Revision	**01**
Date	**06/2021**
Supersede	**D-EOMOAH00903-21EN**

OPERATING MANUAL
D-EOMOAH00903-21_01EN

Digital AHU

ADK

D-STREAM

Table of Contents

1 About this document

1.1 Revision History

Name	Revision	Date	Scope
D-EOMOAH00903-21_01EN	1	June 2021	Second edition • Modified table page 28 – **Led yellow #5 of Modbus node doesn't represent a communication error.** At present software versions, if blinking only indicates that at least once communication has been interrupted. The only indicator for communication state is the BLUE led.
D-EOMOAH00903-21EN	0	March 2021	First edition

1.2 Notice

1.3 Before starting

Application range

This document refers to the following components:

Microtech 4	Controller

Users

Users of this document are intended to be:

- AHU users
- Sales staff

Conventions

MicroTech 4 further in this document and when proper will be referred to as "MicroTech"

2 Safety Information

Observe all safety directions and comply with the corresponding general safety regulations in order to prevent personal injury and damage to property.

- Safety devices may not be removed, bypassed or taken out of operation.
- Apparatus and system components may only be used in a technically fault-free state. Faults that can affect safety must be rectified immediately.
- Observe the required safety instructions against excessively high contact voltages.
- The plant may not be in operation if the standard safety devices are out of operation or if their effects are influenced in some other way.
- All handling that affects the prescribed disconnection of the protective extra-low voltage (AC 24 V) must be avoided.
- **Disconnect the supply voltage before opening the apparatus cabinet. Never work when the power is on!**
- Avoid electromagnetic and other interference voltages in signal and connection cables.
- Assembly and installation of system and plant components may only be performed in accordance with corresponding installation instructions and instructions for use.
- Every electric part of the system must be protected against static charging: electronic components, open printed circuit boards, freely accessible connectors and apparatus components that are connected with the internal connection.
- All equipment that is connected to the system must be CE marked and comply with the Machine Safety Directive.

3 Introduction

This operating manual provides the basic information that allows the control of the Daikin Air Handling Unit (AHU). AHUs are used for air conditioning and air handling in terms of temperature, humidity and CO_2 level control. There are four types of AHU, based on the external devices used to produce cooling or heating:

1. **AH-ERQ-U**
   The AH-(ERQ)-U is connected with the Daikin ERQ condensing unit;
2. **AH-W-U**
   The AH-(Water)-U is connected with an external device that provides hot water or cold water used in a water heat exchanger;
3. **AH-DX-U**
   The AH-(Direct eXpansion)-U is connected with an external condenserless unit;
4. **AH-WDX-U**
   This type of AH-(Water Direct eXpansion)-U can be connected to both water and direct expansion devices.
5. **AH-X-U**
   This type of AHU is not connected to a principal treatment device, or this is of electric type. Refer to Commissioning Guide for further details.

4 Basic Control System Diagnostic

Unit controller, extension modules and communication modules are equipped with two status LED, BSP and BUS, to indicate the operational status of the devices. The “BUS” LED indicates the status of the communication with the controller. The meaning of the two status LED is indicated below.

- **MAIN CONTROLLER**

- ***BSP LED***

LED Color	Mode
Solid Green	Application running
Solid Yellow	Application loaded but not running (*) or BSP Upgrade mode active
Solid Red	Hardware Error (*)
Flashing Green	BSP startup phase. The controller needs time for starting.
Flashing Yellow	Application not loaded (*)
Flashing Yellow/Red	Fail safe mode (in case that the BSP upgrade was interrupted)
Flashing Red	BSP Error (software error*)
Flashing Red/Green	Application/BSP update or initialization

(*) Contact Service.

