temperature for regulation when 002=1,2. -300=forced value not considered. It releases any forcing of the variable by supervisor. -200=sensor open....970=sensor short-circuited, forced value considered		-300	-200	970	R
12091	**ADR_MOD_FORCE_HUM_AHS2** → Force humidity transmitted by AHS2 multiplied by 10. It allows supervisor to transmit its own humidity for humidity regulation based on internal humidity sensor of AHS2. -300=forced value not considered. It releases any forcing of the variable by supervisor. 0=0% r.h, 1000=100.0% r.h, forced value considered		-300	0	1000	R
12092	**ADR_MOD_FORCE_TRASM_TEMP_1** → Force temperature level of virtual transmitter 1 connected to internal network, multiplied by 10 To use the force mode select a transmitter with parameter 034, its function with 035. The forced value considered will substitute the value of temperature of virtual transmitter 1. -300=forced value not considered. It releases any forcing of the variable by supervisor. -200=sensor open....970=sensor short-circuited, forced value considered		-300	-200	970	R/W
12093	**ADR_MOD_FORCE_TRASM_HUM _1** → Force humidity level of virtual transmitter 1 connected to internal network, multiplied by 10 To use the force mode select a transmitter with parameter 034 and set the forced value. The forced value considered will substitute the value of humidity of virtual transmitter 1. -300=forced value not considered. It releases any forcing of the variable by supervisor. 0 (0% r.h.)..1000 (100.0% r.h.)=force value considered		-300	0	1000	R/W
12094	**ADR_MOD_FORCE_TRASM_CO2_1** → Force current level of CO_2 of virtual transmitter.1 To use the force mode select a transmitter with parameter 034 and set the forced value. The forced value considered will substitute the value of CO_2 of virtual transmitter 1. -300=forced value not considered. It releases any forcing of the variable by supervisor. 0 (0 ppm)..2000 (2000 ppm)=force value considered		-300	0	2000	R/W
12095	**ADR_MOD_FORCE_TRASM_PRESSURE_1** → Force current level of pressure of virtual transmitter.1 To use the force mode select a transmitter with parameter 034 and set the forced value. The forced value considered will substitute the value of pressure of virtual transmitter 1. -300=forced value not considered		-300	0	9999	R/W
12096	**ADR_MOD_FORCE_TRASM_TEMP_2** → Force temperature level of virtual transmitter 2 connected to internal network, multiplied by 10. To use the force mode select a transmitter with parameter 036, its function with 037. The forced value considered will substitute the value of temperature of virtual transmitter 2. -300=forced value not considered. It releases any forcing of the variable by supervisor. -200=sensor open....970=sensor short-circuited, forced value considered		-300	-200	970	R/W

12097	**ADR_MOD_FORCE_TRASM_HUM _2** → Force humidity level of virtual transmitter 2 connected to internal network, multiplied by 10. To use the force mode select a transmitter with parameter *036* and set the forced value. The forced value considered will substitute the value of humidity of virtual transmitter 2. -300=forced value not considered. It releases any forcing of the variable by supervisor. 0 (0% r.h.)..1000 (100.0% r.h.)=force value considered		-300	0	1000	R/W
12098	**ADR_MOD_FORCE_TRASM_CO2_2** → Force current level of CO_2 of virtual transmitter.2. To use the force mode select a transmitter with parameter *036* and set the forced value. The forced value considered will substitute the value of CO_2 of virtual transmitter 2. -300=forced value not considered. It releases any forcing of the variable by supervisor. 0 (0 ppm)..2000 (2000 ppm)=force value considered		-300	0	2000	R/W
12099	**ADR_MOD_FORCE_TRASM_PRESSURE_2** → Force current level of pressure of virtual transmitter.2. The forced value considered will substitute the value of pressure of virtual transmitter 2. To use the force mode select a transmitter with parameter *036* and set the forced value -300=forced value not considered. It releases any forcing of the variable by supervisor.		-300	0	9999	R/W
12100	**ADR_MOD_FORCE_STA_MANUAL** → Operating season (2-pipe only) if no contact are defined as remote change-over (equivalent to parameter *SLA* of AHS2 set from keyboard.) 0=force 2-pipe heating 1=force 2-pipe cooling			0	1	R/W
12101	**ADR_MOD_FORCE_VENTILATOR_SPEED_MODE** → regulation type for ventilator (equivalent to the setting of speed request done on AHS2 from key ESC). - for on/off ventilator: 1=ventilator set to speed 1 2=ventilator set to speed 2 3=ventilator set to speed 3 4=ventilator regulated automatically - for EC ventilator regulation type (% between speed 1 and 3): 0..100%			0	100	R/W
12102	**ADR_MOD_FORCE_OFFSET_SETPOINT** → Value of offset setpoint multiplied by 10 (°C) (equivalent to the offset setpoint that can be set from keyboard of AHS2 when comfort function is activated *311*=1). - par *194* x * 10...par - *194* x *10 °C			- *194* x 10	*194* x 10	R/W

Note: the value -300 must be set by supervisor to release any forced variables such as temperature, humidity, CO_2, pressure. The value 300 is set to release forced variables that don't belong to temperature, humidity, CO_2, pressure.

For forced variables from **ADR_MOD_FORCE_TRASM_TEMP_1 to ADR_MOD_FORCE_TRASM_PRESSURE_2** it is not necessary that a transmitter is really connected on internal network. That's why they are called virtual transmitter 1 or 2 on the variables considered.

35. Forcing digital and analogue inputs/outputs of AHS2-0MM

• Forcing outputs

Any output of a AHS2-0MM master and slaves can be forced via Modbus regardless of the regulation. To implement the forcing, proceed as follows on slave:
- write the forcing value for outputs to be forced at AHS2-0MM address between **ADR_MOD_FORCE_DO1** (12104) to **ADR_MOD_FORCE_AO3** (12112):
- write a forcing key indicating which output(s) are to be forced to the following master x address: **ADR_MOD_KEYSELECT_FORCED_OUTPUTS** (12103).
This forcing will be then transmitted to other slaves so that operating is the same on the entire internal network.

Definition of the forcing key for the outputs:
The forcing key is a variable composed of a fixed part to which the value corresponding to one or more outputs to be forced is added (see table below):

	Value for each forced output to be added to the fixed part								
Fixed part=21504	**A03**	**A02**	**A01**	**DO6**	**DO5**	**DO4**	**DO3**	**DO2**	**DO1**
	256	128	64	32	16	8	4	2	1

Example 1: the forcing key for forcing outputs D02 and A01 is 21504 + 2 + 64=21570.
Example 2: the forcing key for forcing output D04 is 21504 + 8=21512.

Forcing values should be written to the addresses given in the following table on AHS2-0MM master unit:

Detailed list of forcible registers	Min	Max	Address	Variable
ADR_MOD_FORCED_DO1 → Forces AHS2-0MM digital output 1 0=relay 1 deactivated 1=relay 1 activated	0	1	12104	DO1
ADR_MOD_FORCED_DO2 → Forces AHS2-0MM digital output 2 0=relay 2 deactivated 1=relay 2 activated	0	1	12105	DO2
ADR_MOD_FORCED_DO3 → Forces AHS2-0MM digital output 3 0=relay 3 deactivated 1=relay 3 activated	0	1	12106	DO3
ADR_MOD_FORCED_DO4 → Forces AHS2-0MM digital output 4 0=relay 4 deactivated 1=relay 4 activated	0	1	12107	DO4
ADR_MOD_FORCED_DO5 → Forces AHS2-0MM digital output 5 0=relay 5 deactivated 1=relay 5 activated	0	1	12108	DO5
ADR_MOD_FORCED_DO6 → Forces AHS2-0MM digital output 6 0=relay 6 deactivated 1=relay 6 activated	0	1	12109	DO6
ADR_MOD_FORCED_AO1 → Forces AHS2-0MM analogue output 1 0=0 V 1000=10 V	0	1000	12110	AO1
ADR_MOD_FORCED_AO2 → Forces AHS2-0MM analogue output 2 0=0 V 1000=10 V	0	1000	12111	AO2
ADR_MOD_FORCED_AO3 → Forces AHS2-0MM analogue output 3 0=0 V 1000=10 V	0	1000	12112	AO3

Example 1:
enabling relay 1 in forcing mode:
Forcing key -> 21504 + 1=21505.
Write the key variable to **ADR_MOD_KEYSELECT_FORCED_OUTPUTS** (12103)
Relay activation: write variable **ADR_MOD_FORCE_DO1** (12104) to 1.
Relay deactivation: write variable **ADR_MOD_FORCE_DO1** (12104) to 0.

It is possible to enable more than one output for forcing mode.

Example 2:
enabling relays 2 and 3, and analogue output **AO1** in forcing mode:

Forcing key=21504 + 2 + 4 + 64=21574 in decimals.
Write 21574 in variable **ADR_MOD_KEYSELECT_FORCED_OUTPUTS** (12103)
To activate relay 2, write variable **ADR_MOD_FORCE_DO2** (12105) to 1.
To activate relay 3, write variable **ADR_MOD_FORCE_DO3** (12106) to 1.
To set output AO1 to 4.2 V, write variable **ADR_MOD_FORCE_AO1** (12110) to 420.

To exit forcing mode, write the value 0 to address **ADR_MOD_KEYSELECT_FORCED_OUTPUTS** (12103).

• Forcing inputs

Any input of a AHS2-0MM master and slaves can be forced via Modbus regardless of the regulation. To implement the forcing, proceed as follows on AHS2-0MM master:
- when forcing a digital input, write the following value to be forced to address **ADR_MOD_FORCE_DI1** (12114) for digital input DI1 and/or to address **ADR_MOD_FORCE_DI2** (12115) for digital input DI2:

0=contact forced open
1=contact forced closed

- when forcing an analogue input, write the following value to be forced regardless of the sensor configuration from the list below at address **ADR_MOD_FORCE_AI1** (12116) for analogue input AI1 and/or, at address **ADR_MOD_FORCE_AI2** (12117) for analogue input AI2:

-200=sensor open
970=sensor short-circuited.
-150...900=sensor present with value equivalent to temperature multiplied by 10.

If you wish to force a remote setpoint variation between - *194* and *194* with sensor AIx configured as a remote setpoint variator *021*=10 (AI1) and *023*=10 (AI2), force a value as indicated below:

if, for example, *194*=10.0, force a value between -100 and 100. A forced value of 50 corresponds to 5.0°C.
A forced value outside the range set by parameter *194* will not be taken into account.

- write a forcing key indicating which input(s) are to be forced at AHS2-0MM address: **ADR_MOD_KEYSELECT_FORCED_INPUTS** (12113).

Definition of the forcing key for the inputs:
The forcing key is a variable composed of a fixed part to which the value corresponding to one or more inputs or sensors to be forced is added (see table below)

	Value for each input or forced sensor to be added to the fixed part			
Fixed part=26112	**AI2**	**AI1**	**DI2**	**DI1**
	8	4	2	1

Example: the forcing key for forcing DI2 and sensor AI1 is 26112 + 2 + 4=26118

The forcing key must be written to the address **ADR_MOD_KEYSELECT_FORCED_INPUTS** (12113)
Forcing values should be written to the addresses given in the following table on AHS2-0MM master:

Detailed list of forcible registers	Min	Max	Address	Var.
ADR_MOD_FORCED_DI1 → Forces AHS2-0MM digital input 1 0=contact DI1 open 1=contact DI1 closed	0	1	12114	DI1
ADR_MOD_FORCED_DI2 → Forces AHS2-0MM digital input 2 0=contact DI2 open 1=contact DI2 closed	0	1	12115	DI2
ADR_MOD_FORCED_AI1 → Forces AHS2-0MM analogue input 1 - temperature sensor value multiplied by 10(°C) if *021*≠10: forcing -200 (corresponding to -20.0°C) corresponds to open sensor AI1; the forcing of 970 (corresponding to 97.0°C) corresponds to short-circuited sensor AI1. - value between - *194* and + *194* (setpoint variation) multiplied by 10(°C) if *021*=10	-150	900	12116	AI1
ADR_MOD_FORCED_AI2 → Forces AHS2-0MM analogue input 2 - temperature sensor value multiplied by 10(°C) if *023*≠10: forcing -200 (corresponding to -20.0°C) corresponds to open sensor AI2; the forcing of 970 (corresponding to 97.0°C) corresponds to short-circuited sensor AI2. - value between - *194* and + *194* (setpoint variation) multiplied by 10(°C) if *023*=10	-150	900	12117	AI2

Example 1:

Forcing of closed contact on DI1:

Forcing key -> 26112 + 1=26113.
Write 26113 to variable **ADR_MOD_KEYSELECT_FORCED_INPUTS** (12113).
To close contact DI1: write variable **ADR_MOD_FORCE_DI1** (12114) to 1.

Example 2:
Forcing of analogue input AI1 to 26.5°C and contact open on DI2:

Forcing key -> 26112 + 2 + 4=26118.
Write 26118 to variable **ADR_MOD_KEYSELECT_FORCED_INPUTS** (12113).
Opening of contact DI2: write variable **ADR_MOD_FORCE_DI2** (12115) to 0.
AI1=26.5°C: write variable **ADR_MOD_FORCE_AI1** (12116) to 265.

Note:
If the controller is connected to a supervisor control system, and the option of forcing inputs or outputs is selected, AB Industrietechnik is not liable for any damage caused by incorrect control of this type of output.

To exit forcing mode, write the value 0 in the register **ADR_MOD_KEYSELECT_FORCED_INPUTS** (12113).

36. Alarms

The alarms enable the detection of one or more abnormal conditions during the operation of the controller.
The alarms can be categorized in 3 groups:
- alarms without delay on activation: category 0.
- alarms with delay before activation: category 1, the alarm delay is defined by parameter 198.
- alarms with delay before activation with possibility to do a manual reset in case of activation: category 2, the alarm delay is defined by parameter 199. By parameter 200 it is possible to select the alarms of category 2 that can be with manual reset in case of activation.

	Parameter 200							
	bit 7	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**
Weight	0	0	0	16	8	4	2	1
Alarm					t3	t2	t1	t0

x=0 alarm with manual reset deactivated
x=1 alarm with manual reset activated

t0 = stop all alarm
t1 = generic alarm
t2 = ventilation alarm
t3 = electric heater overtemperature alarm

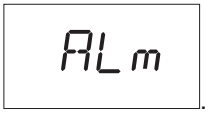
To set the value of parameter 200 select which alarms among t0, t1, t2, t3 that must be with manual reset and add the corresponding weight indicated on the schedule.
Example generic alarm t1 (weight 2) and ventilation alarm t2 (weight 4) with manual reset:
parameter 200 = 2 + 4 = 6.

You can see all current 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	Category
noAL	No alarm	-	-	-
CML	Communication timeout between AHS2 and AHS2-0MM	-	⚠ ⚠ 485	0
CMd	Incorrect data or routing between AHS2 and AHS2-0MM	-	⚠ ⚠ 485	0

FIA	Stop all alarms	All control is stopped.	⚠	2
FI	General filter	Just an indication, no effect on control.	⚠	0
FIS	Supply filter	Just an indication, no effect on control.	⚠	0
FIE	Extractor filter	Just an indication, no effect on control.	⚠	0
AL	General	Just an indication, no effect on control.	⚠	2
ALC	Condensation	Only operates in cooling. Humidifier OFF. Cooling valve closed.	⚠	0
ALF	Frost protection	Dehumidifier OFF. Humidifier OFF. Ventilators OFF. Free heating or free cooling OFF. Heating valve opened to the maximum. Modulating cooling valve positioned based on the parameter 192.	⚠	0
AFC	Frost protection heat exchanger	If 187=0, reduction of supply ventilator speed. If 187=1, bypass open. If 187=2, activation of pre-heating heat exchanger resistance. If 187=3 reduction of supply ventilator speed and bypass open If 187=4 reduction of supply ventilator speed and activation of pre-heating heat exchanger resistance	⚠	0
E0I	Internal sensor of AHS2 in error	If used as a regulation sensor, the elements being controlled are disabled.	⚠	0
E01	AI1 sensor in error (*)	If used as a regulation sensor, the elements being controlled are disabled.	⚠	0
E02	AI2 sensor in error (*)	If used as a regulation sensor, the elements being controlled are disabled.	⚠	0
LILL	Low temperature limit	see paragraph *"17. Supply limits function with fixed-point control" page 39*	⚠	1
LIHL	High temperature limit	see the limits paragraph *"17. Supply limits function with fixed-point control" page 39*	⚠	1
LILH	Low humidity limit	Dehumidifier OFF		0
LIHH	High humidity limit	Humidifier OFF		0
ALU	Ventilation	Activation of digital output for ventilation alarms if configured 025=18 (DO1) or 026=18 (DO2) or 027=18 (DO3) or 028=18 (DO4) or 029=18 (DO5) or 030=18 (DO6). Ventilation stopped if no electric heater is active		2
F1L1	Filter dirty	-	⚠	0
OLHE	Overheating electric heater	Electric heater(s) are deactivated	⚠	2
ECL	Clock	Just an indication, no effect on control.		0

(*) 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:
002=0, 021=1 and 103=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 103.
If the internal sensor is broken, the operating sensor becomes the sensor **AI1,** regardless of the value of parameter 103.
If both are broken, the operating sensor cannot be determined. Regulation is stopped.

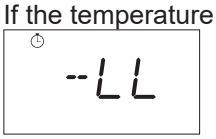
If parameter 305 or 306 is set to 5, the corresponding operating setpoint is shown on the display. If the operating temperature cannot be calculated (sensor open or in short circuit), "----" is shown on the display.

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 *"18. Control with setpoint compensation" page 43*).

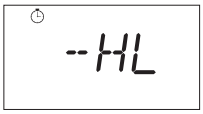
For sensors used as external sensors, in the event of a sensor failure, the cooling compensation setpoint function is not blocked:
- in the event of a short circuit on the sensor, the temperature is considered to be high and setpoint 138 is used as the compensation setpoint.
- in the event of an open sensor, the temperature of the sensor is considered to be low and the setpoint 137 is used as the compensation setpoint (see paragraph *"18. Control with setpoint compensation" page 43*).

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.

Procedure to reset manually alarms belonging to category 2 with manual reset activated:

In case an alarm belonging to category 2 is activated with manual reset feature go to alarms page following the procedure indicated before. Move on the different alarms and select the one to reset.
Press the ⏻ button to activate the procedure of manual reset. The following screen displays with the indication no flashing on the second row:

Press the ◠ button to visualize the indication YES and press the key ⏻ to do the manual reset. The corresponding alarm is resetted and vanishes from the active alarms list.

• Communication error counter parameters

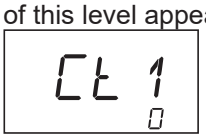
If a AHS2-0MM fails to communicate with the AHS2, the letter C flashes on the display along with the icons ⚠ 485:

It is possible to monitor the communication status between the AHS2 and AHS2-0MM, transmitters 1 and 2 of the internal network by accessing the error counter parameters under password 66 (see below).

The communication error counter parameters of the internal network can be accessed with a password.
Press the ▲ and ▼ keys simultaneously to access the general menu. The following screen appears:

Press the ▲ or ▼ key until the following screen appears:

Press the ⏻ key and then the ▲ key until the value **66** is displayed.
Press the ⏻ key to access level of communication error counter parameters. The screen corresponding to the first parameter of this level appears:



Use the ▲ or ▼ key to scroll through the error counter parameters.

Parameter	Description	Default	Min	Max
CEU	Communication timeout counter between AHS2 and AHS2-0MM connected	0	0	9999
CrU	Date error counter or incorrect routing message counter between AHS2 and AHS2-0MM connected	0	0	9999
CE 1	Communication timeout counter between AHS2 and transmitter 1 (if 034≠0)	0	0	9999
Cr 1	Date error or incorrect routing message counter between AHS2 and transmitter 1 (if 034≠0)	0	0	9999
CE2	Communication timeout counter between AHS2 and transmitter 2 (if 036≠0)	0	0	9999
Cr2	Date error or incorrect routing message counter between AHS2 and transmitter 2 (if 036≠0)	0	0	9999

• Resetting of internal network communication error counter parameters

To reset all error counters of internal network communication (parameters from CEU to CrE) follow the procedure below.

Press the ▲ and ▼ keys simultaneously to access the general menu. The following screen appears:

Press the ▲ or ▼ key until the following screen appears:

Press the ⏻ key and then the ▲ key until the value **67** is displayed.
Press the ⏻ key to access the reset level for internal network communication error counters

To cancel and return to regulation, press the ESC key.
To start the procedure, press the ⏻ key; the value 0 flashes. Press the ▲ key to set the value to 1, and then press the ⏻ key again. When the procedure finishes, the value set returns to 0. It is possible to exit the menu by pressing the ESC key once or waiting approximately 120 seconds.

37. Parameter configuration 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:

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

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

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

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

To exit the menu, press the ESC button one or more times or wait for about time defined by parameter *319*.

Parameter	Description	Default	Min	Max
001	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
002	Type of control sensor 0=control with remote room sensor of AHS2-0MM 1=control with internal room sensor of AHS2 or from supervisor 2=control with remote supply sensor of AHS2-0MM	0	0	2
003	Type of heating battery 0=no heating battery 1=modulating electrical resistance 2=modulating valve 3=on/off electrical resistance 4=on/off valve 5=3-point valve	0	0	5
004	Type of cooling battery 0=no cooling battery 1=modulating valve 2=on/off valve 3=cooling modulating damper 4=3-point valve	0	0	4
005	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
006	Post-heating battery operation 0=post-heating 1=integration and post-heating 2=additional heating battery	0	0	2
007	Type of humidifier battery 0=no humidifier battery 1=modulating 2=on/off	0	0	2
008	Type of dehumidifier battery 0=cooling battery 1=modulating 2=on/off	0	0	2

Parameter	Description	Default	Min	Max
009	Type of ventilator 0=non-controlled ventilator 1=single-speed on/off ventilator 2=two-speed on/off ventilator 3=three-speed on/off ventilator 4=modulating ventilator 5=ventilator present but not controlled	0	0	5
010	Type of ventilator control 0=manual selectable between speed 1, speed 2, speed3 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) (modulating ventilator only) 6=regulation based on pressure/flow rate (reverse action) (modulating ventilator only) 7=regulation based on dehumidification (modulating ventilator only) 8=manual selectable in % linearly between speed 1 and 3 (modulating ventilator only)	0	0	8
011	Type sensor for temperature regulation of ventilator (used only if 010=2,3,4) 0=room or return sensor 1=supply sensor	0	0	1
012	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
013	Damper action 0=CO_2 1=free cooling/heating 2=free cooling/heating, CO_2 3=dehumidification 4=cooling 5=cooling, CO_2	1	0	5
014	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
015	Type heat pump 0=no heat pump 1=heat pump with reverse valve acitvated in cooling 2=heat pump with reverse valve acitvated in heating	0	0	2
016	Activation of mid-season operation 0=not enabled 1=enabled	0	0	1
017	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 (INPUT ON = economy activated) 5=frost protection (INPUT ON=frost protection alarm) 6=generic alarm (INPUT ON=generic alarm) 7=condensation contact (INPUT ON=condensation alarm) 8=generic filter contact (INPUT ON=generic filter alarm) 9=supply filter contact (INPUT ON=supply filter alarm) 10=extractor filter contact (INPUT ON=extractor filter alarm) 11=stop all alarm contact (INPUT ON=stop all alarm) 12=ventilator alarm contact (INPUT ON=ventilator alarm) 13=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm) 14=electric heater over temperature contact (INPUT ON=over temperature alarm)	0	0	14
018	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