- **EXTENSION MODULES**
- ***BSP LED***

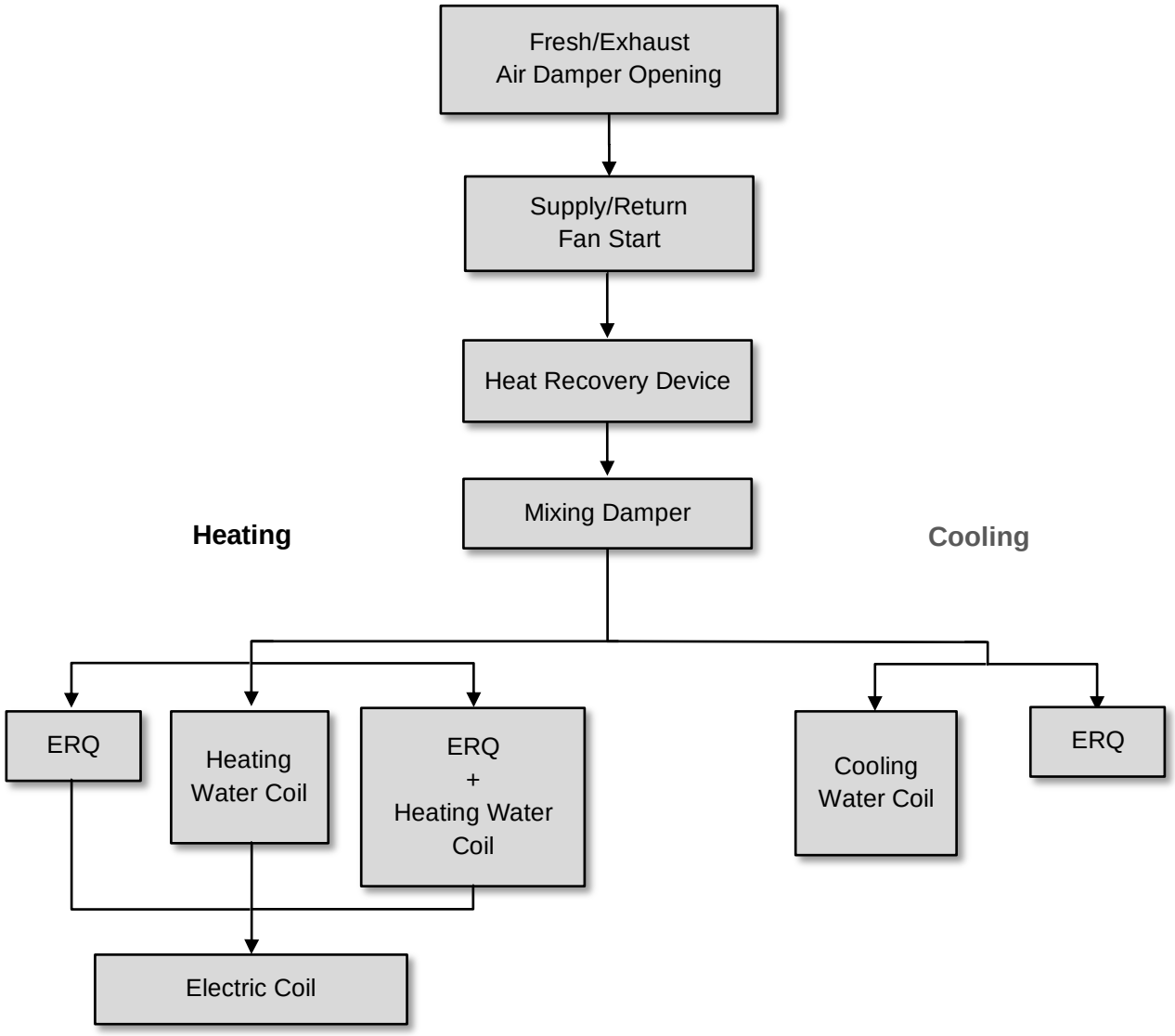
LED Color	Mode
Solid Green	BSP running
Solid Red	Hardware Error (*)
Flashing Red	BSP Error (*)
Flashing Red/Green	BSP upgrade mode

- ***BUS LED***

LED Color	Mode
Solid Green	Communication running, I/O working
Solid Yellow	Communication running but parameter from the application wrong or missing, or uncorrect factory calibration
Solid Red	Communication down (*)

5 Control Functions

This section describes the main control functions available in Daikin Air Handling Units. A typical activation sequence of the devices installed in Daikin AHU for thermoregulation control is showed below.



The starting sequence is performed according to an energy saving management logic, in order to satisfy the desired temperature setpoint.
As soon as a device is fully operational (i.e. operates at 100%), the next device starts according to the sequence shown in the figure above. The same sequence describes also the devices turn-off order by following the opposite direction, ensuring that the upper devices are directly controlled only when the lowest ones are not working. This ensure that the temperature setpoint is always satisfied with the lowest energy consumption.

The activation sequence strictly depends on the devices actually installed in your AHU, so it may changes accordingly.

6 Main Menu screen

Through Main Menu screen the user can access to all the information necessary for monitoring the AHU status, in addition to managing the unit operative mode.
In particular, the user can:

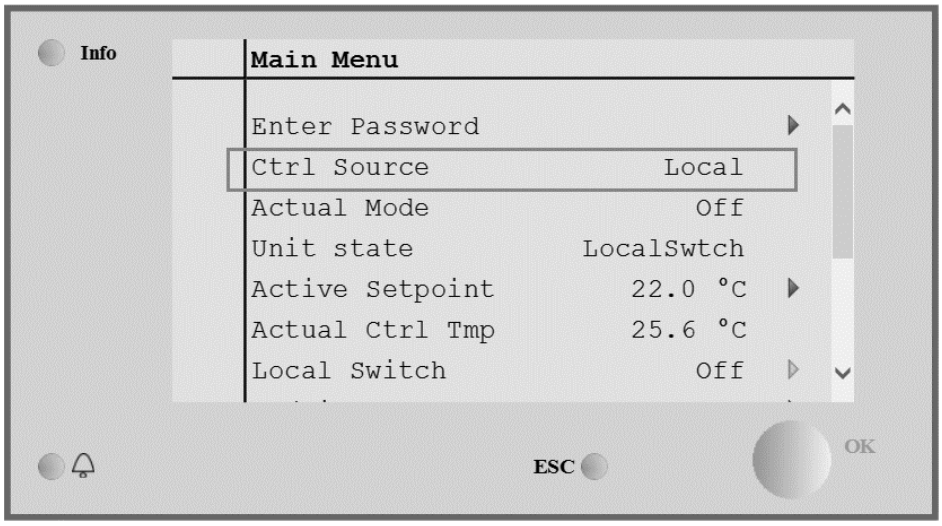
- Control the AHU operative mode
- Change the AHU Setpoint
- Change the Summer/Winter state
- Access to the I/O overview menu
- Program the time scheduler
- Restore alarm conditions

Next chapters will describe any item of the main menu.

6.1 Control Source

This item displays the actual control source of the AHU. All possible control source are reported in the table below.

HMI Path: Main Menu -> Ctrl Source



Main Menu item	Value	Description
Control Source	- Local - BMS	– ***Local:*** a. HMI: unit control managed directly from the controller interface or automatically via time scheduler. Refer to **Local Switch** page for more details. b. Room Unit: when Control Source is set to Local, the unit can be controlled also through the Room Unit device (POL822), if installed. Refer to **Appendix A** for more details on **Room Unit control.** – **BMS:** *a.* Modbus: the unit can be controlled by a Modbus Master device through Modbus protocol, if the corresponding communication module is installed (POL902). Refer to D-EOMOCAH202-18EN for more details. b. BACnet: the unit can be controlled through BACnet communication if the corresponding communication module is installed (POL904/POL908). Refer to D-EOMOCAH10009 for more details.

Value for Ctrl Source determines the priority chain among available control sources, included the Panel switch, according to the following table:

Relations among CONTROL SOURCE, PRIORITY AND INTERLOCKS of all unit switches (Panel switch, HMI, BMS)

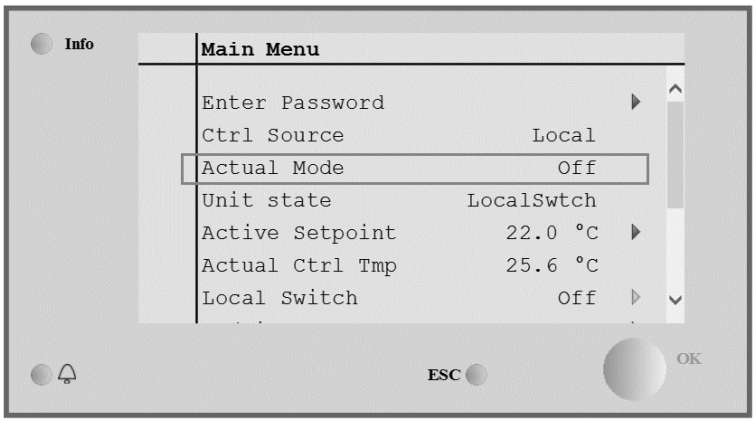
Ctrl Source	Panel Switch (Electrical Panel)	Local Switch (HMI)	BMS (MSV 24562)	Unit Actual Mode
Local	Off	x	x	Off
Local	On	Off	x	Off
Local	On	On	x	ON
BMS	Off	x	x	Off
BMS	On	Off	x	Off
BMS	On	On	Off	Off
BMS	On	On	On	ON

Note - The value «x» means that whichever state doesn't affect the unit Actual Mode. As a consequence, for example, in order to set ON the unit Actual Mode when Ctrl Source is BMS, Panel Switch AND Local Switch must stay ON.

6.2 Actual Mode

This item (read-only) displays the actual operating mode of the AHU. All possible operating mode are reported in the table below.

HMI Path: Main Menu -> Actual Mode

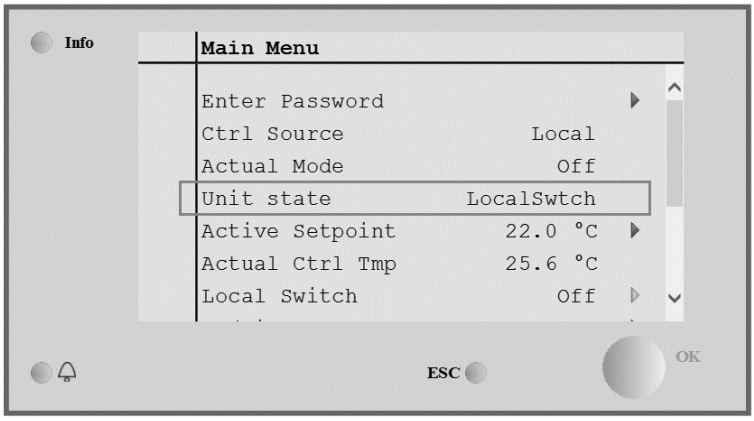


Main Menu item	Value	Description
Actual Mode	- Off - On - Ventilation - Economy	***Off:*** AHU in Off mode. All devices installed on the AHU (fans, cooling/heating coil, dampers, etc..) are Off.
		On: AHU in On mode. Normal functioning: all controls are active.
		Ventilation: AHU in Ventilation mode. In this mode only fans are running.
		Economy: AHU in Economy mode. Normal functioning: all controls are active, but the AHU works referring to the ***Economy*** set points. Refer to ***Setpoints*** page for more details.

6.3 Unit State

This item (read-only) displays the actual state of the AHU. All possible states are reported in the table below.