Parameter	Description	Default	Min	Max
d19	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 (INPUT ON = economy activated) 5=frost protection (INPUT ON=frost protection alarm) 6=generic alarm (INPUT ON=generic alarm) 7=condensation contact (INPUT ON=condensation alarm) 8=generic filter contact (INPUT ON=generic filter alarm) 9=supply filter contact (INPUT ON=supply filter alarm) 10=extractor filter contact (INPUT ON=extractor filter alarm) 11=stop all alarm contact (INPUT ON=stop all alarm) 12=ventilator alarm contact (INPUT ON=ventilator alarm) 13=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm) 14=electric heater over temperature contact (INPUT ON=over temperature alarm)	0	0	16
d20	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
d21	Analogue input 1 function 0=not used 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 5=antifreeze heating battery sensor 6=remote setpoint variator (with SAP-NTC-02-2-EV) 7=season change remote contact (INPUT ON=winter, INPUT OFF=summer) 8=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 9=non-occupied/holiday (INPUT ON=occupied) 10=economy (INPUT ON=economy activated) 11=frost protection (INPUT ON= frost protection alarm) 12=generic alarm (INPUT ON=generic alarm) 13=condensation contact (INPUT ON=condensation alarm) 14=generic filter contact (INPUT ON=generic filter alarm) 15=supply filter contact (INPUT ON=supply filter alarm) 16=extract filter contact (INPUT ON=extract filter alarm) 17=stop all alarm contact (INPUT ON=stop all alarm) 18=ventilator alarm contact (INPUT ON=ventilator alarm) 19=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm) 20=electric heater over temperature contact (INPUT ON=over temperature alarm)	0	0	20
d22	Logic for analogue input 1 (only with d21=7 to 20): 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	0	0	1
d23	Analogue input 2 function 0=not used 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 5=antifreeze heating battery sensor 6=remote setpoint variator (with SAP-NTC-02-2-EV) 7=season change remote contact (INPUT ON=winter, INPUT OFF=summer) 8=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 9=non-occupied/holiday (INPUT ON=occupied) 10=economy (INPUT ON=economy activated) 11=frost protection (INPUT ON= frost protection alarm) 12=generic alarm (INPUT ON=generic alarm) 13=condensation contact (INPUT ON=condensation alarm) 14=generic filter contact (INPUT ON=generic filter alarm) 15=supply filter contact (INPUT ON=supply filter alarm) 16=extract filter contact (INPUT ON=extract filter alarm) 17=stop all alarm contact (INPUT ON=stop all alarm) 18=ventilator alarm contact (INPUT ON=ventilator alarm) 19=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm) 20=electric heater over temperature contact (INPUT ON=over temperature alarm)	0	0	20
d24	Logic for analogue input 2 (only with d23=7 to 20) 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
025	Digital output function 1 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 22=3-point heating valve: open 23=3-point heating valve: close 24=3-point cooling valve: open 25=3-point cooling valve: close 26=3-point heating/cooling valve: open 27=3-point heating/cooling valve: close 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode	0	0	30
026	Digital output function 2 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 22=3-point heating valve: open 23=3-point heating valve: close 24=3-point cooling valve: open 25=3-point cooling valve: close 26=3-point heating/cooling valve: open 27=3-point heating/cooling valve: close 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode	0	0	30

Parameter	Description	Default	Min	Max
027	Digital output function 3 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 22=3-point heating valve: open 23=3-point heating valve: close 24=3-point cooling valve: open 25=3-point cooling valve: close 26=3-point heating/cooling valve: open 27=3-point heating/cooling valve: close 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode	0	0	30
028	Digital output function 4 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode	0	0	30

Parameter	Description	Default	Min	Max
029	Digital output function 5 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 22=3-point heating valve: open 23=3-point heating valve: close 24=3-point cooling valve: open 25=3-point cooling valve: close 26=3-point heating/cooling valve: open 27=3-point heating/cooling valve: close 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode	0	0	30
030	Digital output function 6 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 22=3-point heating valve: open 23=3-point heating valve: close 24=3-point cooling valve: open 25=3-point cooling valve: close 26=3-point heating/cooling valve: open 27=3-point heating/cooling valve: close 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode			

Parameter	Description	Default	Min	Max
031	Analogue output function 1 0=not used 1=supply ventilator output 2=extractor ventilator 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 14=6-way valve	0	0	14
032	Analogue output function 2 0=not used 1=supply ventilator output 2=extractor ventilator 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 14=6-way valve	0	0	14
033	Analogue output function 3 0=not used 1=supply ventilator output 2=extractor ventilator 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 14=6-way valve	0	0	14
034	Presence modbus transmitter 1 0=not present 1=type TTUA-M room version / TCM1001 duct version (temperature, humidity) 2=type TCO2A-M room version / TCM0101 duct version (temperature, CO_2 transmitter) 3=type TCO2AU-M room version / TCM1101 duct version (temperature, humidity, CO_2) 4=type TPDA25C (differential pressure transmitter)	0	0	4
035	Function of temperature of transmitter 1 when transmitter 1 include temperature measurement 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 5=antifreeze heating battery sensor	1	1	5
036	Presence Modbus transmitter 2 0=not present 1=type TTUA-M room version / TCM1001 duct version (temperature, humidity) 2=type TCO2A-M room version / TCM0101 duct version (temperature, CO_2 transmitter) 3=type TCO2AU-M room version / TCM1101 duct version (temperature, humidity, CO_2) 4=type TPDA25C (differential pressure transmitter)	0	0	4
037	Function of temperature of transmitter 2 when transmitter 2 include temperature measurement 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 5=antifreeze heating battery sensor	1	1	5

38. 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 ESC button to exit the parameter editing mode without saving.

To exit the menu, press the ESC button one or more times or wait for about time defined by parameter 319.

Parameter	Description	Default	Min	Max
101	Correction of external temperature sensor **AI1** (K) (°C) The correction parameter 101 is added to the temperature reading of the external sensor **AI1**	0	-5.0	5.0
102	Correction of the temperature sensor **AI2** (K) (°C) The correction parameter 102 is added to the temperature reading of the external sensor **AI2**	0	-5.0	5.0
103	Weighting (%) of the remote control sensor **AI1** in relation to the internal sensor (if 021=1) to create the control sensor. 103=0 → internal sensor used alone as control sensor 103=100 → sensor **AI1** used alone as control sensor 103=Y → sensor **AI1** and internal sensor used together to create the control sensor based on the following formula Treg=[Ti (100 - Y) + (TA1 x Y)] / 100 The **AI1** sensor must be configured as a remote control sensor; otherwise, the parameter 103 is not considered.	100	0	100
104	Heating setpoint for regulation without compensation (°C)	20.0	108	107
105	Cooling setpoint for regulation without compensation (°C)	25.0	110	109
106	Setpoint for 4-pipe regulation without offset (°C)	21.0	108	107
107	Maximum heating regulation setpoint value (°C) Sets an upper limit for setpoints 104 and 106	40.0	108	90.0
108	Minimum heating regulation setpoint value (°C) Sets a lower limit for setpoints 104 and 106	6.0	6.0	107
109	Maximum cooling regulation setpoint value (°C) Sets an upper limit for setpoints 105	40.0	110	90.0
110	Minimum cooling regulation setpoint value (°C) Sets a lower limit for setpoints 105	6.0	6.0	109
111	Heating regulation proportional band (K) (°C)	2.0	1.0	20.0
112	Integral time for regulation in heating mode(s). Parameter used to regulate the 0..10 V modulating valves If 112=0, the integral action is excluded.	0	0	999
113	Cooling regulation proportional band (K) (°C)	2.0	1.0	20.0
114	Integral time for regulation in cooling mode(s). Parameter used to regulate the 0..10 V modulating valves If 114=0, the integral action is excluded.	0	0	999
115	Heating hysteresis for on/off output (°C)	1.0	0.5	2.0
116	Cooling hysteresis for on/off output (°C)	1.0	0.5	2.0
117	Proportional band for calculation of supply setpoint in cascade control mode (K) (°C)	20.0	1.0	50.0

Parameter	Description	Default	Min	Max
118	Integral time(s) for calculation of supply setpoint in cascade regulation mode If 118=0, the integral action is excluded.	0	0	999
119	Economy offset (K) (°C) In economy mode, the cooling setpoint is increased by 119 In economy mode, the heating setpoint is reduced by 119 Example: 119=3 -> economy mode bHS=20 - 119=17°C bCS=25 + 119=28°C	3.0	0	12.0
120	Offset mode for “non-occupied/holiday” operation (K) (°C) In the “non-occupied/holiday” mode, the cooling setpoint is increased by 120 In the “non-occupied/holiday” mode, the heating setpoint is reduced by 120 Example: 120=5 bHS=20 - 120=15°C bCS=25 + 120=30°C	5.0	1.0	14.0
121	Neutral zone for 4-pipe systems (K) (°C)	1.0	0.5	5.0
122	Differential addition of heating in summer season (mid-season) (K) (°C)	3.0	0.5	10.0
123	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
124	Minimum low supply limit setpoint (°C)	10.0	6.0	126
125	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
126	High supply limit setpoint (°C)	30.0	124	50.0
127	Limit proportional band (K) (°C)	2.0	1.0	50.0
128	Limit integral time (s). Parameter used if 123≠0 or 125≠0 If 128=0 limit integral time is excluded.	0	0	999
129	Differential of insertion post heating in integration (K) (°C)	0.0	0.0	10.0
130	Activation of compensation for operations with 001=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)	-10.0	-10.0	132
132	Maximum external temperature for winter compensation (°C)	20.0	131	50.0
133	Compensated setpoint corresponding to the minimum external temperature for winter compensation 131 (°C)	60.0	5.0	80.0
134	Compensated setpoint corresponding to the maximum external temperature for winter compensation 132 (°C)	30.0	5.0	80.0
135	Minimum external temperature for summer compensation (°C)	22.0	-10.0	136
136	Maximum external temperature for summer compensation (°C)	35.0	135	50.0
137	Compensated setpoint corresponding to the minimum external temperature for summer compensation 135 (°C)	19.0	5.0	80.0
138	Compensated setpoint corresponding to the maximum external temperature for summer compensation 136 (°C)	16.0	5.0	80.0
139	Dehumidification activation (see *“19. Dehumidification” page 45*) 0=not enabled 1=enabled with built-in humidity sensor of AHS2 2=enabled with remote humidity sensor of transmitter 1 3=enabled with remote humidity sensor of transmitter 2 4=enabled with built-in humidity sensor of AHS2 in cooling mode 5=enabled with remote humidity sensor of transmitter 1 in cooling mode 6=enabled with remote humidity sensor of transmitter 2 in cooling mode	0	0	6
140	Humidification activation (see *“20. Humidification” page 48*) 0=not enabled 1=enabled with built-in humidity sensor of AHS2 2=enabled with remote humidity sensor of transmitter 1 3=enabled with remote humidity sensor of transmitter 2 4=enabled with built-in humidity sensor of AHS2 in heating mode 5=enabled with remote humidity sensor of transmitter 1 in heating mode 6=enabled with remote humidity sensor of transmitter 2 in heating mode	0	0	6

Parameter	Description	Default	Min	Max
141	Humidity neutral zone (%r.h.)	6.0	4.0	20.0
142	Humidity setpoint (%r.h.)	50.0	5	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 with transmitter 1 2=enabled with transmitter 2	0	0	2
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 with transmitter 1 2=enabled with transmitter 2	0	0	2
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 ventilator	0	0	151
151	Maximum voltage of supply ventilator	10.0	150	10.0
152	Minimum voltage of extractor ventilator	0	0	153
153	Maximum voltage of extractor ventilator	10.0	152	10.0
154	Speed 1 of the modulating ventilators: - percentage of the range (151 - 150) for the supply ventilator, - percentage of the range (153 - 152) for the extractor ventilator.	10	0	100
155	Speed 2 of the modulating ventilators: - percentage of the range (151 - 150) for the supply ventilator, - percentage of the range (153 - 152) for the extractor ventilator.	65	0	100
156	Speed 3 of the modulating ventilators: - percentage of the range (151 - 150) for the supply ventilator, - percentage of the range (153 - 152) for the extractor ventilator.	100	0	100
157	Ventilator hysteresis (with ventilator control in temperature) (°C)	1.0	1.0	5.0
158	Step activation of the modulating ventilators:	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 ventilators begin..	0	0	600
160	Ventilation off delay(s) Defines the minimum delay for maintaining operation of the ventilator after deactivation of the control of the valves and/or heating elements.	30	0	600
161	Pressure (Pa)/flow constant (m^3/h) setpoint	1000	0	5000
162	Proportional band for pressure (Pa)/flow constant (m^3/h)	300	1	5000
163	Integral time for pressure regulation (s). If 163=0, the integral action is excluded.	0	0	1000
164	Minimum opening of modulating damper (%)	10	0	165
165	Maximum modulating damper opening (%)	100	164	100
166	Damper off delay (s)	0	0	600
167	CO_2 Air change setpoint (ppm)	1000	0	2000
168	CO_2 proportional band (ppm)	200	50	2000
169	CO_2 integral time(s). 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)	4.0	0.4	10.0
172	Free cooling/heating proportional band (K) (°C)	2.0	0.4	10.0
173	Hysteresis for regulation free heating/cooling (K) (°C)	1.0	0.5	10.0

Parameter	Description	Default	Min	Max
174	Differential setpoint for free cooling/heating max (K) (°C). 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	5.0	20.0
175	Minimum external temperature for free cooling (°C). The external temperature must be greater than or equal to this value in order for free cooling to be available for activation.	17.0	10.0	20.0
176	Minimum control temperature for free cooling (°C). The control temperature must be greater than or equal to this value for free cooling to be available for activation.	22.0	15.0	30.0
177	Maximum external temperature for free heating (°C). The external temperature must be less than or equal to this value for free heating to be available for activation.	28.0	20.0	35.0
178	Maximum control temperature for free heating (°C). The control temperature must be less than or equal to this value for free heating to be available for activation.	33.0	20.0	35.0
179	Post-heating setpoint (K) (°C)	24.0	5.0	50.0
180	Post-heating proportional band or hysteresis (K) (°C) Defines the hysteresis or proportional band for the on/off or modulating post-heating battery respectively	2.0	0.5	5.0
181	Integral time post-heating (s). Parameter used if post-heating is modulating type. If 181=0 integral action is excluded.	0	0	999
182	Differential setpoint for heat recovery (K) (°C)	2.0	0.5	10.0
183	Hysteresis for heat exchanger (K) (°C)	0.5	0.5	182
184	Minimum speed of modulating rotary heat exchanger	0	0	185
185	Maximum speed of modulating rotary heat exchanger	100	184	100
186	Frost protection heat exchanger setpoint (°C)	5.0	4.0	10.0
187	Frost protection heat exchanger action 0=reduction of the supply ventilator speed 1=bypass of the heat exchanger 2=activation of pre-heating electrical resistance of the heat exchanger 3=reduction of the supply ventilator speed and bypass of the heat exchanger 4=reduction of the supply ventilator speed and activation of pre-heating electrical resistance of the heat exchanger	0	0	4
188	Percentage reduction of the supply ventilator speed relative to the extractor ventilator (%)	10	0	100
189	Activation of the heat frost protection battery 0=not enabled 1=enabled with remote contact 2=enabled with antifreeze heating battery sensor 3=enabled with remote control sensor 4=enabled with supply sensor	0	0	4
190	Setpoint of the frost protection heat battery (°C)	5.0	4.0	10.0
191	Frost protection heat battery or heat exchanger hysteresis (K) (°C)	2.0	2.0	10.0
192	Percentage of cooling valve opening in case of frost protection heat battery (%)	0	0	100
193	Maximum ventilator run time before filter is considered dirty (hours) 0=function not used X=maximum number of on/off or modulating supply ventilator operating hours before a warning appears on the display.	0	0	9990
194	Setpoint offset range applied in the comfort function (K) (°C). Defines how much the setpoint can be varied in the comfort function	3.0	0	10
195	Manual speed limit. In case of activation of electrical resistance, if the percentage power applied to the electrical resistance exceeds the parameter 195 the speed of the ventilator increases by the same percentage.	50	15	100
196	Temperature/humidity control priority 0=temperature priority 1=humidity priority	0	0	1
197	Flow rate coefficient k 0=control in constant pressure otherwise control in constant flow rate	0	0	1000
198	Delay alarm limit If temperature limit is reached (with 123≠0 or 125≠0) alarm of limit is activated after delay alarm limit	0	0	600
199	Delay other alarms Used only for alarms of category 1 (see *"36. Alarms" page 122*)	0	0	600

Parameter	Description	Default	Min	Max
200	Authorization manual reset alarms of category 2 Value = (8 x b3) + (4 x b2) + (2 x b1) + b0 b0 = reset stop all alarm authorized if b0=1, not authorized if b0=0 b1 = reset generic alarm authorized if b1=1, not authorized if b1=0 b2 = reset ventilator 's alarm authorized if b2=1, not authorized if b2=0 b3 = reset electric heater overtemp. alarm authorized if b3=1, not authorized if b3=0	0	0	15
201	Low limit band 1 of regulation for 6-way valve (V)	0	0	202
202	High limit band 1 of regulation for 6-way valve (V)	4,0	201	203
203	Low limit band 2 of regulation for 6-way valve (V)	6,0	202	204
204	High limit band 2 of regulation for 6-way valve (V)	10,0	203	10,0
205	Regulation type selection for band 1 of 6-way valve 0=heating 1=cooling	0	0	1
206	Hysteresis 6-way valve (V)	0,5	0	2,0
207	Stroke time 3-point valve (s)	60	30	180
208	Delay between two successive activation of heat pump compressor (s)	60	0	900
209	Reset hour counter for ventilator operation The operating hours of the ventilator are stored. When they exceed the value 193, the icon appears. To cancel the counter, set 209=1. The parameter 209 automatically returns to 0 after reset	0	0	1

39. Configuration of AHS2 parameters (level 3 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 **33** is displayed.
Press the ⏻ button to access level 3. The screen corresponding to the first level 3 parameter is displayed:

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

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

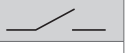
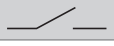
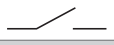
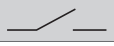
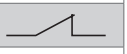
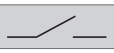
To exit the menu, press the ESC button one or more times or wait for about time defined by parameter 319.

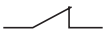
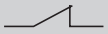
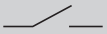
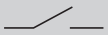
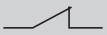
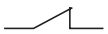
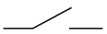
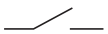
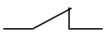
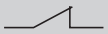
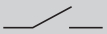
Parameter	Description	Default	Min	Max
301	Digital input 1 function: 0=not used 1=remote season change (INPUT ON=winter, INPUT OFF=summer) 2=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 3=non-occupied holiday (INPUT ON=Occupied) 4=economy (INPUT ON = economy activated)	0	0	4
302	Digital input 1 contact logic: 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	0	0	1
303	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 (INPUT ON = economy activated)	0	0	4
304	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
305	Value displayed on display A 0=temperature of internal sensor of AHS2 1=humidity of internal sensor of AHS2 2=temperature remote sensor **AI1** of AHS2-0MM 3=temperature remote sensor **AI2** of AHS2-0MM 4=operating temperature 5=working setpoint 6=supply setpoint calculated in cascade control mode 7=working post heating setpoint 8=temperature of transmitter 1 9=humidity of transmitter 1 10=temperature of transmitter 2 11=humidity of transmitter 2	4	0	11

Parameter	Description	Default	Min	Max
306	Value displayed on display B 0=temperature of internal sensor of AHS2 1=humidity of internal sensor of AHS2 2=temperature remote sensor **AI1** of AHS2-0MM 3=temperature remote sensor **AI2** of AHS2-0MM 4=operating temperature 5=working setpoint 6=supply setpoint calculated in cascade control mode 7=working post heating setpoint 8=temperature of transmitter 1 9=humidity of transmitter 1 10=temperature of transmitter 2 11=humidity of transmitter 2 12=current hour:minutes 13=CO_2 of transmitter 1 14=pressure of transmitter 1 15=CO_2 of transmitter 2 16=pressure of transmitter 2 17=total hours of ventilator operation 18=flow rate 19=display B off	5	0	19
307	MODE button functionality 0=local change of season if a season change contact is not used. 1=timer extension. 2=operating mode (normal, with time bands or “non-occupied holiday”)	1	0	2
308	Summertime change Determines whether summertime is used automatically 0=no automatic update of summertime change 1=automatic summertime change in Europe	1	0	1
309	Duration of extension timer (minutes): With timer extension function activated • if 310=0, the operating setpoint does not consider the economy and holiday modes for the duration309 • if 310=1, the appliance remains switched on for the duration 309 regardless of the timer periods.	60	1	480
310	Timer periods function 0=timer periods for normal/economy operation 1=timer periods to switch on/off the appliance	0	0	1
311	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 12*	0	0	1
312	Manual switch-off priority 0=manual on/off not priority 1=manual on/off priority	0	0	1
313	Internal temperature correction (K) (°C) The correction parameter 313 is added to the temperature reading of the internal sensor	0	-5.0	5.0
314	Measured internal humidity correction (%r.H) The correction parameter 314 is added to the humidity reading	0	-10.0	10.0
315	Modbus baud rate (1 = 2400, 2 = 4800, 3 = 9600, 4 = 19315, 5 = 38400 bit/s) of AHS2-0MM for external network (CN5)	4	1	5
316	Modbus parity (0=none, 1= odd, 2=even) of AHS2-0MM for external network (CN5)	2	0	2
317	Device's Modbus address (1…247) of AHS2-0MM for external network (CN5)	1	1	247
318	AHS2 function 0 = AHS2 can only control setpoint, offset setpoint, speed, on/off and send internal temperature and humidity to AHS2-0MM connected. 1 = AHS2 can only control setpoint, offset setpoint, speed, on/off and does not send internal temperature and humidity to AHS2-0MM. 2=AHS2 visualizes the state of AHS2-0MM connected, it does not control any parameter	1	0	2
319	Time before exiting parameters setting when no key is pressed (s): During that time the backlight of display remains ON (s): This time is not applied when accessing quick access on AHS2 like keypad lock, global on/off, setpoint or offset sepoint, ventilator operating mode, function with MODE key.	120	4	240

40. Digital and analogue input logic

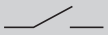
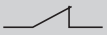
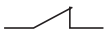
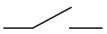
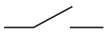
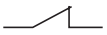
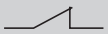
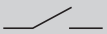
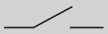
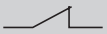
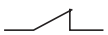
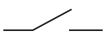
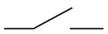
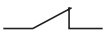
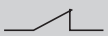
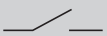
• Digital inputs DI1 and DI2 of AHS2-0MM

Parameter	Logic		
017=0 (*Input DI1*) or 019=0 (*Input DI2*) Not used			
017=1 (*Input DI1*) or 019=1 (*Input DI2*) Remote season change contact (1)	Logic DI1 018 = Logic DI2 020 =	0	1
	Summer		
	Winter		
017=2 (*Input DI1*) or 019=2 (*Input DI2*) Remote On/Off (2)	Logic DI1 018 = Logic DI2 020 =	0	1
	Off		
	On		
017=3 (*Input DI1*) or 019=3 (*Input DI2*) Unoccupied (1)	Logic DI1 018 = Logic DI2 020 =	0	1
	“Non-occupied holiday” mode		
	“Occupied” mode		
017=4 (*Input DI1*) or 019=4 (*Input DI2*) Energy saving (1)	Logic DI1 018 = Logic DI2 020 =	0	1
	No economy mode		
	Economy mode		
017=5 (*Input DI1*) or 019=6 (*Input DI2*) Heat frost protection battery	Logic DI1 018 = Logic DI2 020 =	0	1
	Frost protection off		
	Frost protection on		
017=6 (*Input DI1*) or 019=7 (*Input DI2*) Generic alarm	Logic DI1 018 = Logic DI2 020 =	0	1
	No alarm		
	Alarm active		
017=7 (*Input DI1*) or 019=8 (*Input DI2*) Condensation alarm	Logic DI1 018 = Logic DI2 020 =	0	1
	No condensation		
	Condensation alarm		
017=8 (*Input DI1*) or 019=9 (*Input DI2*) Generic filter alarm	Logic DI1 018 = Logic DI2 020 =	0	1
	No generic filter alarm		
	Generic filter alarm		
017=9 (*Input DI1*) or 019=10 (*Input DI2*) Supply filter alarm	Logic DI1 018 = Logic DI2 020 =	0	1
	no supply filter alarm		
	supply filter alarm		
017=10 (*Input DI1*) or 019=11 (*Input DI2*) Extraction filter alarm	Logic DI1 018 = Logic DI2 020 =	0	1
	No extraction filter alarm		
	Extraction filter alarm		
017=11 (*Input DI1*) or 019=12 (*Input DI2*) Stop all alarm	Logic DI1 018 = Logic DI2 020 =	0	1
	No stop all alarm		
	Stop all alarm		

Parameter	Logic		
017=12 (*Input DI1*) or 019=13 (*Input DI2*) Ventilator alarm	Logic DI1 018 = Logic DI2 020 =	0	1
	No ventilator alarm		
	Ventilator alarm		
017=13 (*Input DI1*) or 019=14 (*Input DI2*) Frost protection heat exchanger alarm	Logic DI1 018 = Logic DI2 020 =	0	1
	No frost protection heat exchanger		
	Frost protection heat exchanger		
017=14 (*Input DI1*) or 019=15 (*Input DI2*) Electric heater overheating alarm	Logic DI1 018 = Logic DI2 020 =	0	1
	No overheating alarm		
	Overheating alarm		

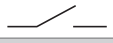
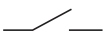
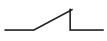
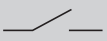
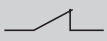
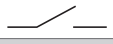
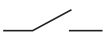
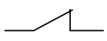
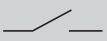
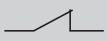
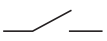
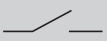
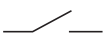
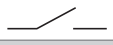
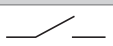
Note 1: digital input contact could be overriden by supervisor.
Note 2: digital input contact could not be overriden by supervisor.