HMI Path: Main Menu -> Unit State

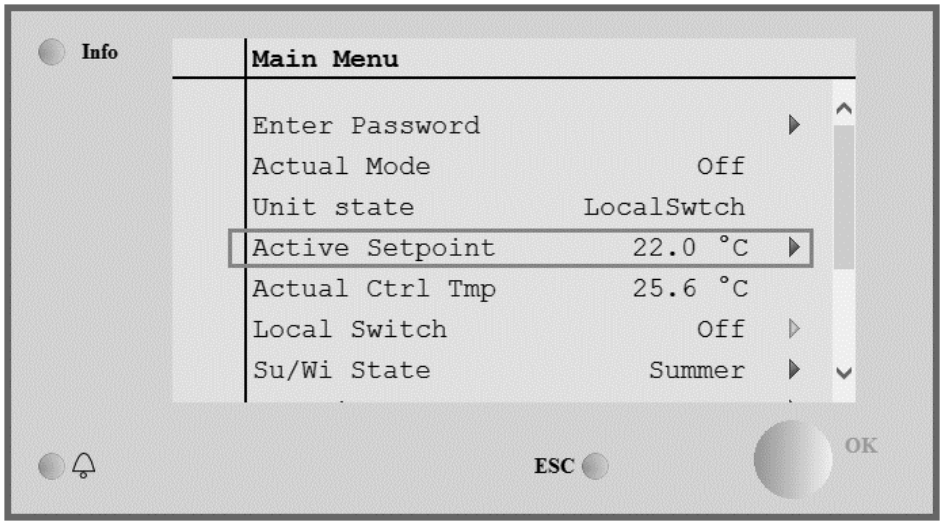


Main Menu item	Value	Description
Unit State	- Fire - Emergency - Alarm - Manual - Panel Switch - Local Switch - BMS - Scheduler - Ready - Occupancy	***Fire:*** AHU in Fire alarm state. The AHU is in this state when a "***Fire Alarm"*** digital input is detected.
		Emergency: AHU in Emergency state This state indicates that the Emergency button has been pressed.
		Alarm: AHU in alarm state. This state is displayed when an alarm has been detected.
		Manual: AHU in Test mode. The AHU is in this state when ***Local Switch*** is set to ***Test***. Refer to ***Local Switch*** page for more details.
		Panel Switch: Switch labeled "*Enable Switch*" located on the Electrical Box is set to zero.
		Local Switch: Local Switch setpoint in the HMI or switch on/off control from Room Unit Interface are set to off.
		BMS: Network control by BMS is set to off.
		Scheduler: AHU in ***On*** state by ***Time Scheduler.*** Refer to ***Time Scheduler*** page for more details
		Ready: AHU in ***Off*** state by ***Time Scheduler.*** Refer to ***Time Scheduler*** page for more details.
		Occupancy: AHU in ***On*** state by ***Occupancy*** function. Refer to ***Room Unit*** page for more details. (***Appendix A***)

6.4 Active Setpoint

All actual setpoints used by the software to control AHU devices are reported in the ***Active Setpoint*** page.
In the Main Menu screen is displayed the actual setpoint used for controlled temperature.

HMI Path: Main Menu -> Active Setpoint



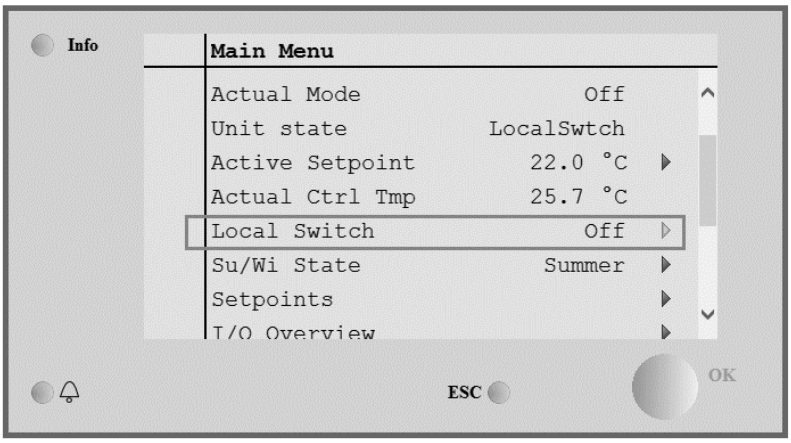
Parameters	Description
Temperature	Display the actual setpoint used for the controlled temperature. This value is the sum of the basic setpoint (given by `Summer/Winter state`) plus the offset set through the `Room unit` (R.U.), if present. - Summer mode ***Temperature = Cool (+ R.U. Offset, if present)*** - Winter mode ***Temperature = Heat (+ R.U. Offset, if present)***
Supply Fan	Display the actual setpoint value for the supply fan. This value is the sum of the basic setpoint plus the offset evaluated by the software for compensation (if a compensation function is active). ***Supply Fan = Supply Fan (+ Comp. Offset, if active)***
Return Fan	Display the actual setpoint value for the return fan. This value is the sum of the basic setpoint plus the offset evaluated by the software for compensation (if a compensation function is active). ***Return Fan = Return Fan (+ Comp. Offset, if active)***
Humidification	Display the actual humidification setpoint.
Dehumidification	Display the actual dehumidification setpoint.
Air Quality	Display the actual air quality setpoint.

6.5 Local Switch

This item is used to control locally the operating mode of the AHU.

NOTE! ***Note: Local switch must set to a value not Off or Test in order the BMS to be able to turn unit ON provided that Control Source is set to BMS. (see Control source priority chain).***

HMI Path: Main Menu -> Local Switch



Main Menu item	Value	Description
Local Switch	- Auto - Off - On - Ventilation - Economy - Test	***Auto:*** AHU On-Off state is managed by the time scheduler. Refer to ***Time Scheduler*** page for more details.
		Off: turn off the AHU.
		On**:** turn on the AHU. In this mode all controls are active and setpoints related to temperature regulation and fans control are the normal setpoints. Refer to ***Setpoints*** page to change normal setpoints.
		Ventilation: Switch the AHU in ventilation mode. In this mode only fans are running. No temperature control is performed.
		Economy: Switch the AHU in economy mode. In this mode all controls are active, but the setpoints related to temperature regulation and fans control switch from normal setpoints to economy setpoints. Refer to ***Setpoints*** page to change economy setpoints.
		Test: AHU in Test mode. In this mode every device of the AHU can be manually controlled. ***NOTE! This function is only available with service password entered and the item is visible only if the AHU is OFF.***

6.6 Summer/Winter state

The AHU software provides several options for summer/winter changeover control:

Auto Mode	The controller monitors one of the several temperatures available on the AHU (Room, Return or Outside). The value of this temperature is compared with two limits (one for summer and one for winter) and, depending on the result of this comparison, the controller chooses the cool/heat state for the next period.
Manual Mode	The changeover is managed via controller interface or through the Room Unit device (if installed).
Pursuit Mode	This logic can be used when it is desired to follow a temperature setpoint, regardless of the actual heating/cooling mode of the unit. The unit will automatically switch to Summer/Winter state when the actual controlled temperature has passed respectively the to Summer/to Winter thresholds, which are calculated based on the actual temperature setpoint selected.
BMS	The changeover is managed via a Building Management System (BMS) through BACnet or Modbus protocol communication.

For additional information on summer/winter changeover logics and settings refer to **Summer/Winter state** section.

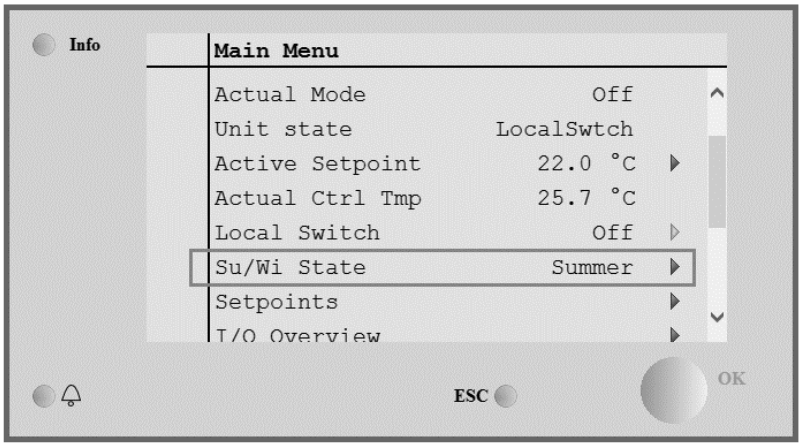
The available summer/winter changeover modes depend on the components and functions configured in the AHU, so the number and configuration may changes accordingly.

The AHU software provides three different options for summer/winter changeover control:

- Automatic changeover based on temperature.
  The controller monitors one of the several temperatures available on the AHU (Room, Return or Outside). The value of this temperature is after compared with two limits (one for summer and one for winter) and, depending on the result of this comparison, the controller chooses the cool/heat state for the next period.
- Manually changeover via HMI or Room Unit.
- Changeover managed via BMS.

All information and settings for this control are available in the following HMI page:

HMI Path: Main Menu -> Su/Wi State



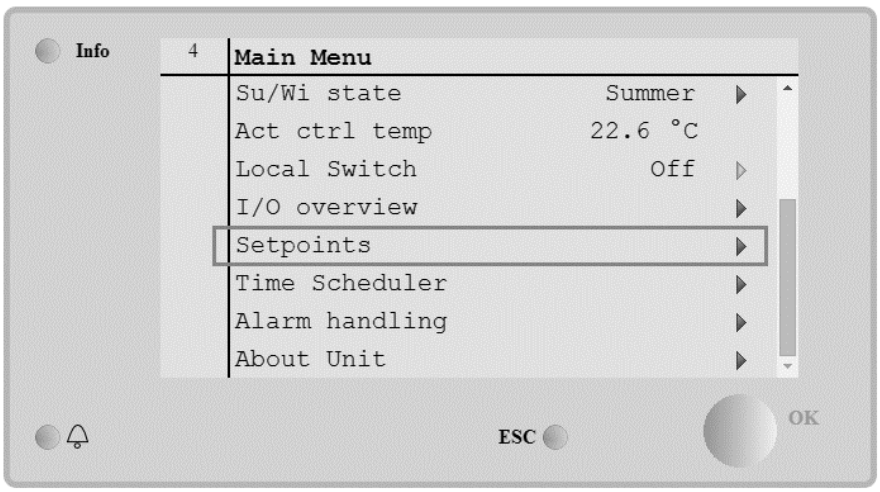
The following table explains all items present in the ***Su/Wi state*** page and how configure them to obtain the desired control.

Parameters	Value	Description
Su/Wi chg source	1. Auto 2. HMI 3. BMS 4. Pursuit*	This parameter defines which mode is used to control the Summer/Winter switch: 1. Auto: changeover is done automatically by the AHU based on the auto mode configuration 2. HMI: Summer/Winter state is set manually by the HMI 3. BMS: Summer/Winter state is set via BMS communication. 4. Pursuit*: changeover is performed automatically in order to reach and maintain the desired temperature setpoint. Refer to ***Setpoints*** page to change ***Pursuit*** mode setpoints. **Available from Airstream 1.00.A software version and only if Return or Room temperature control has been selected.*
HMI changeover	- Summer - Winter	Set actual mode of the AHU if ***Su/Wi chg source = HMI***
Network changeover	- Summer - Winter	Display the mode set via BMS. If the ***Su/Wi chg source = BMS***, this value is the current state of the AHU.
Current State	- Summer - Winter	Display the current state in which the AHU is operating.
Auto mode settings:		
Tmp Used	- Return - Room - Outside	Select the temperature monitored to determine the Summer/Winter state changeover.
Time constant	0…36000 [h]	Define the frequency at which the check is being performed for the Summer/Winter changeover in Auto Mode. *Example:* *If this parameter is set equal to 6 hours, the controller maintains the same state (Summer or Winter) for six hours. After six hours, the controller performs again the check to determine the next state that will be maintained for next six hours.*
Tmp Damped	-64...64 [°C]	Display the value of temperature stored when automatic changeover happened.
Su tmp	-64...64 [°C]	Changes over to summer operation when the selected temperature is greater than this value.
Wi tmp	-64...64 [°C]	Changes over to winter operation when the selected temperature is less than this value.