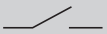
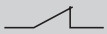
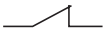
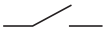
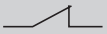
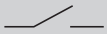
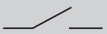
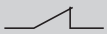
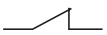
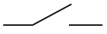
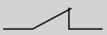
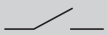
• Digital inputs DI1 and DI2 of AHS2

Parameter	Logic		
301=0 (*Input DI1*) or 303=0 (*Input DI2*) Not used			
301=1 (*Input DI1*) or 303=1 (*Input DI2*) Remote season change contact (³)	Logic DI1 302 = Logic DI2 304 =	0	1
	Summer		
	Winter		
301=2 (*Input DI1*) or 303=2 (*Input DI2*) Remote On/Off (³)	Logic DI1 302 = Logic DI2 304 =	0	1
	Off		
	On		
301=3 (*Input DI1*) or 303=3 (*Input DI2*) Unoccupied (³)	Logic DI1 302 = Logic DI2 304 =	0	1
	“Unoccupied holidays“ mode		
	“occupied“ mode		
301=4 (*Input DI1*) or 303=4 (*Input DI2*) Energy saving (³)	Logic DI1 302 = Logic DI2 304 =	0	1
	No economy		
	Economy		

Note 3: digital input contact could not be overriden by supervisor.

• Analogue input AI1 of AHS2-0MM

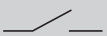
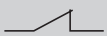
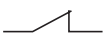
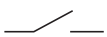
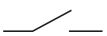
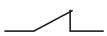
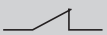
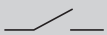
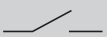
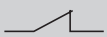
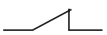
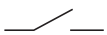
Parameter	Logic		
021=0	Sensor not used		
021=1 Remote regulation sensor	The **AI1** sensor is used together with the internal sensor to obtain the final room regulation temperature according to the parameter 103 see *"9. Control sensors" page 19*		
021=2 Supply sensor	The **AI1** sensor is used as a limit sensor for fixed-point regulation with limits (123 and/or 125 not equal to 0), or as a regulation sensor for the valves (002=2), or as a regulation sensor in the cascade regulation (001=2).		
021=3 External sensor	The **AI1** sensor is used for the compensation (130 not equal to 0)		
021=4 Frost protection heat exchanger sensor	The **AI1** sensor is used as a frost protection heat exchanger sensor		
021=5 Frost protection heating battery sensor	The **AI1** sensor is used as antifreeze heating battery sensor		
021=6 Remote setpoint variator input	The setpoint variator SAP-NTC-02-2-EV must be connected in order to change the setpoint remotely		
021=7 Remote season change contact (4)	022 =	0	1
	Summer		
	Winter		
021=8 Remote on/off contact (5)	022 =	0	1
	Off		
	On		
021=9 unocuppied remote-contact (4)	022 =	0	1
	"Non-occupied holiday" mode		
	"Occupied" mode		
021=10 Energy saving remote contact (4)	022 =	0	1
	No economy mode		
	Economy mode		
021=11 Heat frost protection battery contact	022 =	0	1
	Frost protection off		
	Frost protection on		
021=12 Generic alarm contact	022 =	0	1
	No alarm		
	Alarm active		
021=13 Condensation alarm contact	022 =	0	1
	No condensation		
	Condensation alarm		
021=14 Generic filter alarm contact	022 =	0	1
	No generic filter alarm		
	Generic filter alarm		
021=15 Supply filter alarm contact	022 =	0	1
	No supply filter alarm		
	Supply filter alarm		
021=16 Extraction filter alarm contact	022 =	0	1
	No extraction filter alarm		
	Extraction filter alarm		

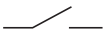
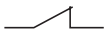
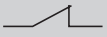
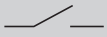
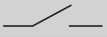
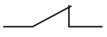
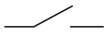
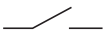
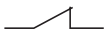
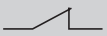
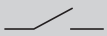
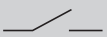
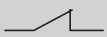
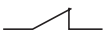
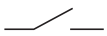
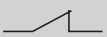
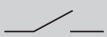
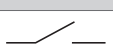
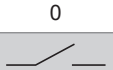
Parameter	Logic		
021=17 Stop all alarm contact	022 =	0	1
	No stop all alarm		
	Stop all alarm		
021=18 Ventilator alarm contact	022 =	0	1
	No ventilator alarm		
	Ventilator alarm		
021=19 Frost protection heat exchanger alarm contact	022 =	0	1
	No frost protection heat exchanger		
	Frost protection heat exchanger alarm		
021=20 Electric heater overheating alarm contact	022 =	0	1
	No electric heater overheating alarm		
	Electric heater overheating alarm		

Note 4: digital input contact could be overriden by supervisor.
Note 5: digital input contact could not be overriden by supervisor.

For configurations 021=1 to 20 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.

• Analogue input AI2 of AHS2-0MM

Parameter	Logic		
023=0	Sensor not used		
023=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 103 see *"9. Control sensors" page 19*		
023=2 Supply sensor	The **AI2** sensor is used as a limit sensor for fixed-point regulation with limits (123 and/or 125 not equal to 0), or as a regulation sensor for the valves (002=1), or as a regulation sensor in the cascade regulation (001=2).		
023=3 External sensor	The **AI2** sensor is used for the compensation (130 not equal to 0)		
023=4 Frost protection heat exchanger sensor	The **AI2** sensor is used as a frost protection heat exchanger sensor		
023=5 Frost protection heating battery sensor	The **AI2** sensor is used as antifreeze heating battery sensor		
023=6 Remote setpoint variator input	The setpoint variator SAP-NTC-02-2-EV must be connected in order to change the setpoint remotely		
023=7 Remote season change contact (⁶)	024 =	0	1
	Summer		
	Winter		
023=8 Remote on/off contact (⁷)	024 =	0	1
	Off		
	On		
023=9 unoccuppied remote contact (⁶)	024 =	0	1
	"Non-occupied holiday" mode		
	"Occupied" mode		

Parameter	Logic		
023=10 Energy saving remote contact (6)	024 =	0	1
	No economy mode		
	Economy mode		
023=11 Heat frost protection battery contact	024 =	0	1
	Frost protection off		
	Frost protection on		
023=12 Generic alarm contact	024 =	0	1
	No alarm		
	Alarm active		
023=13 Condensation alarm contact	024 =	0	1
	No condensation		
	Condensation alarm		
023=14 Generic filter alarm contact	024 =	0	1
	No generic filter alarm		
	Generic filter alarm		
023=15 Supply filter alarm contact	024 =	0	1
	No supply filter alarm		
	Supply filter alarm		
023=16 Extraction filter alarm contact	024 =	0	1
	No extraction filter alarm		
	Extraction filter alarm		
023=17 Stop all alarm contact	024 =	0	1
	No stop all alarm		
	Stop all alarm		
023=18 Ventilator alarm contact	024 =	0	1
	No ventilator alarm		
	Ventilator alarm		
023=19 Frost protection heat exchanger alarm contact	024 =	0	1
	No frost protection heat exchanger		
	Frost protection heat exchanger alarm		
023=20 Electric heater overheating alarm contact	024 =	0	1
	No electric heater overheating alarm		
	Electric heater overheating alarm		

Note 6: digital input contact could be overriden by supervisor.
Note 7: digital input contact could not be overriden by supervisor.

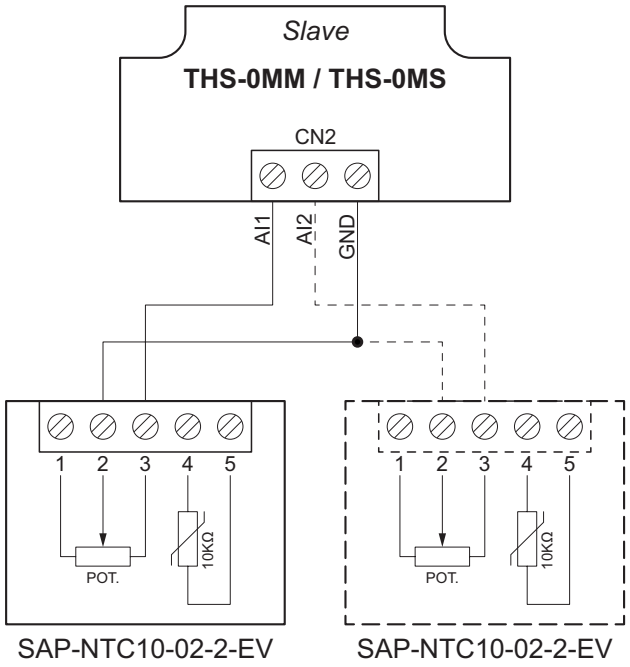
For configurations 023=7 to 20 the analogue input 2 is used as a digital input. The contact is considered closed if it is short-circuited at the analogue input. The contact is considered open if there is no connection.

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**) AHS2 - Highest priority
Digital input 2 (**DI1**) AHS2 -
Digital input 1 (**DI1**) AHS2-0MM -
Digital input 2 (**DI2**) AHS2-0MM
Analogue input 1 (**AI1**) AHS2-0MM
Analogue input 2 (**AI2**) AHS2-0MM Lowest priority

41. Remote setpoint variator

it is possible to change the setpoint by a shift of ±x °C from the main setpoint by connecting the SAP-NTC10-02-2-EV setpoint variator to an analogue input configured as a setpoint variator input: 021=23 (AI1) or 023=23 (AI2).
The range of variation ±x °C is defined by parameter 194.



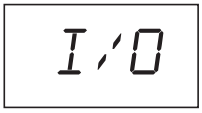
The heating and cooling working setpoint value obtained after changing the remote setpoint can be displayed on the I/O status if an optional AHS2 is connected to the AHS2-0MM. By Modbus it is possible to see the value of variation of setpoint directly on variable **ADR_MOD_STATUS_CURRENT_OFFSET_VARIATOR** (12062).

42. Inputs/Outputs state visualization and force outputs

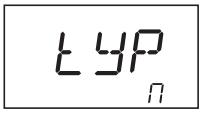
The status of inputs and outputs of AHS2-0MM unit can be displayed during operation by AHS2.

Press the ▲ and ▼ keys simultaneously to access the general menu. The following screen appears:

Press the ▲ or ▼ key until the following screen appears:

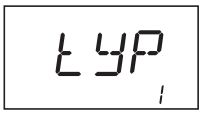
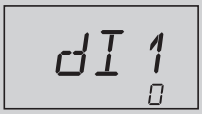
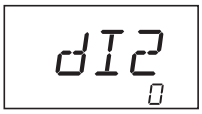
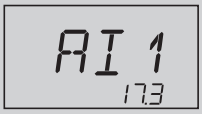


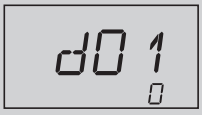
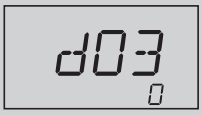
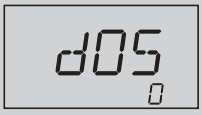
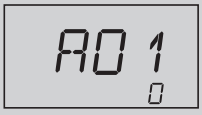
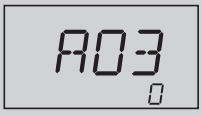
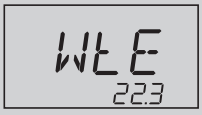
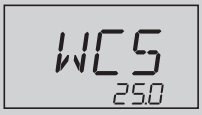
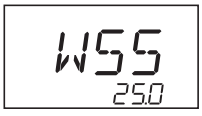
Press the ⏻ key to access the list of inputs and outputs.
The screen that allows you to select the unit for which you wish to display the input/output status appears first:

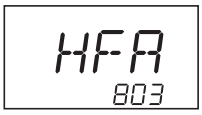


The second row indicates the status of the unit considered (1=AHS2-0MM, M=AHS2).
To change the displayed controller, press the ⏻ key (the current unit flashes) and then the ▲ or ▼ key until the desired controller is displayed. Then press the ⏻ key again to validate your selection.
Use the ▲ or ▼ key to scroll through the status of the inputs and outputs present in the selected unit.
The following screens are displayed:

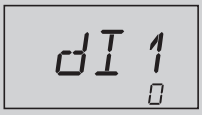
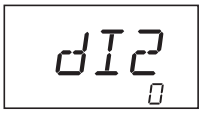
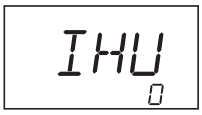
For the AHS2-0MM connected to the display AHS2:

Screen	Input/Output	Display B indicator (second row)
	Selection of displayed controller	M=AHS2 1=AHS2-0MM
	Digital input 1	0=contact open 1=contact closed
	Digital input 2	0=contact open 1=contact closed
 for AHS2-0MM only	Analogue input 1 (for AHS2-0MM units only):	Sensor input 021 <= 5: --LL=sensor open -HL=sensor short-circuited -150..900=temperature noS=input not used (021=0)
		Contact input 021 >= 7 and 021 <= 20: 0=contact open 1=contact closed
		Set remote variator input 021=6: offset value of the variator (if not connected value=00)
 for AHS2-0MM only	Analogue input 2 (for AHS2-0MM units only):	Sensor input 023 <= 5: --LL=sensor open -HL=sensor short-circuited -150..900=temperature noS=input not used (I13=0)
		Contact input 023 >= 7 and 023 <= 20: 0=contact open 1=contact closed
		Set remote variator input 023=6: offset value of the variator (if not connected value=00)

 for AHS2-0MM only	Digital output 1, on/off or 3-point valve opening or closure	0=relay deactivated 1=relay activated 6=destratification cycle in progress (025=1)
 for AHS2-0MM only	Digital output 2, on/off or 3-point valve opening or closure	0=relay deactivated 1=relay activated 6=destratification cycle in progress (026=1)
 for AHS2-0MM only	Digital output 3, on/off or 3-point valve opening or closure	0=relay deactivated 1=relay activated 6=destratification cycle in progress (027=1)
 for AHS2-0MM only	Digital output 4	0=relay deactivated 1=relay activated 6=destratification cycle in progress (028=1)
 for AHS2-0MM only	Digital output 5, on/off or 3-point valve opening or closure	0=relay deactivated 1=relay activated 6=destratification cycle in progress (029=1)
 for AHS2-0MM only	Digital output 6, on/off or 3-point valve opening or closure	0=relay deactivated 1=relay activated 6=destratification cycle in progress (030=1)
 for AHS2-0MM only	Analogue output 1	00.. 1000=voltage (x10)
 for AHS2-0MM only	Analogue output 2	00.. 1000=voltage (x10)
 for AHS2-0MM only	Analogue output 3	00.. 1000=voltage (x10)
 for AHS2-0MM only	Communication status between AHS2-0MM and AHS2 in real time.	0=no error 1=timeout 2=incorrect data or routing 3=other communication errors
 for AHS2-0MM only	Operating temperature	-200=sensor open or short-circuited - 150..900=temperature
 for AHS2-0MM only	Working setpoint in heating mode	-300=forced operating setpoint with open or short-circuited sensor 700=forced operation setpoint with active frost protection ----=setpoint not calculated other values=calculated operation setting
 for AHS2-0MM only	Working setpoint in cooling mode	980=forced operation setpoint with open or short-circuited sensor 710=forced operation setpoint with active frost protection ----=setpoint not calculated other values=calculated operation setting
 for AHS2-0MM only	Supply setpoint calculated in cascade mode	calculated setpoint with decimal value ----=setpoint not calculated
 for AHS2-0MM only	Working dehumidification setpoint	calculated setpoint with decimal value ----=setpoint not calculated

 for AHS2-0MM only	Working humidification setpoint	calculated setpoint with decimal value ----=setpoint not calculated
 for AHS2-0MM only	Working post-heating setpoint	calculated setpoint with decimal value ----=setpoint not calculated
 for AHS2-0MM only	Current hours of ventilator operation	0..9999=hours of operation

For the AHS2 unit:

Screen	Input/Output	Display B indicator (second row)
	Selection of displayed controller	M=display
	Digital input 1	0=contact open 1=contact closed
	Digital input 2	0=contact open 1=contact closed
	Temperature of internal sensor	-200..970=temperature
	Humidity of internal sensor	0.. 100=humidity

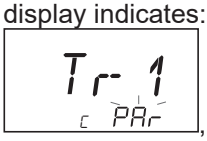
To exit the menu, press the  button one or more times or wait for about time defined by parameter 319.

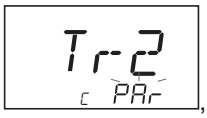
43. Setting configuration parameters from Evolution Tool 3

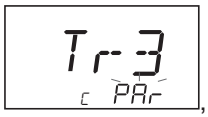
In normal condition of use when AHS2 is connected to AHS2-0MM, it reads the configuration from AHS2-0MM.
It is then possible to change parameters setting from display and transfert modifications done back to to AHS2-0MM.

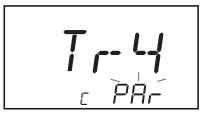
If a complete configuration has to be transferred to AHS2-0MM using Evolution tool 3 when AHS2-0MM and AHS2 are already installed and connected, the transfert can take place in 2 ways:
- directly mode on AHS2-0MM using Modbus port CN5,
- indirectly mode on AHS2 via USB port and modality “transfert parameters” selected on AHS2.

Follow the procedure below to use indirectly mode from Evolution tool:
- Set SEL=2 (modality transfert parameters activated) on AHS2 or from Evolution tool 3,
- connect USB cable on AHS2 and transfert parameters setting from Evolution tool 3,
- unconnect USB cable and power off and on AHS2, the transfert of parameters to AHS2-0MM starts from AHS2 and the display indicates:









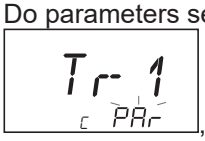
and at the end of transfert 

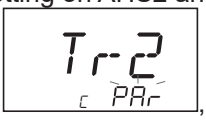
if the parameters transfert occured without any error of communication.
Note: In case of error of communication the AHS2 tries to download all configuration untill no error occurs or if parameter SEL is set to 0 or 1.

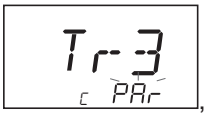
- To exit transfert modality 

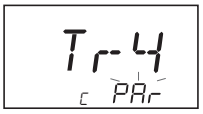
and retrieve normal operating, set SEL=0.

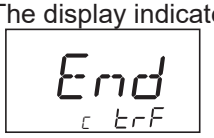
If a complete configuration has to be transferred to several AHS2-0MM from AHS2 without Evolution tool 3, connect AHS2 to AHS2-0MM unit and set SEL=1 to stop any communication between AHS2 and AHS2-0MM.
Do parameters setting on AHS2 and then set SEL=2 to use AHS2 as a parameters programmer. The display indicates:



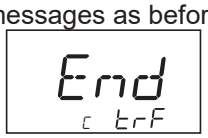






and at the end of transfert 

Unconnect AHS2 and connect to a new AHS2-0MM unit for transferring parameters again. The transfert of parameters starts automatically with same messages as before.

- To exit transfert modality 

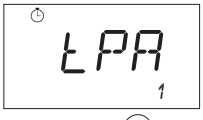
and retrieve normal operating, set SEL=0.

• Accessing the parameter SEL from AHS2:

To access parameter SEL from AHS2 follow the procedure below:

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 to access parameter SEL:

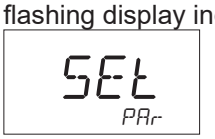
To modify it press the ⏻ button and then the ▲ or ▼ buttons to select its value.

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

To exit the menu, press the ESC button one or more times or wait for about time defined by parameter 319.

Parameter	Description	Default	Min	Max
SEL (1)	Transfert mode selection 0=modality “transfert parameters” deactivated 1=stop any comunication between AHS2 and AHS2-0MM (2) 2=modality “transfert parameters”activated	0	0	2

Note1: after the selection is done it is necessary to exit the menu to apply the selection.Note2: If the parameter SEL=1 the flashing display indicates:

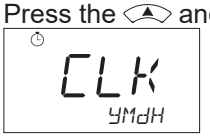


This modality is used when parameters must be modified directly on AHS2 before transfering them.
After parameters are modified, it is necessary to set SEL=2 to activate the transfert of parameters to AHS2-0MM.

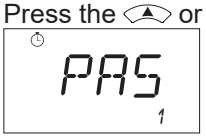
44. Resetting the default parameters

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:

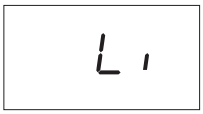


Press the ▲ or ▼ button until the following screen is displayed:



Press the ⏻ button and then the ▲ button until the value **44** is displayed.
Press the ⏻ button to access the default parameters reset level.

To cancel and return to the controller, press the ESC button.
To activate the procedure, press the ⏻ button, the value 0 starts to flash. Press the ▲ button to change the value to 1 and press the ⏻ button again.
The reset procedure starts, the display reports the following messages:



loading default settings begins

default parameters loaded.

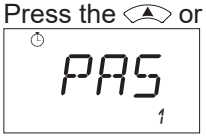
When the following screen appears again, it is possible to exit, press the ESC button one or more times or wait for about time defined by parameter 319.

45. 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:

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.

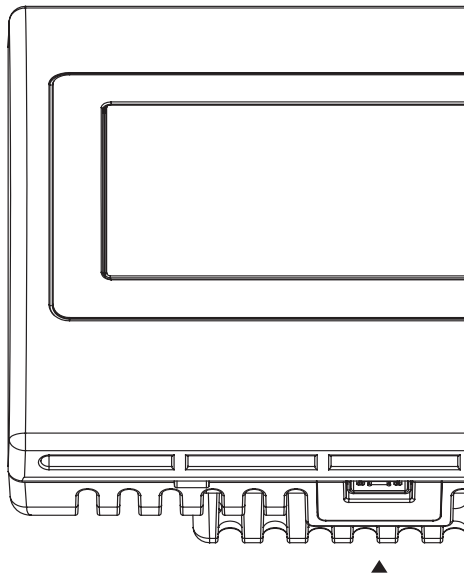
To exit the menu, press the ESC button one or more times or wait for about time defined by parameter *319*.

Parameter	Description	Value	Min	Max
U01	Major release of firmware AHS2	x	0	9
U02	Minor release of firmware AHS2	y	0	9
U03	Built release of firmware AHS2	z	0	9
U04	Built release of firmware AHS2-0MM	t	0	999

The firmware revision is x.y.z for AHS2 and t value for AHS2-0MM (for instance t=1 corresponds to 0.0.1, t=15 corresponds to 0.1.5, t=203 corresponds to 2.0.3).

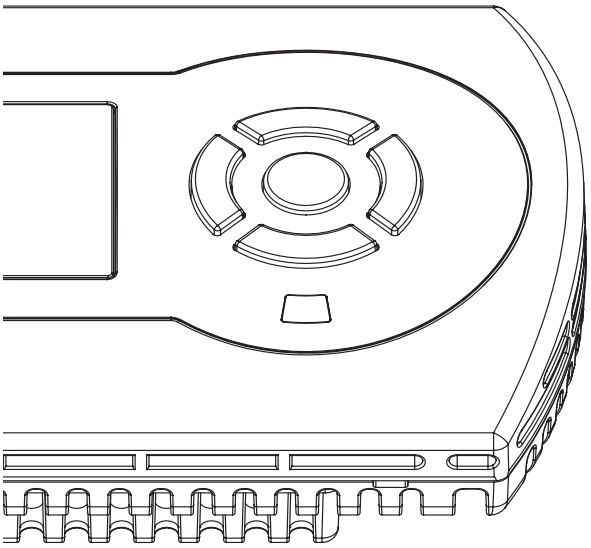
46. USB connection

The AHS2 unit implements a USB “device” type of interface that can be used to configure time bands or update software.
To connect the controller to a personal computer via USB, use a cable with “Type A” connectors on one side and “Mini B” connectors on the other side.



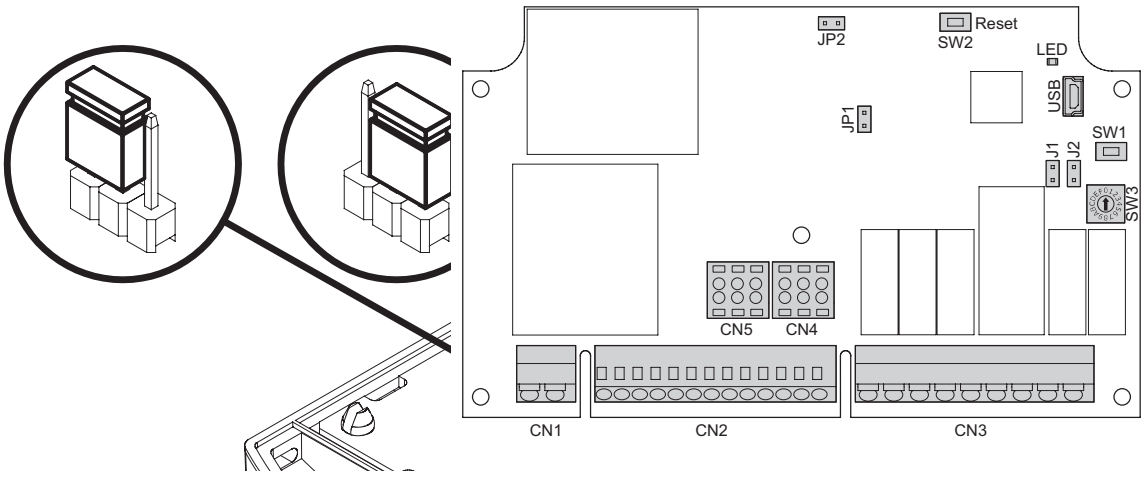
The connection can be made either with the device live or without supply voltage.
When the USB cable is connected to the AHS2 unit, the display turns off and the unit stands by for configuration or a software update.