6.7 Setpoints

All setpoints of the AHU can be set from the HMI. Depending on the AHU configuration some setpoints can be available or not.

HMI Path: Main Menu -> Setpoints



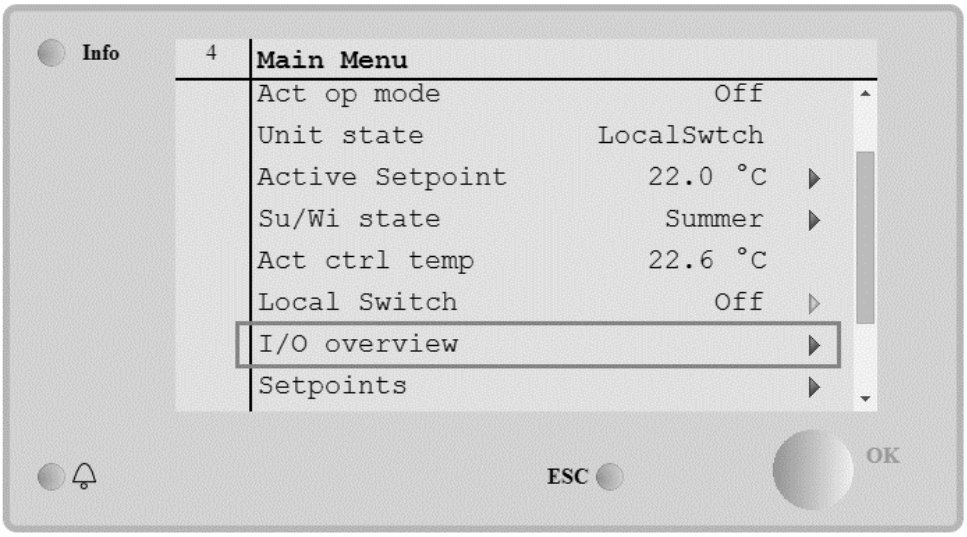
Parameters	Value Range	Description
Temperature:		
Cool	10..40 [°C]	Cooling temperature setpoint. *(Available when direct Htg/Clg setpoint control selected)*
Heat	10..40 [°C]	Heating temperature setpoint. *(Available when direct Htg/Clg setpoint control selected)*
Cool Economy	Cool..40 [°C]	Cooling temperature setpoint in Economy mode. *(Available when direct Htg/Clg setpoint control selected)*
Heat Economy	10..Heat [°C]	Heating temperature setpoint in Economy mode. *(Available when direct Htg/Clg setpoint control selected)*
Central Temp	10..40 [°C]	Central temperature setpoint. *(Available only when temperature regulation with deadzone control selected)*
Band Temp	0..20 [°C]	Deadzone temperature setpoint. *(Available only when temperature regulation with deadzone control selected)*
Central Temp Economy	Cool..40 [°C]	Central temperature setpoint in Economy mode. *(Available only when temperature regulation with deadzone control selected)*
Band Temp Economy	10..Heat [°C]	Deadzone temperature setpoint in Economy mode. *(Available only when temperature regulation with deadzone control selected)*
Pursuit	10..40 [°C]	Pursuit mode temperature setpoint. Refer to ***Summer/Winter state*** for more details. *(Available from Airstream 0.10.B SW version and only if Return or Room temperature control has been selected)*
Pursuit Eco	10..40 [°C]	Pursuit mode temperature economy setpoint. Refer to ***Summer/Winter state*** for more details. *(Available from Airstream 0.10.B SW version and only if Return or Room temperature control has been selected)*
Pursuit Band	3,5..10 [°C]	Pursuit mode offset temperature setpoint. This value is added/subtracted from actual Pursuit setpoint in order to estimate Summer/Winter changeover tresholds. Refer to ***Summer/Winter state*** for more details. *(Available from Airstream 0.10.B SW version and only if Return or Room temperature control has been selected)*
R.U. Offset	-6…6 [°C]	Display the actual offset set through the room unit. *(Available only with room unit)*
Pre-Heating	0..30 [°C]	Temperature threshold for Pre-Heating control activation.

				(Available only if pre-heating control enabled)
Fan Ventilation:				
Supply	0..100 [%]	0..4000[Pa]	0..140000[m^3/h]	Fans setpoints. Depending on the control type of the fan, the setpoint can be expressed in **Percentage** [%], **Pascal** [Pa], **Cube meter per hour** [m^3/h]. *(Not available if fans are controlled in On/Off mode)*
Return	0..100 [%]	0..4000[Pa]	0..140000[m^3/h]	
Supply Economy	0..100 [%]	0..4000[Pa]	0..140000[m^3/h]	
Return Economy	0..100 [%]	0..4000[Pa]	0..140000[m^3/h]	
Supply Defrost	0..100 [%]	0..4000[Pa]	0..140000[m^3/h]	Supply fan setpoint in case of defrost of the condensing unit ERQ *(Available only if fan-defrost limitation control enabled)*
Return Defrost	0..100 [%]	0..4000[Pa]	0..140000[m^3/h]	Return fan setpoint in case of defrost of the condensing unit ERQ *(Available only if fan-defrost limitation control enabled)*
Supply filter # Warning *# = 1,2,3,4*	0..1000 Pa			Differential Pressure threshold for Warning on supply filter # Alarm
Return filter # Warning *# = 1,2*	0..1000 Pa			Differential Pressure threshold for Warning on return filter # Alarm
Others:				
Dehumidification	- 0…100 [%rH] - Humidification…100 [%rH] *(if humidification control enabled)*			Dehumidification setpoint *(Available only if dehumidification control enabled)*
Humidification	- 0…100 [%rH] - 0…Dehumidification [%rH] *(if dehumidification control enabled)*			Humidification setpoint. *(Available only if humidification control enabled)*
Air Quality	0..3000 [ppm]			Air control quality setpoint. Limit of ppm (parts per million) for the CO_2. *(Available only if CO_2 control enabled)*
Fan fire setpoint	0..100 [%]			Fans setpoints when fire alarm detected. *(Available only if Fire Alarm enabled)*