The AHS2-0MM unit implements a USB “device” type of interface that can be used to update the software.
To connect the controller to a personal computer via USB, use a cable with “Type A” connectors on one side and “Mini B” connectors on the other side.



The connection must be made when AHS2-0MM is powered on.
When the USB cable is connected to the unit, press the reset button (see *“49. Electrical connections” page 178* slave unit connections). The LED stops flashing, and the unit stands by for a software update. At the end of software update hit the key reset again.

47. Jumper configuration



AHS2 unit AHS2-0MM

AHS2 unit:
JP1=Term. ON → 120 ohm internal network Modbus line termination resistance INSERTED.
JP1=OFF → 120 ohm internal network Modbus line termination resistance NOT INSERTED.

AHS2-0MM unit:
JP1=Term. ON → 120 ohm internal network line termination resistance INSERTED.
JP1=OFF → 120 ohm internal network line termination resistance NOT INSERTED.

JP2=Term. ON → 120 ohm external (to supervisor) Modbus line termination resistance INSERTED.
JP2=OFF → 120 ohm resistance for external Modbus line termination (to supervisor) NOT INSERTED.

J1 = ON -> AHS2-0MM is the master on CN4 port for reading optional transmitters when no display AHS2 is connected**.**
J1 = OFF -> AHS2-0MM is a slave on CN4 for connection to display AHS2 unit.

J2 = ON -> the address of AHS2-0MM in the external network CN5 is variable **ADR_MOD_MODBUS_ADDRESS_CN5** (12424) (parameter *3 17*)
J2 = OFF -> the address of AHS2-0MM in the external network CN5 is the address set on rotary switch SW3.

Note: the address of AHS2-0MM on internal network CN4 is always 1.

48. AHS2-0MM Modbus variables on CN5

A AHS2-0MM is equipped with a second communication port (CN5) to be connected to a supervision system as Modbus slave
All parameters and variables can be accessed by the supervisor as a holding register, and read and write operations must be implemented with the appropriate function codes (FC=03, 06, 16).
Given the large number of parameters, read a maximum of 121 variables at a time.
A timeout of 1 s is sufficient for baud rates of 19200 and 9600. For other baud rates, increase the timeout value to 2 seconds

Address	Description	Par	Def	Min	Max	R/W
12000	**ADR_MOD_STATUS_DO1** → Status of digital output DO1 0=relay 1 deactivated, 1=relay 1 activated.		0	0	1	R
12001	**ADR_MOD_STATUS_DO2** → Status of digital output DO2 0=relay 1 deactivated, 1=relay 1 activated.		0	0	1	R
12002	**ADR_MOD_STATUS_DO3** → Status of digital output DO3 0=relay 1 deactivated, 1=relay 1 activated.		0	0	1	R
12003	**ADR_MOD_STATUS_DO4** → Status of digital output DO4 0=relay 1 deactivated, 1=relay 1 activated.		0	0	1	R
12004	**ADR_MOD_STATUS_DO5** → Status of digital output DO5 0=relay 1 deactivated, 1=relay 1 activated.		0	0	1	R
12005	**ADR_MOD_STATUS_DO6** → Status of digital output DO6 0=relay 1 deactivated, 1=relay 1 activated.		0	0	1	R
12006	**ADR_MOD_STATUS_AO1** → Status of analogue output 1 0=0 V and 1000=10 V		0	0	1000	R
12007	**ADR_MOD_STATUS_AO2** → Status of analogue output 2 0=0 V and 1000=10 V		0	0	1000	R
12008	**ADR_MOD_STATUS_AO3** → Status of analogue output 3 0=0 V and 1000=10 V		0	0	1000	R
12009	**ADR_MOD_STATUS_DI1** → Status of Input contact DI1 0=contact DI1 open, 1=contact DI1 closed		0	0	1	R
12010	**ADR_MOD_STATUS_DI2** → Status of input contact DI2 0=contact DI2 open, 1=contact DI2 closed		0	0	1	R
12011	**ADR_MOD_STATUS_AI1** → Remote sensor 1 temperature multiplied by 10(°C) if *I11*≠10 if the sensor is open, the reading is -200 (corresponding to -20.0°C) in case of short-circuit of the sensor, the reading is 970 (corresponding to 97.0°C). → Value between - *194* and + *194* (setpoint variation) multiplied by 10(°C) if *021*=6		0	-150	900	R
12012	**ADR_MOD_STATUS_AI2** → Remote sensor 2 temperature multiplied by 10(°C) if *I13*≠10 if the sensor is open, the reading is -200 (corresponding to -20.0°C) In case of short-circuit of the sensor, the reading is 970 (corresponding to 97.0°C). → Value between - *194* and + *194* (setpoint variation) multiplied by 10(°C) if *023*=6		0	-150	900	R
12013	**ADR_MOD_TYPE_SLAVE_UNIT** → AHS2-0MM function in the internal network 20000 = AHS2-0MM is master on internal network 11000 = AHS2-0MM is slave on internal network			11000	20000	R
12014	**Reserved address**					R
12015	**ADR_MOD_STATUS_CURRENT_MASTERCURRENTMODEREG** → Current type of regulation 0=regulation with base setpoint 1=regulation with base setpoint (within a time band if 310=0) 2=regulation with base setpoint (active forced presence) 3=regulation in economy mode 4=regulation in unoccupied holidays mode			0	4	R
12016	**ADR_MOD_STATUS_WORKING_TEMP** → Working temperature multiplied by 10 (°C). If the sensor is open, the reading is -200 (corresponding to -20.0°C). In case of short-circuit of the sensor, the reading is 970 (corresponding to 97.0°C).			-150	900	R
12017	**ADR_MOD_STATUS_WORKING_SET_HEAT** → Calculated WHS working setpoint for heating multiplied by 10 (°C) for AHS2-0MM. The reading for the frost protection alarm is 700 (70.0°C). If the operating temperature is in error (heating), the reading is -300 (-30.0°C)			see parameters	see parameters	R
12018	**ADR_MOD_STATUS_WORKING_SET_COOL** → Calculated WCS working setpoint for cooling multiplied by 10 (°C) for AHS2-0MM. The reading for the frost protection alarm is 710 (71.0°C). If the operating temperature is in error (cooling), the reading is 980 (98.0°C)			see parameters	see parameters	R
12019	**ADR_MOD_STATUS_WORKING_SET_SUPPLY** → Calculated working supply setpoint in cascade mode multiplied by 10 (°C) for AHS2-0MM. The reading is 0 if the variable is not calculated		0	par. *126*	par. *128*	R

Address	Description	Par	Def	Min	Max	R/W
12020	**ADR_MOD_STATUS_WORKING_SET_DEHUM** → Calculated working setpoint for dehumidification multiplied by 10 (r.h.) when 139≠0 otherwise 0		0	see parameters	see parameters	R
12021	**ADR_MOD_STATUS_WORKING_SET_HUM** → Calculated working setpoint for humidification multiplied by 10 (r.h.) when 140≠0 otherwise 0		0	see parameters	see parameters	R
12022	**ADR_MOD_STATUS_WORKING_POST_HEAT_SET** → Calculated working post heating setpoint multiplied by 10 (°C) for AHS2-0MM. The reading is 0 if the variable is not calculated		0	see parameters	see parameters	
12023	**ADR_MOD_STATUS_ON_OFF** → AHS2-0MM on/off status 0=OFF from remote contact 1=OFF from time bands 2=OFF manually from key of AHS2 3=OFF from Modbus 4=ON from remote contact 5=ON from time bands 6=ON manually from key of AHS2 7=ON from Modbus		6	0	7	R
11224	**ADR_MOD_STATUS_ECONOMY** → Economy mode status 0=no economy 1=economy 2=economy from time bands (send by AHS2 if current time outside bands with 310=0)		0	0	2	R
12025	**ADR_MOD_STATUS_HOLIDAY** → Unoccupied holidays mode status 0=no unoccupied holidays mode 1=unoccupied holidays mode 2=unoccupied holidays selected manually from keyboard of AHS2		0	0	2	R
12026	**ADR_MOD_STATUS_STA** → Current operating season status 0=2-pipe heating 1=2-pipe cooling 5=season undefined (in 2-pipe mode) 6=season undefined when the internal network is switched on (2-pipe mode)		0	0	6	R
12027	**ADR_MOD_STATUS_FORCE_COMFORT** → Comfort mode status selected from keyboard of AHS2 0=no comfort mode 2=comfort mode		0	0	2	R
12028	**ADR_MOD_STATUS_HEATING** → heating status 0=heating in progress 1=heating stopped		0	0	1	R
12029	**ADR_MOD_STATUS_ELECTRIC_HEATER** → electrical resistance status 0=electrical resistance ON 1=electrical resistance OFF		0	0	1	R
12030	**ADR_MOD_STATUS_COOLING** → cooling status 0=cooling in progress 1=cooling stopped		0	0	1	R
12031	**ADR_MOD_STATUS_POST_HEATING** → post-heating status 0=post-heating in progress 1=post-heating stopped		0	0	1	R
12032	**ADR_MOD_STATUS_FROST_PROTECTION** → frost protection heating battery status 0=frost protection alarm not present 1=frost protection alarm		0	0	1	R
12033	**ADR_MOD_STATUS_FREE_COOLING_CONDITION** → free cooling condition 0=conditions for free cooling present 1=conditions for free cooling not present		0	0	1	R
12034	**ADR_MOD_STATUS_FREE_COOLING_CONDITION_EFFECTIVE**→ free cooling used in regulation 0=free cooling used 1=free cooling not used		0	0	1	R
12035	**ADR_MOD_STATUS_FREE_HEATING_CONDITION** → free heating condition 0=conditions for free heating present 1=conditions for free heating not present		0	0	1	R
12036	**ADR_MOD_STATUS_FREE_HEATING_CONDITION_EFFECTIVE**→ free heating used in regulation 0=free heating used 1=free heating not used		0	0	1	R
12037	**ADR_MOD_STATUS_SPEED_ON_OFF** → one or more speed ventilator status ON/OFF 0=ventilator coil off 1=ventilator coil at speed 1 for ON/OFF 3-speed ventilator coil 2=ventilator coil at speed 2 for ON/OFF 3-speed ventilator coil 3=ventilator coil at speed 3 for ON/OFF 3-speed ventilator coil		0	0	3	R
12038	**ADR_MOD_STATUS_SPEED_SUPPLY** → modulating supply ventilator voltage x 10 0=0V..100=10,0V		0	0	100	R

Address	Description	Par	Def	Min	Max	R/W
12039	**ADR_MOD_STATUS_SPEED_EXTRACT** → modulating extract ventilator voltage x 10 0=0V..100=10,0V		0	0	100	R
12040	**ADR_MOD_STATUS_LIM_ALARM** → temperature limit alarm status 0=no limit alarm 1=low limit alarm 2=high limit alarm		0			
12041	**ADR_MOD_STATUS_DEHUMIDIFICATION** → dehumidification status 0=dehumidification in progress 1=dehumidification stopped		0	0	1	R
12042	**ADR_MOD_STATUS_HUMIDIFICATION** → humidification status 0=humidification in progress 1=humidification stopped		0	0	1	R
12043	**ADR_MOD_STATUS_DIRTY_FILTER** → ventilator filter status 0=ventilator filter clean 1=ventilator filter dirty (operational hours > *193*).		0	0	1	R
12044	**ADR_MOD_STATUS_DECREASE_CO2** → status of CO_2 decrease 0=air exchange finished 1=air exchange in progress		0	0	1	R
12045	**ADR_MOD_STATUS_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	0	1	R
12046	**ADR_MOD_STATUS_STATE_EXCHANGER** → heat exchanger status 0=heat recovery stopped 1=recovery in progress 2=cool recovery in progress 3=heat recovery in progress 4=frost protection alarm present in the heat exchanger 5=heat exchanger stopped for free cooling or free heating 6=heat exchanger modulated 7=rotative exchanger at minimum speed (rotative exchanger only)		0	0	7	R
12047	**ADR_MOD_STATUS_GEN_ALARM** → general alarm status 0=no alarm 1=general alarm		0	0	1	R
12048	**ADR_MOD_STATUS_ALARM_CONDENSATION** → condensation alarm status 0=no condensation alarm 1=condensation alarm		0	0	1	R
12049	**ADR_MOD_STATUS_GENERAL_FILTER_ALARM** → filter alarm status 0=no filter alarm 1=filter alarm		0	0	1	R
12050	**ADR_MOD_STATUS_SUPPLY_FILTER_ALARM** 0=no supply ventilator filter alarm 1=filter alarm for supply ventilator		0	0	1	R
12051	**ADR_MOD_STATUS_EXTRACT_FILTER_ALARM** 0=no filter alarm for extract ventilator 1=filter alarm for extract ventilator		0	1	1	R
12052	**ADR_MOD_STATUS_ALARM_STOP_ALL** 0=no alarm stop all 1=stop all alarm		0	0	1	R
12053	**ADR_MOD_STATUS_ALARM_VENTILATION** → ventilator alarm status 0=no alarm for ventilator 1=ventilator alarm		0	0	1	R
12054	**ADR_MOD_STATUS_FLOW_RATE** → value of flow rate (m^3/h) if parameter *197*≠0		0	0	9999	R
12055	**ADR_MOD_STATUS_ALARM_OVERTEMPERATURE_ELECTRIC_HEATER** → electric heater overtemperature status 0=no overtemperature alarm 1= overtemperature alarm		0	0	1	R
12056	**ADR_MOD_STATUS_3_POINT_HEATING_VALVE** -10=cycle regulation -9= cycle closing done -8=cycle closing in execution -7=cycle closing -6=cycle opening done -5=cycle opening in execution -4=cycle opening -3=cycle reset done -2=cycle reset in execution -1=cycle reset 0(0%)..1000(100,0%)=position of the valve in the total stroke		0	0	1000	R

Address	Description	Par	Def	Min	Max	R/W
12057	**ADR_MOD_STATUS_3_POINT_COOLING_VALVE** -10=cycle regulation -9= cycle closing done -8=cycle closing in execution -7=cycle closing -6=cycle opening done -5=cycle opening in execution -4=cycle opening -3=cycle reset done -2=cycle reset in execution -1=cycle reset 0(0%)..1000(100,0%)=position of the valve in the total stroke		0	0	1000	R
12058	**ADR_MOD_STATUS_3_POINT_HEATING_COOLING_VALVE** -10=cycle regulation -9= cycle closing done -8=cycle closing in execution -7=cycle closing -6=cycle opening done -5=cycle opening in execution -4=cycle opening -3=cycle reset done -2=cycle reset in execution -1=cycle reset 0(0%)..1000(100,0%)=position of the valve in the total stroke		0	0	1000	R
12059	**ADR_MOD_STATUS_TOTAL_HOUR_OF_VENTILATOR** → number of hours of operation of the ventilator (only if the parameter *193* is not equal to 0; otherwise, the value read is always 0)		0	0	9999	R
12060	**Reserved**					R
12061	**Reserved**					R
12062	**ADR_MOD_STATUS_CURRENT_OFFSET_VARIATOR** → Value of current offset variator multiplied by 10 (°C)		0	- *194* x 10	*194* x 10	R
12063	**Reserved**					R
12064	**ADR_MOD_STATUS_YEAR_CLOCK_AHS2** → current year of clock AHS2		2021	2021	2100	R
12065	**ADR_MOD_STATUS_MONTH_CLOCK_AHS2** → current month of clock AHS2		1	1	12	R
12066	**ADR_MOD_STATUS_DAY_CLOCK_AHS2** → current day of clock AHS2		1	1	31	R
12067	**ADR_MOD_STATUS_HOUR_CLOCK_AHS2** → current time (hour) of clock AHS2		0	0	23	R
12068	**ADR_MOD_STATUS_MIN_CLOCK_AHS2** → current time (min.) of clock AHS2		0	0	59	R
12069	**ADR_MOD_STATUS_DAY_NAME_CLOCK_AHS2** → current day name of clock AHS2 0=Sunday 1=Monday 2=Tuesday 3=Wednesday 4=Thursday 5=Friday 6=Saturday		0	0	6	R
12070	**ADR_MOD_STATUS_DI1_AHS2** → Status of Input contact DI1 of AHS2 0=contact DI1 open, 1=contact DI1 closed		0	0	1	R
12071	**ADR_MOD_STATUS_DI2_AHS2** → Status of input contact DI2 of AHS2 0=contact DI2 open, 1=contact DI2 closed		0	0	1	R
12072	**ADR_MOD_STATUS_CURRENT_AHS2_SUP_TEMP** → Temperature detected by AHS2 (with correction *313* included) multiplied by 10. -200=value in case temperature not present		-200	-200	970	R
12073	**ADR_MOD_STATUS_CURRENT_AHS2_SUP_HUM** → Humidity detected by AHS2 (with correction *314* included) multiplied by 10. 0=0% r.h, 1000=100.0% r.h.		0	0	1000	R
12074	**ADR_MOD_STATUS_CURRENT_TRASM_TEMP_1** → Current humidity level of transmitter 1 connected to internal network, multiplied by 10. If there is a communication problem with the transmitter 1, the reading is forced to 0		0	-200	970	R
12075	**ADR_MOD_STATUS_CURRENT_TRASM_HUM_1** → Current humidity level of transmitter 1 connected to internal network, multiplied by 10. 0 (0% r.h) and 1000 (100.0% r.h) If there is a communication problem with the transmitter 1, the reading is forced to 0		0	0	1000	R
12076	**ADR_MOD_STATUS_CURRENT_TRASM_CO2_1** → Current level of CO_2 of transmitter 1 connected to internal network. 0 (0 ppm) and 2000 (2000 ppm) If there is a communication problem with the transmitter 1, the reading is forced to 0		0	0	2000	R

Address	Description	Par	Def	Min	Max	R/W
12077	**ADR_MOD_STATUS_CURRENT_TRASM_PRESSURE_1** → Current level of pressure of transmitter 1 connected to internal network. If there is a communication problem with the transmitter 1, the reading is forced to 0		0	0	9999	R
12078	**ADR_MOD_STATUS_CURRENT_TRASM_TEMP_2** → Current humidity level of transmitter 2 connected to internal network, multiplied by 10. If there is a communication problem with the transmitter 2, the reading is forced to 0		0	-200	970	R
12079	**ADR_MOD_STATUS_CURRENT_TRASM_HUM_2** → Current humidity level of transmitter 2 connected to internal network, multiplied by 10. 0 (0% r.h) and 1000 (100.0% r.h) If there is a communication problem with the transmitter 2, the reading is forced to 0		0	0	1000	R
12080	**ADR_MOD_STATUS_CURRENT_TRASM_CO2_2** → Current level of CO_2 of transmitter 2 connected to internal network. 0 (0 ppm) and 2000 (2000 ppm) If there is a communication problem with the transmitter 2, the reading is forced to 0		0	0	2000	R
12081	**ADR_MOD_STATUS_CURRENT_TRASM_PRESSURE_2** → Current level of pressure of transmitter 2 connected to internal network. If there is a communication problem with the transmitter 2, the reading is forced to 0		0	0	9999	R
12082	**Reserved**					R
12083	**ADR_MOD_FORCE_MODE**→ Force mode of operating (equivalent of parameter Mod of AHS2) 0=operating without time bands 1=operating with time bands 2=mode unoccupied, holiday		0	0	2	R/W
12084	**ADR_MOD_FORCE_ECONOMY** → Force economy mode Forcing by supervisor is not considered if a digital input of AHS2 is set as economy function (priority max) and is considered if a digital input of AHS2-0MM is set as economy function (medium priority) or no digital input at all is set as economy function. 300=forced value not considered. It releases any forcing of the variable by supervisor. 0=force no economy 1=force economy 2=force economy outside time bands (not considered if a digital or analogue input is set as economy contact) 10=(read only value) force no economy by AHS2 when a digital input of AHS2 is set as economy and is on position no economy 11=(read only value) force economy by AHS2 when a digital input of AHS2 is set as economy and is on position economy		300	0	2	R/W
12085	**ADR_MOD_FORCE_HOLIDAY** → Force unoccupied holidays mode Forcing by supervisor is not considered if a digital input of AHS2 is set as unoccupied function (priority max) and is considered if a digital input of AHS2-0MM is set as unoccupied function (medium priority) or no digital input at all is set as unoccupied function. 300=forced value not considered. It releases any forcing of the variable by supervisor. 0=force occupied mode 1=force unoccupied, holidays mode 2=force unoccupied, holidays from AHS2 keyboard (not considered if a digital or analogue input is set as economy contact) 10=(read only value not changeable) force unoccupied, holidays mode by AHS2 when a digital input of AHS2 is set as unoccupied holidays contact and is on position unoccupied, holidays 11=(read only value not changeable) force occupied mode by AHS2 when a digital input of AHS2 is set as unoccupied holidays contact and is on position occupied		300	0	2	R/W
12086	**ADR_MOD_FORCE_STA** → Force current operating season (2-pipe only) Forcing by supervisor is not considered if a digital input of AHS2 is set as changeover season function (priority max) and is considered if a digital input of AHS2-0MM is set as changeover season function (medium priority) or no digital input at all is set as changeover season function. 300=forced value not considered. It releases any forcing of the variable by supervisor. 0=force 2-pipe heating 1=force 2-pipe cooling 10=(read only value not changeable) force 2-pipe heating by AHS2 when a digital input of AHS2 is set as remote changeover and is on position heating 11=(read only value not changeable) force 2-pipe cooling by AHS2 when a digital input of AHS2 is set as remote changeover and is on position cooling		300	0	1	R/W
12087	**ADR_MOD_FORCE_COMFORT** → Force comfort mode (equivalent to parameter MOC of AHS2). 300=forced value not considered. It releases any forcing of the variable by supervisor. 0=force no comfort, it corresponds to MOC=noOC 1,2=force comfort mode, it corresponds to MOC=OC (regulation with based setpoint without considering timer extension 309)		300	0	2	R/W
12088	**ADR_MOD_FORCE_GLOBALONOFF** → Force on/off The variable can't be forced if a contact set as on/off function on AHS2 or AHS2-0MM is on position OFF. 0=forced to off 1=forced to on		1	0	1	R/W

Address	Description	Par	Def	Min	Max	R/W
12089	**ADR_MOD_FORCE_OFFSET_VARIATOR** → Force value of offset variator multiplied by 10 (°C). The variable override the current offset variator calculated even if 021=6 (AI1) or 023=6 (AI2) and is added to the current setpoint. 300=forced value not considered. It releases any forcing of the variable by supervisor. - 194 x 10... 194 x 10 forced value considered		300	- 194 x 10	194 x 10	R/W
12090	**ADR_MOD_FORCE_TEMP_AHS2** → Force temperature transmitted by AHS2 multiplied by 10. It allows supervisor to transmit its own temperature for regulation when 002=0,1. -300=forced value not considered. It releases any forcing of the variable by supervisor. -200=sensor open....970=sensor short-circuited, forced value considered		-300	-200	970	R
12091	**ADR_MOD_FORCE_HUM_AHS2** → Force humidity transmitted by AHS2 multiplied by 10. It allows supervisor to transmit its own humidity for humidity regulation based on internal humidity sensor of AHS2. -300=forced value not considered. It releases any forcing of the variable by supervisor. 0=0% r.h, 1000=100.0% r.h, forced value considered		-300	0	1000	R
12092	**ADR_MOD_FORCE_TRASM_TEMP_1** → Force temperature level of virtual transmitter 1 connected to internal network, multiplied by 10 To use the force mode select a transmitter with parameter 034, its function with 035. The forced value considered will substitute the value of temperature of virtual transmitter 1. -300=forced value not considered. It releases any forcing of the variable by supervisor. -200=sensor open....970=sensor short-circuited, forced value considered		-300	-200	970	R/W
12093	**ADR_MOD_FORCE_TRASM_HUM _1** → Force humidity level of virtual transmitter 1 connected to internal network, multiplied by 10 To use the force mode select a transmitter with parameter 034 and set the forced value. The forced value considered will substitute the value of humidity of virtual transmitter 1. -300=forced value not considered. It releases any forcing of the variable by supervisor. 0 (0% r.h.)..1000 (100.0% r.h.)=force value considered		-300	0	1000	R/W
12094	**ADR_MOD_FORCE_TRASM_CO2_1** → Force current level of CO_2 of virtual transmitter.1 To use the force mode select a transmitter with parameter 034 and set the forced value. The forced value considered will substitute the value of CO_2 of virtual transmitter 1. -300=forced value not considered. It releases any forcing of the variable by supervisor. 0 (0 ppm)..2000 (2000 ppm)=force value considered		-300	0	2000	R/W
12095	**ADR_MOD_FORCE_TRASM_PRESSURE_1** → Force current level of pressure of virtual transmitter.1 To use the force mode select a transmitter with parameter 034 and set the forced value. The forced value considered will substitute the value of pressure of virtual transmitter 1. -300=forced value not considered		-300	0	9999	R/W
12096	**ADR_MOD_FORCE_TRASM_TEMP_2** → Force temperature level of virtual transmitter 2 connected to internal network, multiplied by 10. To use the force mode select a transmitter with parameter 036, its function with 037. The forced value considered will substitute the value of temperature of virtual transmitter 2. -300=forced value not considered. It releases any forcing of the variable by supervisor. -200=sensor open....970=sensor short-circuited, forced value considered		-300	-200	970	R/W
12097	**ADR_MOD_FORCE_TRASM_HUM _2** → Force humidity level of virtual transmitter 2 connected to internal network, multiplied by 10. To use the force mode select a transmitter with parameter 036 and set the forced value. The forced value considered will substitute the value of humidity of virtual transmitter 2. -300=forced value not considered. It releases any forcing of the variable by supervisor. 0 (0% r.h.)..1000 (100.0% r.h.)=force value considered		-300	0	1000	R/W
12098	**ADR_MOD_FORCE_TRASM_CO2_2** → Force current level of CO_2 of virtual transmitter.2. To use the force mode select a transmitter with parameter 036 and set the forced value. The forced value considered will substitute the value of CO_2 of virtual transmitter 2. -300=forced value not considered. It releases any forcing of the variable by supervisor. 0 (0 ppm)..2000 (2000 ppm)=force value considered		-300	0	2000	R/W
12099	**ADR_MOD_FORCE_TRASM_PRESSURE_2** → Force current level of pressure of virtual transmitter.2. The forced value considered will substitute the value of pressure of virtual transmitter 2. To use the force mode select a transmitter with parameter 036 and set the forced value -300=forced value not considered. It releases any forcing of the variable by supervisor.		-300	0	9999	R/W
12100	**ADR_MOD_FORCE_STA_MANUAL** → Operating season (2-pipe only) if no contact are defined as remote change-over (equivalent to parameter SLA of AHS2 set from keyboard.) 0=force 2-pipe heating 1=force 2-pipe cooling		0	0	1	R/W

Address	Description	Par	Def	Min	Max	R/W
12101	**ADR_MOD_FORCE_VENTILATOR_SPEED_MODE** → manual regulation for ventilator (equivalent to the setting of speed request done on AHS2 from key ESC). - for on/off or EC ventilator with Ø10=0 0=ventilator set to OFF (only for on/off ventilator) 1=ventilator set to speed 1 2=ventilator set to speed 2 3=ventilator set to speed 3 - for EC ventilator with Ø10=8 (% between speed 1 and 3): 0..100%		1	0	100	R/W
12102	**ADR_MOD_FORCE_OFFSET_SETPOINT** → Value of offset setpoint multiplied by 10 (°C) (equivalent to the offset setpoint that can be set from keyboard of AHS2 when comfort function is activated 311=1). - par 194 x * 10...par - 194 x *10 °C		0	- 194 x 10	194 x 10	R/W
12103	**ADR_MOD_KEYSELECT_FORCED_OUTPUTS** → Output forcing key for address variables 12099 to 12107 inclusive value between 21505 and 22015=forcing key present xxxxx=(with xxxxx not within the range between 21505 and 22015) forcing key not present			0	65535	R/W
12104	**ADR_MOD_FORCE_DO1** → Force digital output 1 0=relay 1 deactivated, 1=relay 1 activated			0	1	R/W
12105	**ADR_MOD_FORCE_DO2** → Force digital output 2 0=relay 1 deactivated, 1=relay 1 activated			0	1	R/W
12106	**ADR_MOD_FORCE_DO3** → Force digital output 3 0=relay 1 deactivated, 1=relay 1 activated			0	1	R/W
12107	**ADR_MOD_FORCE_DO4** → Force digital output 4 0=relay 1 deactivated, 1=relay 1 activated			0	1	R/W
12108	**ADR_MOD_FORCE_DO5** → Force digital output 5 0=relay 1 deactivated, 1=relay 1 activated			0	1	R/W
12109	**ADR_MOD_FORCE_DO6** → Force digital output 6 0=relay 1 deactivated, 1=relay 1 activated			0	1	R/W
12110	**ADR_MOD_FORCE_AO1** → Force analogue output 1 0(0V)...1000(10V)			0	1000	R/W
12111	**ADR_MOD_FORCE_AO2** → Force analogue output 2 0(0V)...1000(10V)			0	1000	R/W
12112	**ADR_MOD_FORCE_AO3** → Force analogue output 3 0(0V)...1000(10V)			0	1000	R/W
12113	**ADR_MOD_KEYSELECT_FORCED_INPUTS** → Input forcing key for variables from addresses 12109 to 12112 inclusive value between 26113 and 26127=forcing key present xxxxx=(with xxxx not within the range between 26113 and 26127) forcing key not present		0	0	65535	R/W
12114	**ADR_MOD_FORCE_DI1** → Force digital input 1 0=contact DI1 open, 1=contact DI1 closed		0	0	1	R/W
12115	**ADR_MOD_FORCE_DI2** → Force digital input 2 0=contact DI2 open, 1=contact DI2 closed		0	0	1	R/W
12116	**ADR_MOD_FORCE_AI1** → Force analogue input 1 - temperature sensor value multiplied by 10(°C): forcing -200 (corresponding to -20.0°C) corresponds to open sensor AI1; the forcing of 970 (corresponding to 97.0°C) corresponds to short-circuited sensor AI1. - if Ø23=6 the value is directly added to the setpoint and must be between - 194 and + 194 (setpoint variation)		0	-150	900	R/W
12117	**ADR_MOD_FORCE_AI2** → Forces analogue input 2) - temperature sensor value multiplied by 10(°C): forcing -200 (corresponding to -20.0°C) corresponds to open sensor AI2; the forcing of 970 (corresponding to 97.0°C) corresponds to short-circuited sensor AI2. - if Ø23=6 the value is directly added to the setpoint and must be between - 194 and + 194 (setpoint variation)		0	-150	900	R/W
12118	**ADR_MOD_FORCE_RESET_COM_ALARM_COUNTERS**→ Reset communication error counters 0=counters not resetted 1=counters resetted		0	0	1	R/W
12119	**ADR_MOD_FORCE_RESET_3PT_VALVES**→ Valve 3-point reset cycle 0=valve 3-point reset cycle not activated 1=valve 3-point reset cycle activated		0	0	1	R/W
12120 to 12149	**Reserved**					
12150	**SUN_HOUR_ON_1** → Start of Sunday hour timer period 1		8	0	23	R/W
12151	**SUN_MIN_ON_1** → Start of Sunday minute timer period 1		0	0	59	R/W
12152	**SUN_HOUR_OFF_1** → End of Sunday hour timer 1		17	0	23	R/W
12153	**SUN_MIN_OFF_1** → End of Sunday hour timer period 1		0	0	59	R/W

Address	Description	Par	Def	Min	Max	R/W
12154	**SUN_HOUR_ON_2** → Start of Sunday hour timer period 2		11	0	23	R/W
12155	**SUN_MIN_ON_2** → Start of Sunday minute timer period 2		0	0	59	R/W
12156	**SUN_HOUR_OFF_2** → End of Sunday hour timer period 2		11	0	23	R/W
12157	**SUN_MIN_OFF_2** → End of Sunday minute timer period 2		0	0	59	R/W
12158	**SUN_HOUR_ON_3** → Start of Sunday hour timer period 3		17	0	23	R/W
12159	**SUN_MIN_ON_3** → Start of Sunday minute timer period 3		0	0	59	R/W
12160	**SUN_HOUR_OFF_3** → End of Sunday hour timer period 3		17	0	23	R/W
12161	**SUN_MIN_OFF_3** → End of Sunday minute timer period 3		0	0	59	R/W
12162	**SUN_HOUR_ON_4** → Start of Sunday hour timer period 4		21	0	23	R/W
12163	**SUN_MIN_ON_4** → Start of Sunday minute timer period 4		0	0	59	R/W
12164	**SUN_HOUR_OFF_4** → End of Sunday hour timer period 4		21	0	23	R/W
12165	**SUN_MIN_OFF_4** → End of Sunday minute timer period 4		0	0	59	R/W
12166	**MON_HOUR_ON_1** → Start of Monday hour timer period 1		8	0	23	R/W
12167	**MON_MIN_ON_1** → Start of Monday minute timer period 1		0	0	59	R/W
12168	**MON_HOUR_OFF_1** → End of Monday hour timer period 1		17	0	23	R/W
12169	**MON_MIN_OFF_1** → End of Monday minute timer period 1		0	0	59	R/W
12170	**MON_HOUR_ON_2** → Start of Monday hour timer period 2		11	0	23	R/W
12171	**MON_MIN_ON_2** → Start of Monday minute timer period 2		0	0	59	R/W
12172	**MON_HOUR_OFF_2** → End of Monday hour timer period 2		11	0	23	R/W
12173	**MON_MIN_OFF_2** → End of Monday minute timer period 2		0	0	59	R/W
12174	**MON_HOUR_ON_3** → Start of Monday hour timer period 3		17	0	23	R/W
12175	**MON_MIN_ON_3** → Start of Monday minute timer period 3		0	0	59	R/W
12176	**MON_HOUR_OFF_3** → End of Monday hour timer period 3		17	0	23	R/W
12177	**MON_MIN_OFF_3** → End of Monday minute timer period 3		0	0	59	R/W
12178	**MON_HOUR_ON_4** → Start of Monday hour timer period 4		21	0	23	R/W
12179	**MON_MIN_ON_4** → Start of Monday minute timer period 4		0	0	59	R/W
12180	**MON_HOUR_OFF_4** → End of Monday hour timer period 4		21	0	23	R/W
12181	**MON_MIN_OFF_4** → End of Monday minute timer period 4		0	0	59	R/W
12182	**TUE_HOUR_ON_1** → Start of Tuesday hour timer period 1		8	0	23	R/W
12183	**TUE_MIN_ON_1** → Start of Tuesday minute timer period 1		0	0	59	R/W
12184	**TUE_HOUR_OFF_1** → End of Tuesday hour timer period 1		17	0	23	R/W
12185	**TUE_MIN_OFF_1** → End of Tuesday minute timer period 1		0	0	59	R/W
12186	**TUE_HOUR_ON_2** → Start of Tuesday hour timer period 2		11	0	23	R/W
12187	**TUE_MIN_ON_2** → Start of Tuesday minute timer period 2		0	0	59	R/W
12188	**TUE_HOUR_OFF_2** → End of Tuesday hour timer period 2		11	0	23	R/W
12189	**TUE_MIN_OFF_2** → End of Tuesday minute timer period 2		0	0	59	R/W
12190	**TUE_HOUR_ON_3** → Start of Tuesday hour timer period 3		17	0	23	R/W
12191	**TUE_MIN_ON_3** → Start of Tuesday minute timer period 3		0	0	59	R/W
12192	**TUE_HOUR_OFF_3** → End of Tuesday hour timer period 3		17	0	23	R/W
12193	**TUE_MIN_OFF_3** → End of Tuesday minute timer period 3		0	0	59	R/W
12194	**TUE_HOUR_ON_4** → Start of Tuesday hour timer period 4		21	0	23	R/W
12195	**TUE_MIN_ON_4** → Start of Tuesday minute timer period 4		0	0	59	R/W
12196	**TUE_HOUR_OFF_4** → End of Tuesday hour timer period 4		21	0	23	R/W
12197	**TUE_MIN_OFF_4** → End of Tuesday minute timer period 4		0	0	59	R/W
12198	**WED_HOUR_ON_1** → Start of Wednesday hour timer period 1		8	0	23	R/W
12199	**WED_MIN_ON_1** → Start of Wednesday minute timer period 1		0	0	59	R/W
12200	**WED_HOUR_OFF_1** → End of Wednesday hour timer period 1		17	0	23	R/W
12201	**WED_MIN_OFF_1** → End of Wednesday minute timer period 1		0	0	59	R/W
12202	**WED_HOUR_ON_2** → Start of Wednesday hour timer period 2		11	0	23	R/W
12203	**WED_MIN_ON_2** → Start of Wednesday minute timer period 2		0	0	59	R/W
12204	**WED_HOUR_OFF_2** → End of Wednesday hour timer period 2		11	0	23	R/W
12205	**WED_MIN_OFF_2** → End of Wednesday minute timer period 2		0	0	59	R/W
12206	**WED_HOUR_ON_3** → Start of Wednesday hour timer period 3		17	0	23	R/W
12207	**WED_MIN_ON_3** → Start of Wednesday minute timer period 3		0	0	59	R/W
12208	**WED_HOUR_OFF_3** → End of Wednesday hour timer period 3		17	0	23	R/W

Address	Description	Par	Def	Min	Max	R/W
12209	**WED_MIN_OFF_3** → End of Wednesday minute timer period 3		0	0	59	R/W
12210	**WED_HOUR_ON_4** → Start of Wednesday hour timer period 4		21	0	23	R/W
12211	**WED_MIN_ON_4** → Start of Wednesday minute timer period 4		0	0	59	R/W
12212	**WED_HOUR_OFF_4** → End of Wednesday hour timer period 4		21	0	23	R/W
12213	**WED_MIN_OFF_4** → End of Wednesday minute timer period 4		0	0	59	R/W
12214	**THU_HOUR_ON_1** → Start of Thursday hour timer period 1		8	0	23	R/W
12215	**THU_MIN_ON_1** → Start of Thursday minute timer period 1		0	0	59	R/W
12216	**THU_HOUR_OFF_1** → End of Thursday hour timer period 1		17	0	23	R/W
12217	**THU_MIN_OFF_1** → End of Thursday minute timer period 1		0	0	59	R/W
12218	**THU_HOUR_ON_2** → Start of Thursday hour timer period 2		11	0	23	R/W
12219	**THU_MIN_ON_2** → Start of Thursday minute timer period 2		0	0	59	R/W
12220	**THU_HOUR_OFF_2** → End of Thursday hour timer period 2		11	0	23	R/W
12221	**THU_MIN_OFF_2** → End of Thursday minute timer period 2		0	0	59	R/W
12222	**THU_HOUR_ON_3** → Start of Thursday hour timer period 3		17	0	23	R/W
12223	**THU_MIN_ON_3** → Start of Thursday minute timer period 3		0	0	59	R/W
12224	**THU_HOUR_OFF_3** → End of Thursday hour timer period 3		17	0	23	R/W
12225	**THU_MIN_OFF_3** → End of Thursday minute timer period 3		0	0	59	R/W
12226	**THU_HOUR_ON_4** → Start of Thursday hour timer period 4		21	0	23	R/W
12227	**THU_MIN_ON_4** → Start of Thursday minute timer period 4		0	0	59	R/W
12228	**THU_HOUR_OFF_4**→ End of Thursday hour timer period 4		21	0	23	R/W
12229	**THU_MIN_OFF_4** → End of Thursday minute timer period 4		0	0	59	R/W
12230	**FRI_HOUR_ON_1** → Start of Friday hour timer period 1		8	0	23	R/W
12231	**FRI_MIN_ON_1** → Start of Friday minute timer period 1		0	0	59	R/W
12232	**FRI_HOUR_OFF_1** → End of Friday hour timer period 1		17	0	23	R/W
12233	**FRI_MIN_OFF_1** → End of Friday minute timer period 1		0	0	59	R/W
12234	**FRI_HOUR_ON_2** → Start of Friday hour timer period 2		11	0	23	R/W
12235	**FRI_MIN_ON_2** → Start of Friday minute timer period 2		0	0	59	R/W
12236	**FRI_HOUR_OFF_2** → End of Friday hour timer period 2		11	0	23	R/W
12237	**FRI_MIN_OFF_2** → End of Friday minute timer period 2		0	0	59	R/W
12238	**FRI_HOUR_ON_3** → Start of Friday hour timer period 3		17	0	23	R/W
12239	**FRI_MIN_ON_3** → Start of Friday minute timer period 3		0	0	59	R/W
12240	**FRI_HOUR_OFF_3** → End of Friday hour timer period 3		17	0	23	R/W
12241	**FRI_MIN_OFF_3** → End of Friday minute timer period 3		0	0	59	R/W
12242	**FRI_HOUR_ON_4** → Start of Friday hour timer period 4		21	0	23	R/W
12243	**FRI_MIN_ON_4** → Start of Friday minute timer period 4		0	0	59	R/W
12244	**FRI_HOUR_OFF_4** → End of Friday hour timer period 4		21	0	23	R/W
12245	**FRI_MIN_OFF_4** → End of Friday minute timer period 4		0	0	59	R/W
12246	**SAT_HOUR_ON_1** → Start of Saturday hour timer period 1		8	0	23	R/W
12247	**SAT_MIN_ON_1** → Start of Saturday minute timer period 1		0	0	59	R/W
12248	**SAT_HOUR_OFF_1** → End of Saturday hour timer period 1		17	0	23	R/W
12249	**SAT_MIN_OFF_1** → End of Saturday minute timer period 1		0	0	59	R/W
12250	**SAT_HOUR_ON_2** → Start of Saturday hour timer period 2		11	0	23	R/W
12251	**SAT_MIN_ON_2** → Start of Saturday minute timer period 2		0	0	59	R/W
12252	**SAT_HOUR_OFF_2** → End of Saturday hour timer period 2		11	0	23	R/W
12253	**SAT_MIN_OFF_2** → End of Saturday minute timer period 2		0	0	59	R/W
12254	**SAT_HOUR_ON_3** → Start of Saturday hour timer period 3		17	0	23	R/W
12255	**SAT_MIN_ON_3** → Start of Saturday minute timer period 3		0	0	59	R/W
12256	**SAT_HOUR_OFF_3** → End of Saturday hour timer period 3		17	0	23	R/W
12257	**SAT_MIN_OFF_3** → End of Saturday minute timer period 3		0	0	59	R/W
12258	**SAT_HOUR_ON_4** → Start of Saturday hour timer period 4		21	0	23	R/W
12259	**SAT_MIN_ON_4** → Start of Saturday minute timer period 4		0	0	59	R/W
12260	**SAT_HOUR_OFF_4** → End of Saturday hour timer period 4		21	0	23	R/W
12261	**SAT_MIN_OFF_4** → End of Saturday minute timer period 4		0	0	59	R/W

Address	Description	Par	Def	Min	Max	R/W
12262	**ADR_MOD_TYPEREG** -> 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	001	0	0	4	R/W
12263	**ADR_MOD_TYPESENSREG** -> Type of control sensor 0=control with remote room sensor of AHS2-0MM 1=control with internal room sensor of AHS2 or from supervisor 2=control with remote supply sensor of AHS2-0MM	002	0	0	2	R/W
12264	**ADR_MOD_TYPHEATINGCOIL** -> Type of heating battery 0=no heating battery 1=modulating electrical resistance 2=modulating valve 3=on/off electrical resistance 4=on/off valve 5=3-point valve	003	0	0	5	R/W
12265	**ADR_MOD_TYPCOOLINGCOIL** -> Type of cooling battery 0=no cooling battery 1=modulating valve 2=on/off valve 3=cooling modulating damper 4=3-point valve	004	0	0	4	R/W
12266	**ADR_MOD_TYPPOSTHEATINGCOIL** -> 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	005	0	0	4	R/W
12267	**ADR_MOD_FUNCPOSTHEATINGCOIL** -> Post-heating battery operation 0=post-heating 1=integration and post-heating 2=additional heating battery	006	0	0	2	R/W
12268	**ADR_MOD_TYPHUMIDIFIER** -> Type of humidifier battery 0=no humidifier battery 1=modulating 2=on/off	007	0	0	2	R/W
12269	**ADR_MOD_TYPDEHUMIDIFIER** -> Type of dehumidifier battery 0=cooling battery 1=modulating 2=on/off	008	0	0	2	R/W
12270	**ADR_MOD_TYPVENTILATOR** -> Type of ventilator 0=ventilator not handled 1=single-speed on/off ventilator 2=two-speed on/off ventilator 3=three-speed on/off ventilator 4=modulating ventilator 5=ventilator present but not controlled	009	0	0	5	R/W
12271	**ADR_MOD_REGVENTILATOR** -> Type of ventilator control 0=manual selectable between speed 0 (on/off vent.), speed 1, speed 2, speed3 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) (modulating ventilator only) 6=regulation based on pressure/flow rate (reverse action) (modulating ventilator only) 7=regulation based on dehumidification (modulating ventilator only) 8=manual selectable in % linearly between speed 1 and 3 (modulating ventilator only)	010	0	0	8	R/W
12272	**ADR_MOD_TYPSENSORFORVENTILATOR** -> Type sensor for temperature regulation of ventilator (used only if 010=2,3,4) 0=room or return sensor 1=supply sensor	011	0	0	1	R/W
12273	**ADR_MOD_TYPDAMPER** -> 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)	012	0	0	5	R/W

Address	Description	Par	Def	Min	Max	R/W
12274	**ADR_MOD_REGDAMPER** -> Damper action 0=CO_2 1=free cooling/heating 2=free cooling/heating, CO_2 3=dehumidification 4=cooling 5=cooling, CO_2	013	1	0	5	R/W
12275	**ADR_MOD_TYPHEATEXCHANGER** -> 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	014	0	0	4	R/W
12276	**ADR_MOD_TYPHEATPUMP** -> Type heat pump 0=no heat pump 1=heat pump with reverse valve acitvated in cooling 2=heat pump with reverse valve acitvated in heating	015	0	0	2	R/W
12277	**ADR_MOD_ACTIVEHALFSEASON** -> Activation of mid-season operation 0=not enabled 1=enabled	016	0	0	1	R/W
12278	**ADR_MOD_DIGINPUT1FUNC** -> 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 (INPUT ON = economy activated) 5=frost protection (INPUT ON=frost protection alarm) 6=generic alarm (INPUT ON=generic alarm) 7=condensation contact (INPUT ON=condensation alarm) 8=generic filter contact (INPUT ON=generic filter alarm) 9=supply filter contact (INPUT ON=supply filter alarm) 10=extractor filter contact (INPUT ON=extractor filter alarm) 11=stop all alarm contact (INPUT ON=stop all alarm) 12=ventilator alarm contact (INPUT ON=ventilator alarm) 13=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm) 14=electric heater over temperature contact (INPUT ON=over temperature alarm)	017	0	0	14	R/W
12279	**ADR_MOD_DIGINPUT1LOG** -> Digital input 1 contact logic 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	018	0	0	1	R/W
12280	**ADR_MOD_DIGINPUT2FUNC** -> 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 (INPUT ON = economy activated) 5=frost protection (INPUT ON=frost protection alarm) 6=generic alarm (INPUT ON=generic alarm) 7=condensation contact (INPUT ON=condensation alarm) 8=generic filter contact (INPUT ON=generic filter alarm) 9=supply filter contact (INPUT ON=supply filter alarm) 10=extractor filter contact (INPUT ON=extractor filter alarm) 11=stop all alarm contact (INPUT ON=stop all alarm) 12=ventilator alarm contact (INPUT ON=ventilator alarm) 13=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm) 14=electric heater over temperature contact (INPUT ON=over temperature alarm)	019	0	0	14	R/W
12281	**ADR_MOD_DIGINPUT2LOG** -> Digital input 2 contact logic 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	020	0	0	1	R/W

Address	Description	Par	Def	Min	Max	R/W
12282	**ADR_MOD_ANAINPUT1FUNC** -> Analogue input 1 function 0=not used 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 5=antifreeze heating battery sensor 6=remote setpoint variator (with SAP-NTC-02-2-EV) 7=season change remote contact (INPUT ON=winter, INPUT OFF=summer) 8=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 9=non-occupied/holiday (INPUT ON=occupied) 10=economy (INPUT ON=economy activated) 11=frost protection (INPUT ON= frost protection alarm) 12=generic alarm (INPUT ON=generic alarm) 13=condensation contact (INPUT ON=condensation alarm) 14=generic filter contact (INPUT ON=generic filter alarm) 15=supply filter contact (INPUT ON=supply filter alarm) 16=extract filter contact (INPUT ON=extract filter alarm) 17=stop all alarm contact (INPUT ON=stop all alarm) 18=ventilator alarm contact (INPUT ON=ventilator alarm) 19=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm) 20=electric heater over temperature contact (INPUT ON=over temperature alarm)	021	0	0	20	R/W
12283	**ADR_MOD_ANAINPUT1LOG** -> Logic for analogue input 1 (only with 021=7 to 20): 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	022	0	0	1	R/W
12284	**ADR_MOD_ANAINPUT2FUNC** -> Analogue input 2 function 0=not used 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 5=antifreeze heating battery sensor 6=remote setpoint variator (with SAP-NTC-02-2-EV) 7=season change remote contact (INPUT ON=winter, INPUT OFF=summer) 8=remote On/Off (INPUT ON=OFF, INPUT OFF=ON) 9=non-occupied/holiday (INPUT ON=occupied) 10=economy (INPUT ON=economy activated) 11=frost protection (INPUT ON= frost protection alarm) 12=generic alarm (INPUT ON=generic alarm) 13=condensation contact (INPUT ON=condensation alarm) 14=generic filter contact (INPUT ON=generic filter alarm) 15=supply filter contact (INPUT ON=supply filter alarm) 16=extract filter contact (INPUT ON=extract filter alarm) 17=stop all alarm contact (INPUT ON=stop all alarm) 18=ventilator alarm contact (INPUT ON=ventilator alarm) 19=frost protection heat exchanger contact (INPUT ON=frost protection heat exchanger alarm) 20=electric heater over temperature contact (INPUT ON=over temperature alarm)	023	0	0	20	R/W
12285	**ADR_MOD_ANAINPUT2LOG** -> Logic for analogue input 2 (only with 023=7 to 20) 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	024	0	0	1	R/W