6.8 I/O Overview

This menu allows the user to monitor all analog/digital inputs and outputs of the controller. The list can be different for each specific AHU as it depends on the installed components of the unit which are activated during the commissioning.

HMI Path: Main Menu -> I/O overview

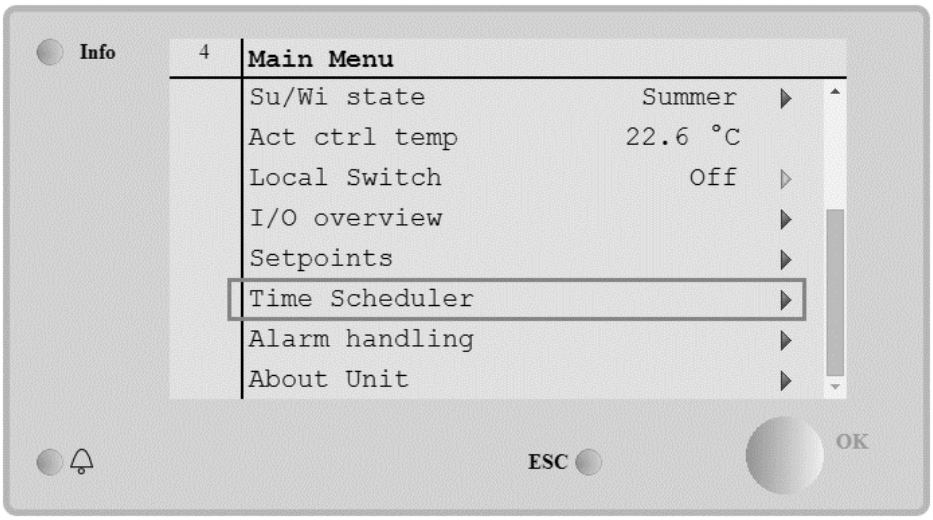


Parameters	Description
Digital inputs	Monitor all digital inputs of the controller. Digital inputs can be connected to alarm signals coming from different installed devices in the AHU (Fan, Damper, Pressure Switch, Water Pump, etc…), or to external switches (Emergency stop, Unit enable).
Analog inputs	Contains the values of all installed sensors: temperature, pressure, air flow, CO_2, humidity.
Digital outputs	Contains the values of all digital outputs used to command the several devices of the AHU (ERQ on/off, Pump on/off, Fan on/off, etc…).
Analog outputs	Contains the values of all analog outputs used to command different devices of the AHU (Fan speed, damper opening, percentage of heat recovery, etc…).

6.9 Time Scheduler

The time scheduler is a function that allows the user to set the time slots at which the AHU can be turned ON or OFF. If the scheduler is set, the AHU will be turned On/Off automatically by following the time slot configuration. In the next tables are reported the items of the time scheduler menu and their description. The time scheduler page contains also the configuration pages for single day time scheduling.

HMI Path: Main Menu -> Time Scheduler



Parameter	Value	Function
TS actual state	- Off - On - Ventilation - Economy	Actual operating mode from time scheduler function.
Monday	- Active - Passive	Active if the present day is Monday. Refer to ***Day Scheduler*** for more details.
Copy schedule	- Off - On	Copy Monday schedule to all weekdays.
Tuesday	- Active - Passive	Active if the present day is Tuesday. Refer to ***Day Scheduler*** for more details.
….	….	….
Sunday	- Active - Passive	Active if the present day is Sunday. Refer to ***Day Scheduler*** for more details.
Exception	- Passive - Active	Active if the present day is an exception day. Refer to both ***Day Scheduler*** and ***Calendar Exception and Calendar Fix off*** for more details.
Period: Start		Start date for the weekly schedule. If equals to *,* *.00, weekly schedules is always enabled.
Period: End		End date for the weekly schedule. If equals to *,* *.00, weekly schedules is never disabled.
Calendar exception	- Passive - Active	Active if the present day is an exception day. Refer to ***Calendar Exception/Fix off*** for more details.
Calendar fix off	- Passive - Active	Active if the present day is a fix off day. Refer to ***Calendar Exception/Fix off*** for more details.

6.9.1 Day Scheduler

By entering in each day page, normal or exception, it is possible to set up to 6 time slots.

Parameter	Range	Function
Time 1	00:00	**SPECIAL CASE**: this entry must always be set to 00:00!
Value 1	- Off - On - Ventilation - Economy	Switching command for Time 1.
Time 2	00:00 - 23:59	Switching time 2 (*:*-> Entry disabled)
Value 2	- Off - On - Ventilation - Economy	Switching command for Time 2.
…		
Time 6	00:00 - 23:59	Switching time 6 (*:*-> Entry disabled)
Value 6	- Off - On - Ventilation - Economy	Switching command for Time 6

Below is an example of a day scheduler setting. In this case the AHU will be turned ON from 9.30 until 13.00 and in Economy mode from 14:00 until to 18:40.