Address	Description	Par	Def	Min	Max	R/W
12286	**ADR_MOD_DIGOUTPUT1FUNC** -> Digital output function 1 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 22=3-point heating valve: open 23=3-point heating valve: close 24=3-point cooling valve: open 25=3-point cooling valve: close 26=3-point heating/cooling valve: open 27=3-point heating/cooling valve: close 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode	025	0	0	30	R/W
12287	**ADR_MOD_DIGOUTPUT2FUNC** -> Digital output function 2 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 22=3-point heating valve: open 23=3-point heating valve: close 24=3-point cooling valve: open 25=3-point cooling valve: close 26=3-point heating/cooling valve: open 27=3-point heating/cooling valve: close 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode	026	0	0	30	R/W

Address	Description	Par	Def	Min	Max	R/W
12288	**ADR_MOD_DIGOUTPUT3FUNC** -> Digital output function 3 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 22=3-point heating valve: open 23=3-point heating valve: close 24=3-point cooling valve: open 25=3-point cooling valve: close 26=3-point heating/cooling valve: open 27=3-point heating/cooling valve: close 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode	027	0	0	30	R/W
12289	**ADR_MOD_DIGOUTPUT4FUNC** -> Digital output function 4 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode	028	0	0	30	R/W

Address	Description	Par	Def	Min	Max	R/W
12290	**ADR_MOD_DIGOUTPUT5FUNC** -> Digital output function 5 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 22=3-point heating valve: open 23=3-point heating valve: close 24=3-point cooling valve: open 25=3-point cooling valve: close 26=3-point heating/cooling valve: open 27=3-point heating/cooling valve: close 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode	029	0	0	30	R/W
12291	**ADR_MOD_DIGOUTPUT6FUNC** -> Digital output function 6 0=not used 1=speed 1 for on/off ventilator 2=speed 2 for on/off ventilator 3=speed 3 for on/off ventilator 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=ventilator 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 22=3-point heating valve: open 23=3-point heating valve: close 24=3-point cooling valve: open 25=3-point cooling valve: close 26=3-point heating/cooling valve: open 27=3-point heating/cooling valve: close 28=compressor 29=reverse valve in cooling mode 30=reverse valve in heating mode	030	0	0	30	R/W
12292	**ADR_MOD_ANAOUTPUTFUNC1** -> Analogue output function 1 0=not used 1=supply ventilator output 2=extractor ventilator 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 14=6-way valve	031	0	0	14	R/W

Address	Description	Par	Def	Min	Max	R/W
12293	**ADR_MOD_ANAOUTPUTFUNC2** -> Analogue output function 2 0=not used 1=supply ventilator output 2=extractor ventilator 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 14=6-way valve	032	0	0	14	R/W
12294	**ADR_MOD_ANAOUTPUTFUNC3** -> Analogue output function 3 0=not used 1=supply ventilator output 2=extractor ventilator 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 14=6-way valve	033	0	0	14	R/W
12295	**ADR_MOD_PRESENCETRASM1** -> Presence Modbus transmitter 1 0=not present 1=type TTUA-M room version / TCM1001 duct version (temperature, humidity) 2=type TCO2A-M room version / TCM0101 duct version (temperature, CO_2 transmitter) 3=type TCO2AU-M room version / TCM1101 duct version (temperature, humidity, CO_2) 4=type TPDA25C (differential pressure transmitter)	034	0	0	4	R/W
12296	**ADR_MOD_FUNCTEMPTRASM1** -> Function of temperature transmitter 1 when transmitter 1 include temperature measurement 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 5=antifreeze heating battery sensor	035	1	1	5	R/W
12297	**ADR_MOD_PRESENCETRASM2** -> Presence Modbus transmitter 2 0=not present 1=type TTUA-M room version / TCM1001 duct version (temperature, humidity) 2=type TCO2A-M room version / TCM0101 duct version (temperature, CO_2 transmitter) 3=type TCO2AU-M room version / TCM1101 duct version (temperature, humidity, CO_2) 4=type TPDA25C (differential pressure transmitter)	036	0	0	4	R/W
12298	**ADR_MOD_FUNCTEMPTRASM2** -> Function of temperature transmitter 2 when transmitter 2 include temperature measurement 1=remote control sensor 2=supply sensor 3=external sensor 4=frost protection heat exchanger sensor 5=antifreeze heating battery sensor	037	1	1	5	R/W
12299	**ADR_MOD_CORREMAI1** -> Correction of external temperature sensor **AI1** (K) (°C) multiplied x 10 The correction parameter 101 is added to the temperature reading of the external sensor **AI1**	101	0	-50	50	R/W
12300	**ADR_MOD_CORREMAI2** -> Correction of the temperature sensor **AI2** (K) (°C) multiplied x 10 The correction parameter 102 is added to the temperature reading of the external sensor **AI2**	102	0	-50	50	R/W
12301	**ADR_MOD_WEIGHTREMAISENS** -> Weighting (%) of the remote control sensor **AI1** in relation to the internal sensor (if 02 1=1) to create the control sensor. 103=0 → internal sensor used alone as control sensor 103=100 → sensor **AI1** used alone as control sensor 103=Y → sensor **AI1** and internal sensor used together to create the control sensor based on the following formula Treg=[Ti (100 - Y) + (TA1 x Y)] / 100 The **AI1** sensor must be configured as a remote control sensor; otherwise, the parameter 103 is not considered.	103	100	0	100	R/W

Address	Description	Par	Def	Min	Max	R/W
12302	**ADR_MOD_BASICHEATSET** -> Heating setpoint for regulation without compensation (°C) multiplied x 10	104	200	108x10	107x10	R/W
12303	**ADR_MOD_BASICCOOLSET** -> Cooling setpoint for regulation without compensation (°C) multiplied x 10	105	250	110x10	109x10	R/W
12304	**ADR_MOD_BASICSET4PIPE** -> Setpoint for 4-pipe regulation without offset (°C) multiplied x 10	106	210	108x10	107x10	R/W
12305	**ADR_MOD_LIMITUPSETHEAT** -> Maximum heating regulation setpoint value (°C) multiplied x 10 Sets an upper limit for setpoints 104 and 106	107	400	108x10	900	R/W
12306	**ADR_MOD_LIMITDOWNSETHEAT** -> Minimum heating regulation setpoint value (°C) multiplied x 10 Sets a lower limit for setpoints 104 and 106	108	60	60	107x10	R/W
12307	**ADR_MOD_LIMITUPSETCOOL** -> Maximum cooling regulation setpoint value (°C) multiplied x 10 Sets an upper limit for setpoints 105.	109	400	110x10	900	R/W
12308	**ADR_MOD_LIMITDOWNSETCOOL** -> Minimum cooling regulation setpoint value (°C) multiplied x 10 Sets a lower limit for setpoints 105.	110	60	60	109x10	R/W
12309	**ADR_MOD_PROPBANDHEAT** -> Heating regulation proportional band (K) (°C) multiplied x 10	111	20	10	200	R/W
12310	**ADR_MOD_INTEGRALTIMEHEAT** -> Integral time for regulation in heating mode(s). Parameter used to regulate the 0..10 V modulating valves If 112=0, the integral action is excluded.	112	0	0	999	R/W
12311	**ADR_MOD_PROPBANDCOOL** Cooling regulation proportional band (K) (°C) multiplied x 10	113	20	10	200	R/W
12312	**ADR_MOD_INTEGRALTIMECOOL** -> Integral time for regulation in cooling mode(s). Parameter used to regulate the 0..10 V modulating valves If 114=0, the integral action is excluded.	114	0	0	999	R/W
12313	**ADR_MOD_HYSTHEAT** -> Heating hysteresis for on/off output (°C) multiplied x 10	115	10	5	20	R/W
12314	**ADR_MOD_ HYSTCOOL** -> Cooling hysteresis for on/off output (°C) multiplied x 10	116	10	5	20	R/W
12315	**ADR_MOD_PROPBANDMAND** -> Proportional band for calculation of supply setpoint in cascade control mode (K) (°C) multiplied x 10	117	200	10	500	R/W
12316	**ADR_MOD_INTEGRALTIMEMAND** -> Integral time(s) for calculation of supply setpoint in cascade regulation mode If 118=0, the integral action is excluded.	118	0	0	999	R/W
12317	**ADR_MOD_ECOSETADJUST** -> Economy offset (K) (°C) multiplied x 10 In economy mode, the cooling setpoint is increased by 119 In economy mode, the heating setpoint is reduced by 119 Example: 119=3 -> economy mode bH5=20 - 119=17°C bC5=25 + 119=28°C	119	30	0	120	R/W
12318	**ADR_MOD_ HOLSETADJUST** -> Offset mode for “non-occupied/holiday” operation (K) (°C) multiplied x 10 In the “non-occupied/holiday” mode, the cooling setpoint is increased by 120 In the “non-occupied/holiday” mode, the heating setpoint is reduced by 120 Example: 120=5 bH5=20 - 120=15°C bC5=25 + 120=30°C	120	50	0	140	R/W
12319	**ADR_MOD_DEADZONE** -> Neutral zone for 4-pipe systems (K) (°C) multiplied x 10	121	10	5	50	
12320	**ADR_MOD_DIFFINSERTHALFSEASON** -> Differential addition of heating in summer season (mid-season) (K) (°C) multiplied x 10	122	30	5	100	
12321	**ADR_MOD_ABIL_LIM_MAND_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 cooling and heating modes	123	0	0	3	R/W
12322	**ADR_MOD_SET_LIM_MAND_LOW** -> Minimum low supply limit setpoint (°C) multiplied x 10	124	100	60	126x10	R/W
12323	**ADR_MOD_ABIL_LIM_MAND_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 cooling and heating modes	125	0	0	3	R/W
12324	**ADR_MOD_SET_LIM_MAND_HIGH** -> High supply limit setpoint (°C) multiplied x 10	126	300	124x10	500	R/W
12325	**ADR_MOD_PROPBANDLIMMAND** -> Limit proportional band (K) (°C) multiplied x 10	127	20	10	500	R/W

Address	Description	Par	Def	Min	Max	R/W
12326	**ADR_MOD_INTEGRALTIMELIMITMAND** -> Limit integral time (s). Parameter used if 123≠0 or 125≠0 If 128=0 limit integral time is excluded.	128	0	0	999	R/W
12327	**ADR_MOD_DIFFERENTIAL_INTEG_RES** -> Differential insertion post-heating stage (°C) multiplied x 10	129	0	0	100	R/W
12328	**ADR_MOD_ABILCOMP** -> Activation of compensation for operations with 001=1 or 4 0=not enabled 1=enabled in cooling mode 2=enabled in heating mode 3=enabled in cooling and heating modes	130	0	0	3	R/W
12329	**ADR_MOD_TEXT_MIN_COMP_HEAT** -> Minimum external temperature for winter compensation (°C) multiplied x 10	131	-100	-100	132x10	R/W
12330	**ADR_MOD_TEXT_MAX_COMP_HEAT** -> Maximum external temperature for winter compensation (°C) multiplied x 10	132	200	131x10	500	R/W
12331	**ADR_MOD_SET_TEXT_MIN_COMP_HEAT** -> Compensated setpoint corresponding to the minimum external temperature for winter compensation 131 (°C) multiplied x 10	133	600	50	800	R/W
12332	**ADR_MOD_SET_TEXT_MAX_COMP_HEAT** -> Compensated setpoint corresponding to the maximum external temperature for winter compensation 132 (°C) multiplied x 10	134	300	50	800	R/W
12333	**ADR_MOD_TEXT_MIN_COMP_COOL** -> Minimum external temperature for summer compensation (°C) multiplied x 10	135	220	-100	136x10	R/W
12334	**ADR_MOD_TEXT_MAX_COMP_COOL** -> Maximum external temperature for summer compensation (°C) multiplied x 10	136	350	135x10	500	R/W
12335	**ADR_MOD_SET_TEXT_MIN_COMP_COOL** -> Compensated setpoint corresponding to the minimum external temperature for summer compensation 135 (°C) multiplied x 10	137	190	50	800	R/W
12336	**ADR_MOD_SET_TEXT_MAX_COMP_COOL** -> Compensated setpoint corresponding to the maximum external temperature for summer compensation 136 (°C) multiplied x 10	138	160	50	800	R/W
12337	**ADR_MOD_ABIL_DEHUMIDIFICATION** -> Dehumidification activation (see *"19. Dehumidification" page 45*) 0=not enabled 1=enabled with built-in humidity sensor of AHS2 2=enabled with remote humidity sensor of transmitter 1 3=enabled with remote humidity sensor of transmitter 2 4=enabled with built-in humidity sensor of AHS2 in cooling mode 5=enabled with remote humidity sensor of transmitter 1 in cooling mode 6=enabled with remote humidity sensor of transmitter 2 in cooling mode	139	0	0	6	R/W
12338	**ADR_MOD_ABIL_HUMIDIFICATION** -> Humidification activation (see *"20. Humidification" page 48*) 0=not enabled 1=enabled with built-in humidity sensor of AHS2 2=enabled with remote humidity sensor of transmitter 1 3=enabled with remote humidity sensor of transmitter 2 4=enabled with built-in humidity sensor of AHS2 in heating mode 5=enabled with remote humidity sensor of transmitter 1 in heating mode 6=enabled with remote humidity sensor of transmitter 2 in heating mode	140	0	0	6	R/W
12339	**ADR_MOD_DEAD_ZONE_HUM_DEHUM** -> Humidity neutral zone (%r.h.) multiplied x 10	141	60	40	200	R/W
12340	**ADR_MOD_SET_HUM** -> Humidity setpoint (%r.h.) multiplied x 10	142	500	50	1000	R/W
12341	**ADR_MOD_PROPBAND_HUM** -> Humidity proportional band (%r.h.) multiplied x 10	143	50	20	1000	R/W
12342	**ADR_MOD_INTEGRALTIME_HUM** -> 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.	144	0	0	999	R/W
12343	**ADR_MOD_ABIL_LIM_MAND_MIN_HUM** -> Activation of minimum humidity supply limit 0=not enabled 1=enabled with transmitter 1 2=enabled with transmitter 2	145	0	0	2	R/W
12344	**ADR_MOD_SET_MAND_MIN_HUM** -> Lower humidity supply setpoint limit (%r.h.) multiplied x 10	146	200	100	500	R/W
12345	**ADR_MOD_ABIL_LIM_MAND_MAX_HUM** -> Activation of maximum humidity supply limit 0=not enabled 1=enabled with transmitter 1 2=enabled with transmitter 2	147	0	0	2	R/W
12346	**ADR_MOD_SET_MAND_MAX_HUM** -> Higher humidity supply setpoint limit (%r.h.) multiplied x 10	148	750	500	900	R/W
12347	**ADR_MOD_PROP_BAND_LIM_HUM** -> Proportional band of humidity limit (%r.h.) multiplied x 10	149	50	30	300	R/W
12348	**ADR_MOD_SUPPLY_VENTILATOR_EC_MINVOLT** -> Minimum voltage of supply ventilator multiplied x 10	150	0	0	151x10	R/W

Address	Description	Par	Def	Min	Max	R/W
12349	**ADR_MOD_SUPPLY_VENTILATOR_EC_MAXVOLT** -> Maximum voltage of supply ventilator multiplied x 10	151	100	150x10	100	R/W
12350	**ADR_MOD_EXTRACT_VENTILATOR_EC_MINVOLT** -> Minimum voltage of extractor ventilator multiplied x 10	152	0	0	153x10	R/W
12351	**ADR_MOD_EXTRACT_VENTILATOR_EC_MAXVOLT** -> Maximum voltage of extractor ventilator multiplied x 10	153	100	152x10	100	R/W
12352	**ADR_MOD_SPEEDVENTILATOREC1** -> Speed 1 of the modulating ventilators: - percentage of the range (151 - 150) for the supply ventilator, - percentage of the range (153 - 152) for the extractor ventilator.	154	10	0	100	R/W
12353	**ADR_MOD_SPEEDVENTILATOREC2** -> Speed 2 of the modulating ventilators: - percentage of the range (151 - 150) for the supply ventilator, - percentage of the range (153 - 152) for the extractor ventilator.	155	65	0	100	R/W
12354	**ADR_MOD_SPEEDVENTILATOREC3** -> Speed 3 of the modulating ventilators: - percentage of the range (151 - 150) for the supply ventilator, - percentage of the range (153 - 152) for the extractor ventilator.	156	100	0	100	R/W
12355	**ADR_MOD_HYST_VENTILATOR** -> Ventilator hysteresis (with ventilator control in temperature) (°C) multiplied x 10	157	10	10	50	R/W
12356	**ADR_MOD_EC_VENTILATOR_SWITCH** -> Step activation of the modulating ventilators:	158	10	0	100	R/W
12357	**ADR_MOD_REG_START_DELAY** -> 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 ventilators begins..	159	0	0	600	R/W
12358	**ADR_MOD_STOP_VENTILATOR_DELAY** -> Ventilation off delay(s) Defines the minimum delay for maintaining operation of the ventilator after deactivation of the control of the valves and/or heating elements.	160	30	0	600	R/W
12359	**ADR_MOD_SET_DIFF_PRESSURE** -> Pressure (Pa)/flow constant (m^3/h) setpoint	161	1000	0	5000	R/W
12360	**ADR_MOD_PROPBAND_DIFF_PRESSURE** -> Proportional band for pressure (Pa)/flow constant (m^3/h)	162	300	1	5000	R/W
12361	**ADR_MOD_INTEGRALTIME_DIFF_PRESSURE** -> Integral time for pressure regulation (s). If 163=0, the integral action is excluded.	163	0	0	1000	R/W
12362	**ADR_MOD_MIN_DAMPER_OPEN_POS** -> Minimum opening of modulating damper (%)	164	10	0	165	R/W
12363	**ADR_MOD_MAX_DAMPER_OPEN_POS** -> Maximum modulating damper opening (%)	165	100	164	100	R/W
12364	**ADR_MOD_DAMPER_STOP_DELAY** -> Damper off delay (s)	166	0	0	600	R/W
12365	**ADR_MOD_SET_CO2** -> CO_2 Air change setpoint (ppm)	167	1000	0	2000	R/W
12366	**ADR_MOD_PROPBAND_CO2** -> CO_2 proportional band (ppm)	168	200	50	2000	R/W
12367	**ADR_MOD_INTEGRALTIME_CO2** -> CO_2 integral time(s). If 169=0, the integral action is excluded.	169	0	0	999	R/W
12368	**ADR_MOD_ABIL_FREE_C_H** -> 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	170	0	0	6	R/W
12369	**ADR_MOD_SET_FREE_C_H** -> Differential setpoint for free cooling/heating (K) (°C) multiplied x 10	171	40	4	100	R/W
12370	**ADR_MOD_DIFF_FREE_C_H** -> Free cooling/heating proportional band (K) (°C) multiplied x 10	172	20	4	100	R/W
12371	**ADR_MOD_HYST_FREE_C_H** -> Hysteresis for regulation free heating/cooling (K) (°C) multiplied x 10	173	10	5	100	R/W
12372	**ADR_MOD_DIFF_FREE_C_MAX** -> Differential setpoint for free cooling/heating max (K) (°C) multiplied x 10. Defines the temperature difference between the external temperature and the control temperature, beyond which the free cooling/heating, if active, is shut down	174	100	50	200	R/W
12373	**ADR_MOD_TEXT_MIN_FOR_FREE_COOLING** -> Minimum external temperature for free cooling (°C) multiplied x 10. The external temperature must be greater than or equal to this value in order for free cooling to be available for activation.	175	170	100	200	R/W
12374	**ADR_MOD_TREG_MIN_FOR_FREE_COOLING**-> Minimum control temperature for free cooling (°C) multiplied x 10. The control temperature must be greater than or equal to this value for free cooling to be available for activation.	176	220	150	300	
12375	**ADR_MOD_TEXT_MAX_FOR_FREE_HEATING** -> Maximum external temperature for free heating (°C) multiplied x 10. The external temperature must be less than or equal to this value for free heating to be available for activation.	177	280	200	350	R/W

Address	Description	Par	Def	Min	Max	R/W
12376	**ADR_MOD_TREG_MAX_FOR_FREE_HEATING** -> Maximum control temperature for free heating (°C) multiplied x 10. The control temperature must be less than or equal to this value for free heating to be available for activation.	178	330	200	350	R/W
12377	**ADR_MOD_SET_POST_HEAT** -> Post-heating setpoint (K) (°C) multiplied x 10	179	240	50	500	R/W
12378	**ADR_MOD_HYST_POST_HEAT** -> Post-heating proportional band or hysteresis (K) (°C) multiplied x 10. Defines the hysteresis or proportional band for the on/off or modulating post-heating battery respectively	180	20	5	50	R/W
12379	**ADR_MOD_INTEGRAL_TIME_REG_POST** -> Integral time post-heating (s). Parameter used if post-heating is modulating type. If 181=0 integral action is excluded.	181	0	0	999	R/W
12380	**ADR_MOD_SET_DELTA_RECOVERY** -> Differential setpoint for heat recovery (K) (°C) multiplied x 10	182	20	5	100	R/W
12381	**ADR_MOD_DIFF_RECOVERY** -> Hysteresis for heat exchanger (K) (°C) multiplied x 10	183	5	5	182x10	R/W
12382	**ADR_MOD_SPEED_MIN_ROTATIVE_EXCHANGER** -> Minimum speed of modulating rotary heat exchanger (%)	184	0	0	185	R/W
12383	**ADR_MOD_SPEED_MAX_ROTATIVE_EXCHANGER** -> Maximum speed of modulating rotary heat exchanger (%)	185	100	184	100	R/W
12384	**ADR_MOD_ANTIFROST_EXCHANGER_SET** -> Frost protection heat exchanger setpoint (°C) multiplied x 10	186	50	40	100	R/W
12385	**ADR_MOD_ACTION_ANTIFROST_EXCHANGER** -> Frost protection heat exchanger action 0=reduction of the supply ventilator speed 1=bypass of the heat exchanger 2=activation of pre-heating electrical resistance of the heat exchanger 3=reduction of the supply ventilator speed and bypass of the heat exchanger 4=reduction of the supply ventilator speed and activation of pre-heating electrical resistance of the heat exchanger	187	0	0	4	R/W
12386	**ADR_MOD_REDUCTION_SUPPLY_SPEED** -> Percentage reduction of the supply ventilator speed relative to the extractor ventilator (%)	188	10	0	100	R/W
12387	**ADR_MOD_ABIL_ANTIFROST** -> Activation of the heat frost protection battery 0=not enabled 1=enabled with remote contact 2=enabled with antifreeze heating battery sensor 3=enabled with remote control sensor 4=enabled with supply sensor	189	0	0	4	R/W
12388	**ADR_MOD_ANTIFROST_SET** -> Setpoint of the frost protection heat battery (°C) multiplied x 10	190	50	40	100	R/W
12389	**ADR_MOD_HYST_ANTIFROST** -> Frost protection heat battery or heat exchanger hysteresis (K) (°C) multiplied x 10	191	20	20	100	R/W
12390	**ADR_MOD_POS_COOLING_VALVE_FROST** -> Percentage of cooling valve opening in case of frost protection heat battery (%)	192	0	0	100	R/W
12391	**ADR_MOD_MAXHOURSVENTILOPERATING** -> Maximum ventilator run time before filter is considered dirty (hours) 0=function not used X=maximum number of on/off or modulating supply ventilator operating hours before a warning appears on the display.	193	0	0	9990	R/W
12392	**ADR_MOD_MAXOFFSETRANGE** -> Setpoint offset range applied in the comfort function (K) (°C) multiplied x 10. Defines how much the setpoint can be varied in the comfort function	194	30	0	100	R/W
12393	**ADR_MOD_LIMIT_SPEED_MAN** -> Manual speed limit. In case of activation of electrical resistance, if the percentage power applied to the electrical resistance exceeds the parameter 195. the speed of the ventilator increases by the same percentage.	195	50	15	100	R/W
12394	**ADR_MOD_PRIORITY_TEMP_HUM** -> Temperature/humidity control priority 0=temperature priority 1=humidity priority	196	0	0	1	R/W
12395	**ADR_MOD_FLOW_RATE_COEF** -> Flow rate coefficient k 0=control in constant pressure otherwise control in constant flow rate	197	0	0	1000	R/W
12396	**ADR_MOD_DELAY_ALARM_LIMIT** -> Delay alarm limit If temperature limit is reached (with 123≠0 or 125≠0) alarm of limit is activated after delay alarm limit	198	0	0	600	R/W
12397	**ADR_MOD_DELAY_ALARM** -> Delay other alarms Used only for alarms of category 1 (see *"36. Alarms" page 122*)	199	0	0	600	R/W

Address	Description	Par	Def	Min	Max	R/W
12398	**ADR_MOD_ABIL_MANUAL_RESET_ALARM** -> Authorization manual reset alarms of category 2 Value = (8 x b3) + (4 x b2) + (2 x b1) + b0 b0 = reset stop all alarm authorized if b0=1, not authorized if b0=0 b1 = reset generic alarm authorized if b1=1, not authorized if b1=0 b2 = reset ventilator 's alarm authorized if b2=1, not authorized if b2=0 b3 = reset electric heater overtemp. alarm authorized if b3=1, not authorized if b3=0	200	0	0	15	R/W
12399	**ADR_MOD_XBAND_VOLT_1** -> Low limit band 1 of regulation for 6-way valve (V) multiplied x 10	201	0	0	202x10	R/W
12400	**ADR_MOD_XBAND_VOLT_2** -> High limit band 1 of regulation for 6-way valve (V) multiplied x 10	202	40	201x10	203x10	R/W
12401	**ADR_MOD_XBAND_VOLT_3** -> Low limit band 2 of regulation for 6-way valve (V) multiplied x 10	203	60	202x10	204x10	R/W
12402	**ADR_MOD_XBAND_VOLT_4** -> High limit band 2 of regulation for 6-way valve (V) multiplied x 10	204	100	203x10	100	R/W
12403	**ADR_MOD_FIRST_BAND_REG_6WAY_VALVE** -> Regulation type selection for band 1 of 6-way valve 0=heating 1=cooling	205	0	0	1	R/W
12404	**ADR_MOD_HYST_REG_6WAY_VALVE** -> Hysteresis 6-way valve (V) multiplied x 10	206	5	0	20	R/W
12405	**ADR_MOD_TIMEVALVE3POINTS** -> Stroke time 3-point valve (s)	207	60	30	180	R/W
12406	**ADR_MOD_TIME_COMPRESSOR** -> Delay between two successive activation of heat pump compressor (s)	208	60	0	900	R/W
12407	**ADR_MOD_CANCELHOURSFVENTILATOR** -> Reset hour counter for ventilator operation The operating hours of the ventilator are stored. When they exceed the value 193, the icon appears. To cancel the counter, set 209=1. The parameter 209 automatically returns to 0 after reset	209	0	0	1	R/W
12408	**ADR_MOD_MODBUS_DIGINPUT1FUNC_AHS2** → Digital input 1 function of AHS2: 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 (INPUT ON = economy activated)	301	0	0	4	R/W
12409	**ADR_MOD_MODBUS_DIGINPUT1LOG_AHS2** → Digital input 1 contact logic of AHS2: 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	302	0	0	1	R/W
12410	**ADR_MOD_MODBUS_DIGINPUT2FUNC_AHS2** → Digital input 2 function of AHS2: 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 (INPUT ON = economy activated)	303	0	0	4	R/W
12411	**ADR_MOD_MODBUS_DIGINPUT2LOG_AHS2** → Digital input 2 contact logic of AHS2: 0=normally open (open = INPUT OFF, closed = INPUT ON) 1=normally closed (closed = INPUT OFF, open = INPUT ON)	304	0	0	1	R/W
12412	**ADR_MOD_MODBUS_VISU_TYPE_FIRST_DISP_AHS2** → Value displayed on display A of AHS2 0=temperature of internal sensor of AHS2 1=humidity of internal sensor of AHS2 2=temperature remote sensor **AI1** of AHS2-0MM 3=temperature remote sensor **AI2** of AHS2-0MM 4=operating temperature 5=working setpoint 6=supply setpoint calculated in cascade control mode 7=working post heating setpoint 8=temperature of transmitter 1 9=humidity of transmitter 1 8=temperature of transmitter 2 9=humidity of transmitter 2	305	4	0	11	R/W

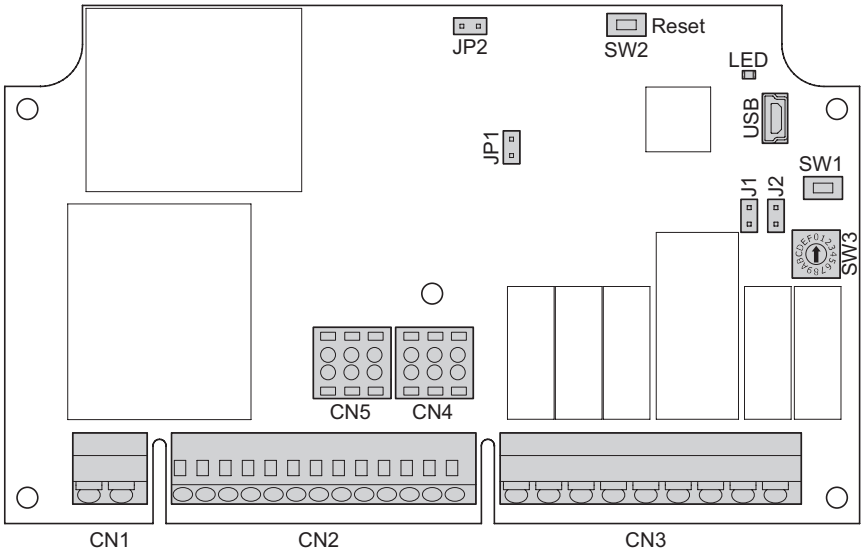
Address	Description	Par	Def	Min	Max	R/W
12413	**ADR_MOD_MODBUS_VISU_TYPE_SECOND_DISP** → Value displayed on display B of AHS2 0=temperature of internal sensor of AHS2 1=humidity of internal sensor of AHS2 2=temperature remote sensor **AI1** of AHS2-0MM 3=temperature remote sensor **AI2** of AHS2-0MM 4=operating temperature 5=working setpoint 6=supply setpoint calculated in cascade control mode 7=working post heating setpoint 8=temperature of transmitter 1 9=humidity of transmitter 1 10=temperature of transmitter 2 11=humidity of transmitter 2 12=current hour:minutes 13=CO_2 of transmitter 1 14=pressure of transmitter 1 15=CO_2 of transmitter 2 16=pressure of transmitter 2 17=total hours of ventilator operation 18=flow rate 19=display B off	306	5	0	19	R/W
12414	**ADR_MOD_MODBUS_FUNCTION_RIGHT_KEY** → MODE button functionality of AHS2 0=local change of season if a season change contact is not used. 1=timer extension. 2=operating mode (normal, with time bands or “non-occupied holiday”)	307	1	0	2	R/W
12415	**ADR_MOD_MODBUS_DAYLIGHT_SAVING_TIME** → Summertime change Determines whether summertime is used automatically 0=no automatic update of summertime change 1=automatic summertime change in Europe	308	1	0	1	R/W
12416	**ADR_MOD_MODBUS_TIME_TIMER_PROLUNG** → Duration of extension timer (minutes): With timer extension function activated • if 310=0, the operating setpoint does not consider the economy and holiday modes for the duration309 • if 310=1, the appliance remains switched on for the duration 309 regardless of the timer periods.	309	60	1	480	R/W
12417	**ADR_MOD_MODBUS_TIME_BAND_FUNC** → Timer periods function 0=timer periods for normal/economy operation 1=timer periods to switch on/off the appliance	310	0	0	1	R/W
12418	**ADR_MOD_MODBUS_COMFORT_FUNC** → 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 12*	311	0	0	1	R/W
12419	**ADR_MOD_MODBUS_PRIORITY_MAN_ON_OFF** → Manual switch-off priority 0=manual on/off not priority 1=manual on/off priority	312	0	0	1	R/W
12420	**ADR_MOD_MODBUS_CORINTTEMPSEMS** → Internal temperature correction (K) (°C) The correction parameter 313 is added to the temperature reading of the internal sensor	313	0	-5.0	5.0	R/W
12421	**ADR_MOD_MODBUS_CORINTHUMSEMS** → Measured internal humidity correction (%r.H) The correction parameter 314 is added to the humidity reading	314	0	-10.0	10.0	R/W
12422	**ADR_MOD_MODBUS_BAUDEXT_CN5** → Baud rate of external Modbus network (towards supervisor in CN5) 3=9600 bit/s 4=19200 bit/s 5=38400 bit/s	315	4	1	5	R/W
12423	**ADR_MOD_MODBUS_PARITYEXT_CN5** → External Modbus network parity (towards supervisor in CN5) 0=none 1=odd 2=even	316	2	0	2	R/W
12424	**ADR_MOD_MODBUS_ADDRESS_CN5** → Address of AHS2-0MM in the external Modbus network (towards supervisor in CN5). 1..247=valid address 248=not valid address	317	1	1	247	R/W
12425	**ADR_MOD_TYPEDISPLAY_AHS2** → Control mode of display 0 = AHS2 can only control setpoint, offset setpoint, speed, on/off and send internal temperature and humidity to AHS2-0MM connected. 1 = AHS2 can only control setpoint, offset setpoint, speed, on/off and does not send internal temperature and humidity to AHS2-0MM. 2=AHS2 visualizes the state of AHS2-0MM connected, it does not control any parameter	318	1	0	2	R/W

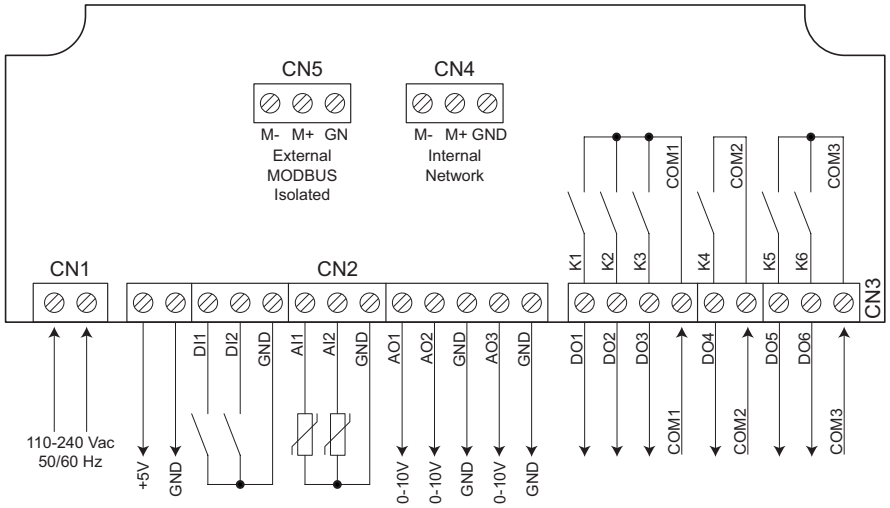
Address	Description	Par	Def	Min	Max	R/W
12426	**ADR_MOD_TIME_EXIT_PARAM_AHS2** → Time before exiting parameters setting when no key is pressed (s): During that time the backlight of display remains ON (s): This time is not applied when accessing quick access on AHS2 like keypad lock, global on/off, setpoint or offset sepoint, ventilator operating mode, function with MODE key.	319	120	4	240	R/W
12427	**ADR_MOD_LOCK_AHS2** → Lock keyboard of AHS2 0=keyboard not locked 1= keyboard locked			0	1	R/W
12428	**Reserved**					R/W
12429	**ADR_MOD_RESET_PARAM_TO_DEFAULT** → Set parameters to default values. Set this variable to 1 to reset parameters to their default values. After parameters are reset to their default values the variable returns to 0 automatically	r01		0	1	R/W
12430	**ADR_MOD_YEAR_CLOCK_AHS2_SET** → year to set of clock AHS2		2021	2021	2100	R/W
12431	**ADR_MOD_MONTH_CLOCK_AHS2_SET** → month to set of clock AHS2		1	1	12	R/W
12432	**ADR_MOD_DAY_CLOCK_AHS2_SET** → day to set of clock AHS2		1	1	31	R/W
12433	**ADR_MOD_HOUR_CLOCK_AHS2_SET** → time (hour) to set of clock AHS2		0	0	23	R/W
12434	**ADR_MOD_MIN_CLOCK_AHS2_SET** → time (min.) to set of clock AHS2		0	0	59	R/W
12435	**ADR_MOD_SET_CLOCK_AHS2** → Authorization to set clock of AHS2 To set clock from Modbus, set before year, month, day, hour, minute on variables from 12430 to 12434 then set this variable to 1. Automatically setting done are loaded on the clock of AHS2 and the variable returns to 0.		0	0	1	R/W
12436 to 12483	**Reserved addresses**					
12484	**ADR_MOD_STATUS_COMMUNICATION** → Status communication on internal network between AHS2-0MM slave and AHS2. 0=not considered (if AHS2-0MM is master unit on internal network and no AHS2 used) 1=messages are exchanged on internal network between AHS2-0MM and AHS2 2=no communication on internal network between AHS2-0MM and AHS2			0	2	R
12485	**ADR_MOD_SOFTWARE_VERSION** → Software version AHS2-0MM (single variable) if value=z the corresponding software version is 0.0.z if value=yz the corresponding software version is 0.y.z if value=xyz the corresponding software version is x.y.z	U04		0	999	R
12486	**ADR_MOD_UNIT** → Unit 0=°C (cannot be changed)			0	0	R
12487 to 12488	**Reserved addresses**					
12489	**ADR_MOD_READ_STATUS_CPT_TIMEOUT_COM_TRASM_1** → Communication timeout counter between AHS2-0MM master and transmitter 1	Ct1		0	9999	R
12490	**ADR_MOD_READ_STATUS_CPT_ERR_DATA_COM_TRASM_1** → Data error counter or incorrect addressing between AHS2-0MM master and transmitter 1	Cr1		0	9999	R
12491	**ADR_MOD_READ_STATUS_CPT_TIMEOUT_COM_TRASM_2** → Communication timeout counter between AHS2-0MM master and transmitter 2	Ct2		0	9999	R
12492	**ADR_MOD_READ_STATUS_CPT_ERR_DATA_COM_TRASM_2** → Data error counter or incorrect addressing between AHS2-0MM master and transmitter 2	Cr2		0	9999	R

49. Electrical connections

Installation and maintenance operations must be carried out by qualified personnel with no power supply to the appliance and with no external loads. AB Industrietechnik shall not be liable for any damage caused by improper installation and/or tampering with or removal of safety devices.

• AHS2-0MM unit connection





Terminal blocks:

Connector CN1:

power supply 110-240 Vac

Connector CN2:

+5V GND = power supply output for AHS2 unit
DI1 - **DI2** = digital inputs 1 and 2
AI1 - **AI2** = analogue inputs 1 and 2
AO1 - **AO2** - **AO3** = analogue outputs 1-3

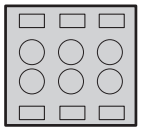
Connector CN3:

DO1 - **DO2** - **DO3** - **DO4** - **DO5 - DO6** = digital outputs 1-6
COM1 = common for digital outputs 1-3
COM2 = common for digital output 4
COM3 = common for digital outputs 5-6

Connector CN4:

M- / **M + GND** = internal communication network (twin connector)

IN
M- M+ GN

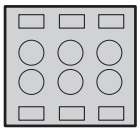


M- M+ GN
OUT

Connector CN5:

M- / **M + GN** = external Modbus network (twin connector)

IN
M- M+ GND



M- M+ GND
OUT

GND = common for digital inputs, analogue inputs, analogue outputs and internal communication network
GN = common for external Modbus network (to supervisor)

Note: The external Modbus network is isolated from the internal network. Consequently, GND and GN terminals are not connected to each other.

SW1 = key not used
SW2 = reset button
SW3 = rotary switch for selecting AHS2-0MM unit address in the external network (the chosen address must be between 1 and 15(F)) with J2 OFF.

LED =
- flashes during normal operation (1 flash/s) if the position of rotary switch SW3 is between 1 and 15.
- steady on (AHS2-0MM address error value 0 selected)

USB = USB connection port for software update

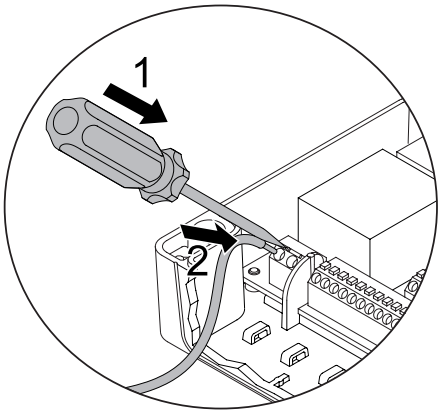
JP1 = Term. ON → 120 ohm internal network (to AHS2 unit) line termination resistance INSERTED.
JP1 = OFF → 120 ohm internal network (to AHS2 unit) line termination resistance NOT INSERTED.

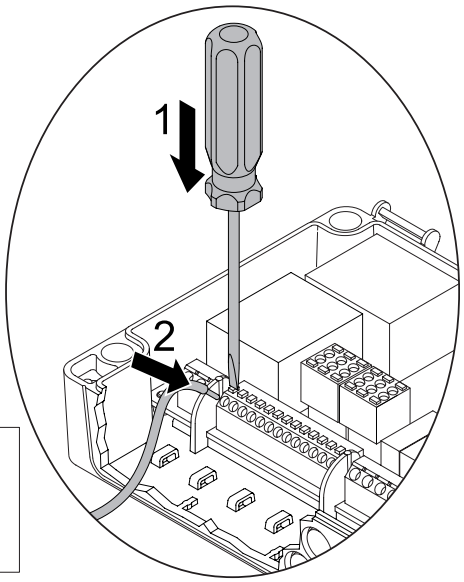
JP2 = Term. ON → 120 ohm external Modbus (to supervisor) line termination resistance INSERTED.
JP2 = OFF → 120 ohm resistance for external Modbus (to supervisor) line termination NOT INSERTED.

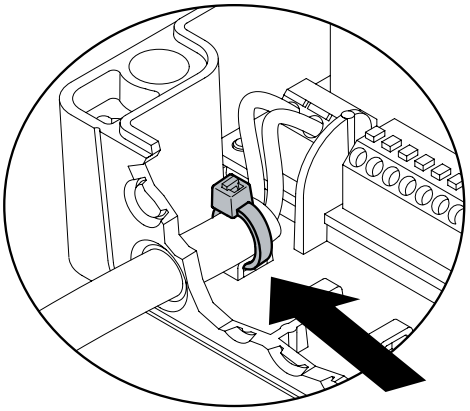
J1 = ON -> AHS2-0MM is the master for internal network. No AHS2 is connected and transmitter 1 and/or transmitter 2 is connected on internal network.
J1 = OFF -> AHS2-0MM is slave for internal network. AHS2 is connected on internal network

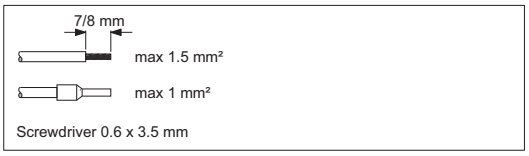
J2 = ON -> the address of AHS2-0MM master in the external network is variable **ADR_MOD_MODBUS_ADDRESS_CN5** (12424) corresponding to parameter 317
J2 = OFF -> the address of AHS2-0MM master in the external network is the address set on rotary switch SW3.

For setting parameters from Evolution tool, use Modbus communication on CN5 connector.



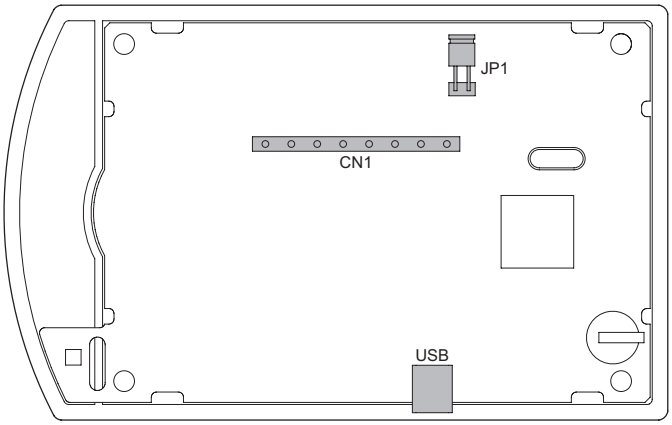


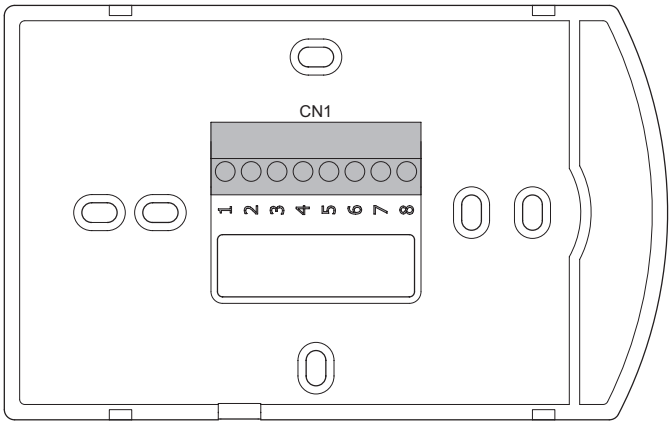


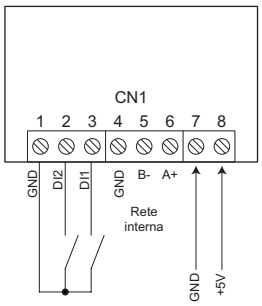


Note: use different cable ties to maintain cables together near connectors.
Twin connectors for CN4 and CN5 make connections easy for Modbus line.

• AHS2 unit connection







Terminal blocks:

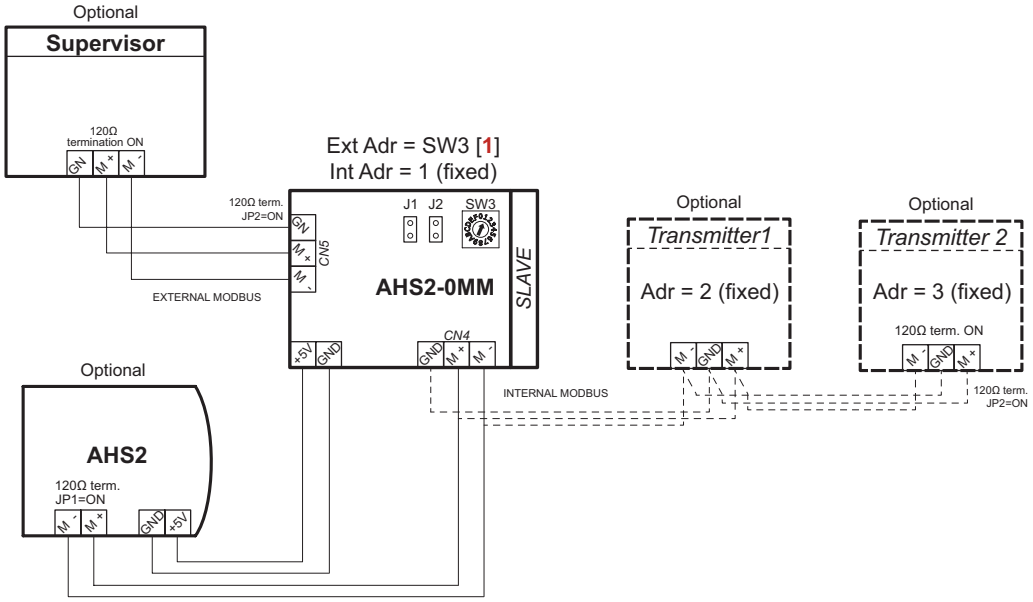
5V - GND=5 Vdc power supply supplied by AHS2-0MM unit.
DI1 - **DI2** =digital inputs 1 and 2
M + / **M -**=internal network
GND =common for digital inputs and internal network.

JP1=Term. ON → 120 ohm internal network line termination resistance INSERTED.
JP1=OFF → 120 ohm internal network line termination resistance NOT INSERTED.

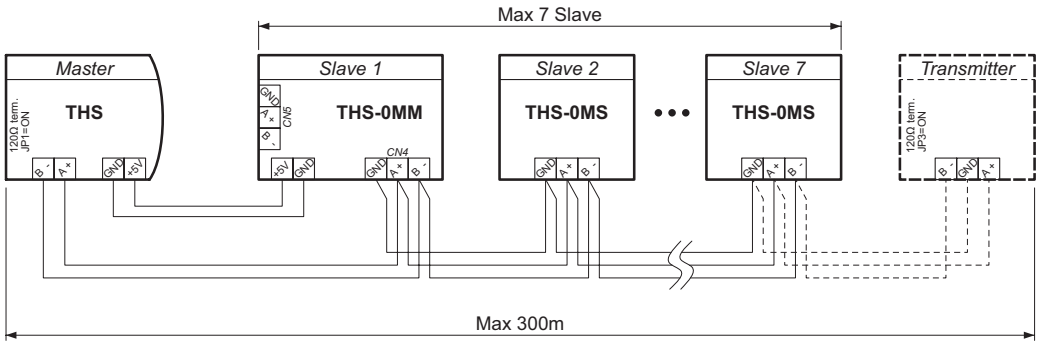
USB= Mini B **USB connection for software update and parameters setting of AHS2 only**.

50. Networks connection diagram

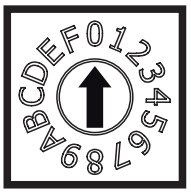
The internal Modbus network is used to connect AHS2-0MM to optional AHS2 display unit.and to one or two optional transmitters.
The presence of transmitter 1 depends on parameter 034, the transmitter 2 on parameter 036.
The minimum configuration of the internal network consists of a single AHS2-0MM slave.
The maximum configuration of the internal network consists of one AHS2-0MM slave connected to AHS2 display and 2 transmitters.
The communication parameters for transmitter 1 must be set to baud=9600 bit/s, partity=even, address=2.
The communication parameters for transmitter 2 must be set to baud=9600 bit/s, partity=even, address=3.
AHS2-0MM is ready for communicating on internal network with AHS2 display unit and transmitters, nothing has to be set.



The external Modbus network allows the connection of a supervisor to AHS2-0MM. Default communication parameters are baud rate 19200 bit/s and parity even.
Up to 246 AHS2-0MM units can be connected to supervisor (for every group of 31 AHS2-0MM a signal repeater must be added).
SW3 can be used to set address from 1 to 15. For higher address mount J2 and set address using parameter 317.
Parameter 317 can be set either by the AHS2 unit (with password 33) or by Modbus connecting a supervisor on CN5 and setting the variable **ADR_MOD_MODBUS_ADDRESS_CN5** (12424).
The baud rate and parity can only be changed for external Modbus network.
With AHS2 set parameters 315 for the baud rate, 316 for parity and exit parameters setting to transfert the new values to AHS2-0MM or by Modbus set the variables **ADR_MOD_MODBUS_BAUD_CN5** (12422) and **ADR_MOD_MODBUS_PARITY_CN5** (12423).

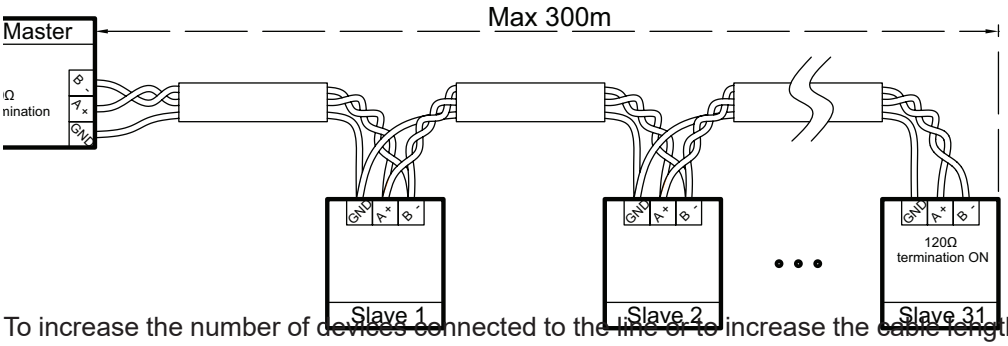


J2		OFF (Ext Adr = SW3)
J2		ON (Ext Adr = par. *317*)

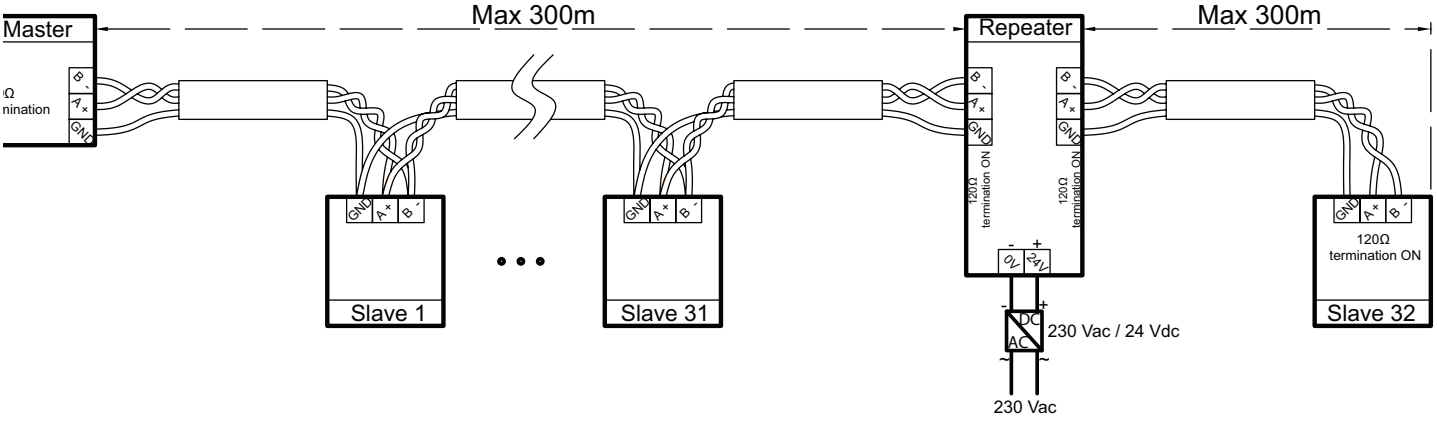


Address A=10, B=11, C=12, D=13, E=14, F=15, address 0 is not valid and must not be selected.

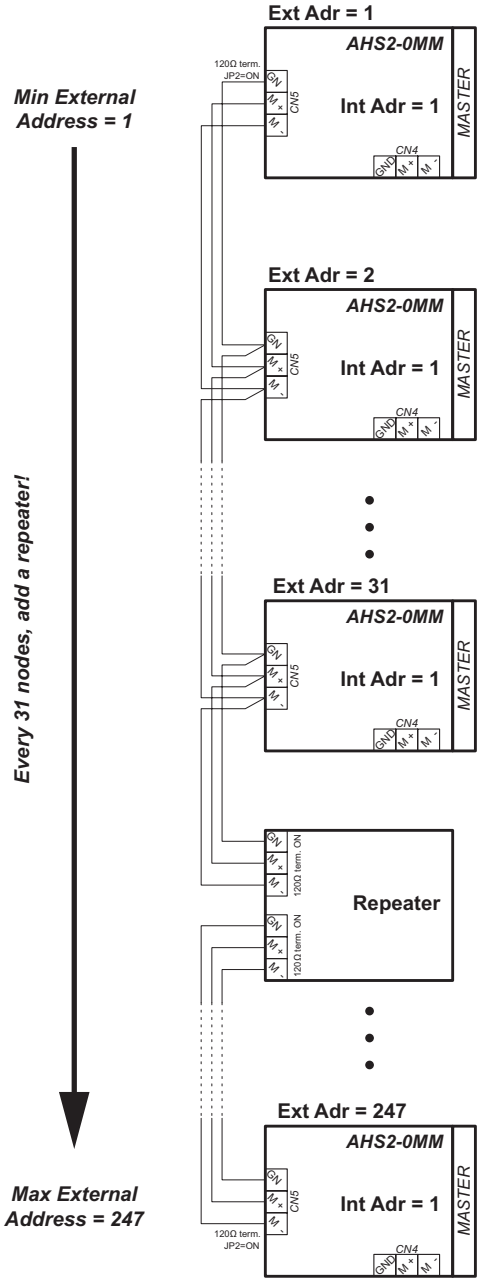
In case of connection of up to 31 AHS2-0MM on the external networks no repeater is necessary.



To increase the number of devices connected to the line or to increase the cable length, a signal repeater must be connected.
Add one signal repeater for each group of 31 connected AHS2-0MM.



Example of asssignment done for the following network:



If the settings are correct for J1, J2, SW3, the LED flashes; otherwise it remains steadily on (error).
Selection of communication parameters on CN5 can be can be done dinamically.

Use cables with a twisted pair + 1 wire for ground + shield.
Use the twisted pair to connect **M+** and **M-** and the single wire for the **GND** which must be connected to each device.
Connect the shield to ground at a single point on the cable as close to the master as possible.
The type of cable must comply with the properties required for data transmission over MODBUS RS485 protocol (e.g. Belden 3106A cable).
The two bus ends must be connected with a 120 ohm termination resistance.
To insert the 120 ohm resistance on the controller, see *"47. Jumper configuration" page 154*.

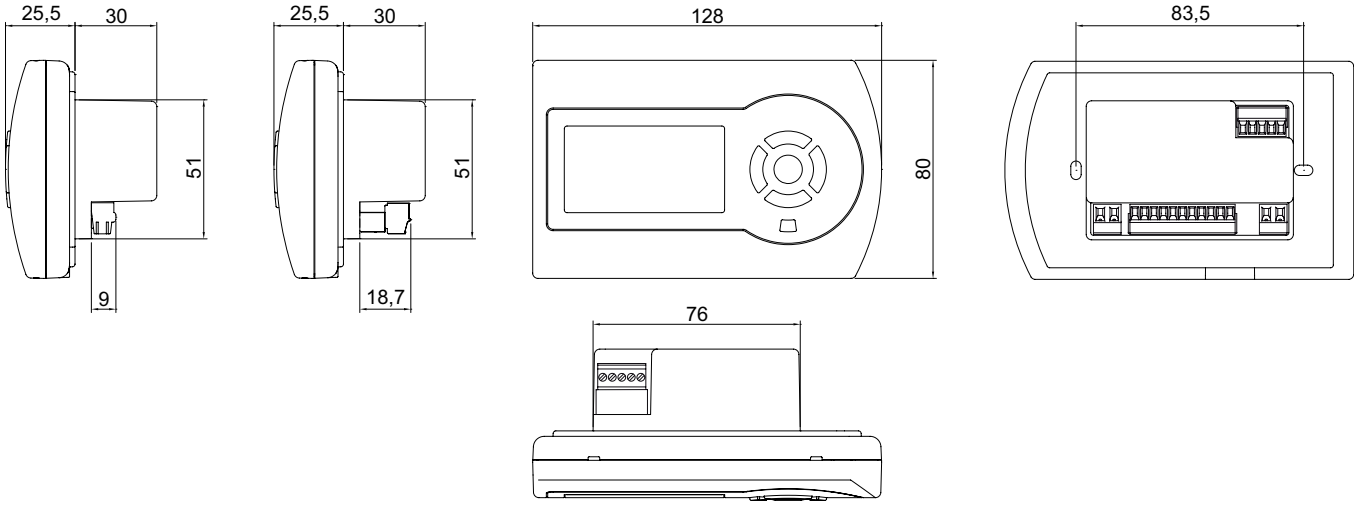
The maximum bus length depends on baud rate and on the cable length.
For a baud rate of 9600, the maximum cable length can reach 1000 m with an AVG26 cable.
Any derivations that are used must be short and must not exceed 20 m. With a multi-port tap used for n derivations, each derivation must have a maximum length of 40 m divided by n.

It is necessary for supervisor to communicate with each AHS2-0MM with a time laps lower than 10 minutes otherwise supervisor could not be seen as connected and AHS2-0MM could not take into consideration eventual forcing data delivered by supervisor for operating. To indicate its presence the supervisor must read a variable from AHS2-0MM on the range of Modbus variables on CN5 see *"48. AHS2-0MM Modbus variables on CN5" page 155***.**

51. Dimensions

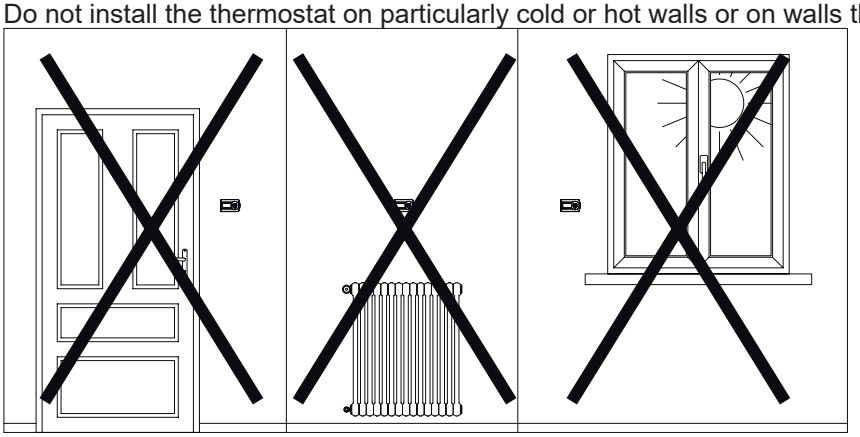
• AHS2-0MM unit

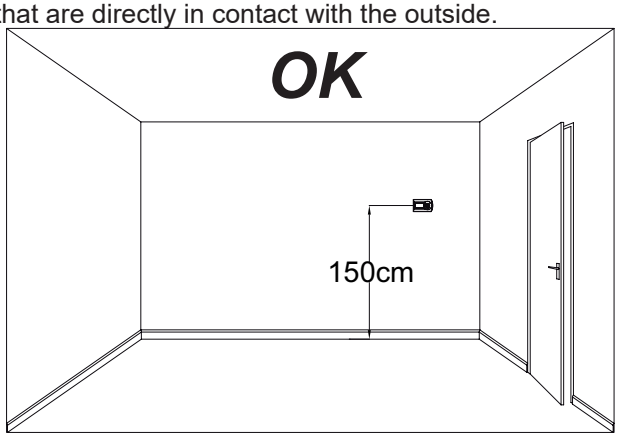
• AHS2 unit

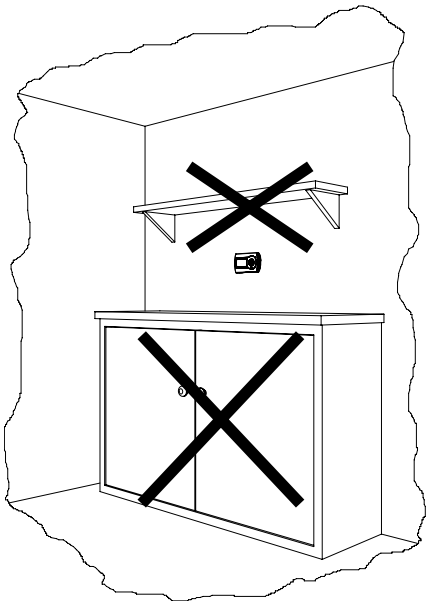


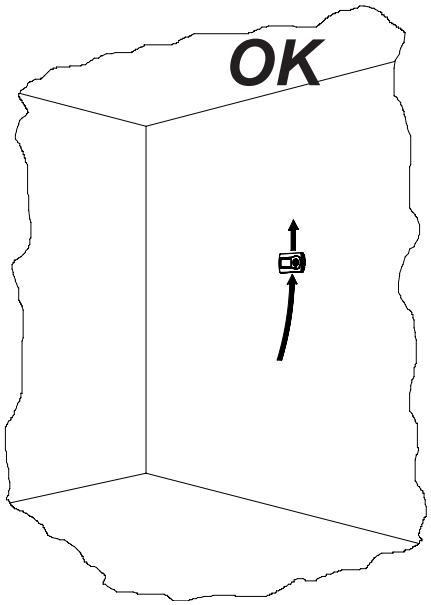
52. Installation requirements

Mount the unit in a place away from heat sources and free of direct draughts at a height of approx. 1.5 m above the floor.
Do not install the thermostat on particularly cold or hot walls or on walls that are directly in contact with the outside.

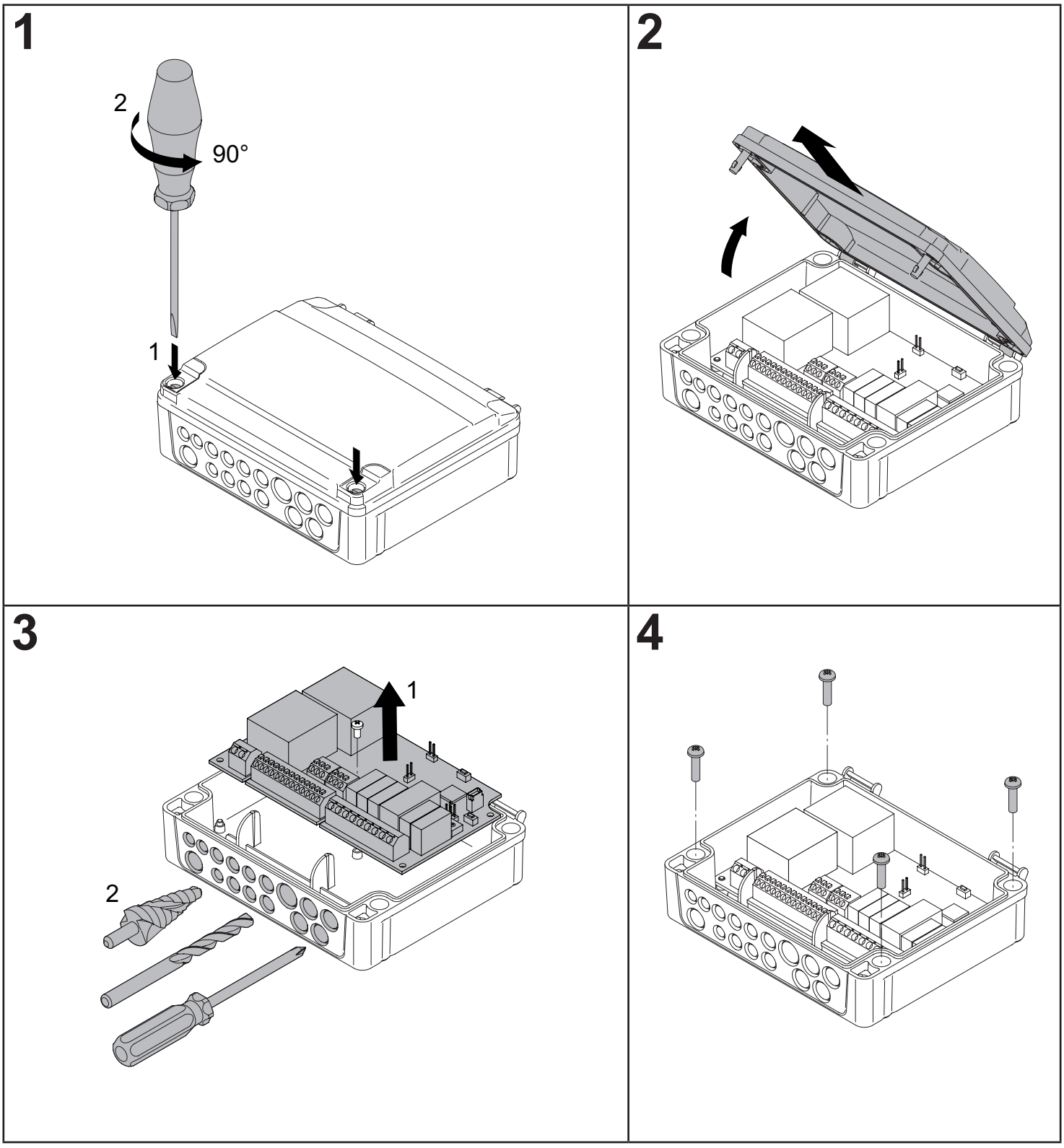






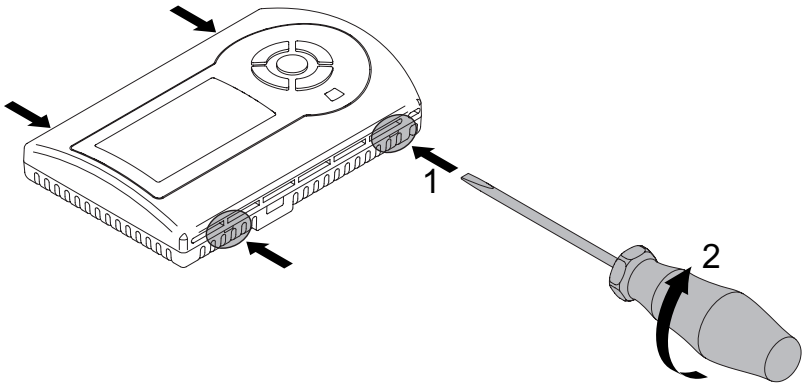


• AHS2-0MM unit installation

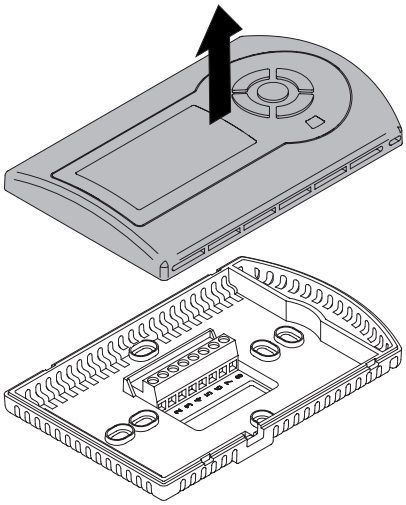


• AHS2 unit installation

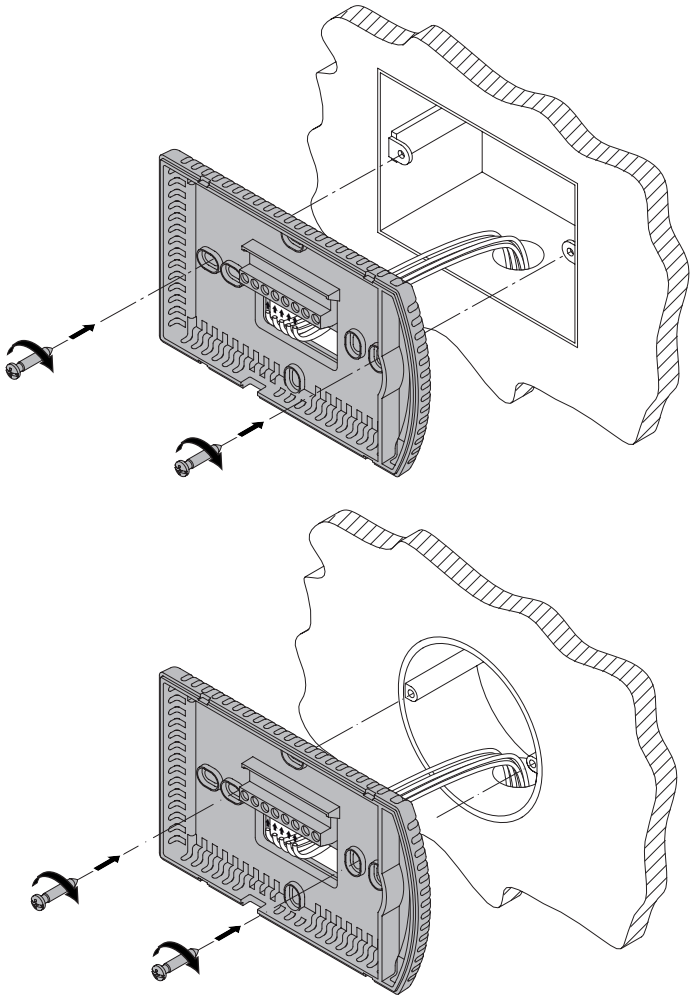
1



2

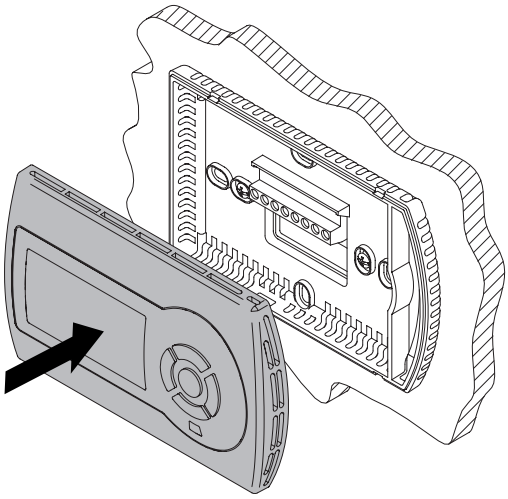


3



Wall mounting
- Spacing between 83.5 mm fixing holes with box for example: Bticino 503E
- Spacing between 60 mm fixing holes with round box for example: Gewiss GW 24 232

4



industrie technik®

CE

AB Industrietechnik srl – Via Julius Durst, 50 – 39042 BRESSANONE (BZ) Italy – Tel: +39 0472/830626 – info@industrietechnik.it – www.industrietechnik.it