Parameter	Value
Time 1	00:00
Value 1	Off
Time 2	09:30
Value 2	On
Time 3	13:00
Value 3	Off
Time 4	14:00
Value 4	Economy
Time 5	18:40
Value 5	Off
Time 6	*:*
Value 6	Off

ATTENTION! If a time value is set incorrectly (i.e. it is less than the previous) the AHU will not work properly and it could be always keep ON or OFF.

6.9.2 Calendar exception and Calendar fix off

Exception days are defined in the calendar items. These may include a specific date, periods or certain days of the week.

When an exception day occurs, the “Exception” day scheduler configuration override the weekly schedule. The time slots at which occurs the exception days can be configured in the “Calendar exception” page. The “Calendar fix Off” page is a special exception day configuration that allows to switch off the plant at specific time slots.

Entering in the “Calendar exception” or “Calendar fix off” page allows the user to find the items reported in the table below.

Parameter	Range	Function
Present value	- Passive - Active	Displays whether a calendar entry is currently enabled: − No calendar entry is currently enabled. − A calendar entry is currently enabled.
Choice-x	- Date - Range - Week Day - Passive	Specifies the entry for the exception: − Date: a certain day (e.g. Friday). − Range: a period (e.g. vacation). − Week Day: a certain day of the week (e.g. every Monday). − Passive: entries are ignored. This value should be set last, after the date is entered.
(Start) date		If ***Choice-x = date*** -> Enter data for a single day. If ***Choice-x = range*** -> Enter start date for the period.
End date		For ***Choice-x = range*** only -> Enter end date for the period. End date must always be after the start date.
Weekday		For ***Choice-x = weekday*** only -> Enter the day of the week.

Example 1: Choice = Date
Only the entry in (start) is relevant:

- (start) date = *,01.01.09
Result: January 1, 2009 is an exception date.
- (Start) date = Mo,*.*.00
Every Monday is an exception day.
- (Start) date = *,*.Evn.00
The days for the entire month are exception day for each even month (February, April, June, August, etc.).

Example 2: Choice = Range
The entries in (start) date and end date are relevant:

- (start) date = *,23.06.09 / end date = *,12.07.09.
June 23, 2009 through July 12, 2009 are exception days (e.g. vacation).
- (start) date = *,23.12.00 / end date = *,31.12.00.
December 23 through 31 are exceptions for each year. The entry end date =*,01.01.00 does not work here, since January 1 is before December 23.
- (start) date = *,23.12.09 / end date = *,01.01.10.
23. December 23, 2009 through January 1, 2010 are exception days.
- (Start) date = *,*.*.00 / -End date = *,*.*.00
Attention! This entry is always enabled! The plant is continuously on exception or off.

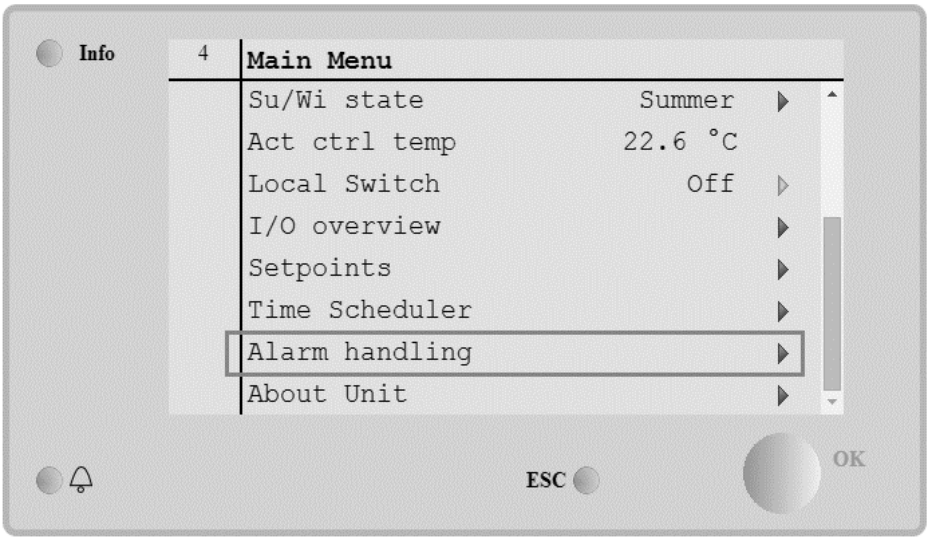
Example 3: Choice = Weekday
The entries for week day are relevant.

- Week day = *,Fr,*
Every Friday is an exception day.
- Week day = *,Fr,Evn
Each Friday in even months (February, April, June, August, etc.) is an exception day.
- Week day = *,*,*
Attention! This settings always enables "*calendar exception"* or *"calendar off"* days.

6.10 Alarm handling

This menu can be used to visualize and manage every alarm occurrence.

HMI Path: Main Menu -> Alarm handling



Depending on the severity of the alarm, the AHU can assume two different behaviors:

- **Not Critical Alarm:** the AHU normal functioning is not affected, reporting only on the interface the alarm condition. An example of not critical alarm is the indication of a dirty filter.
- **Critical Alarm:** the AHU switches to OFF state and controls remain locked until the alarm condition is restored. An example of critical alarm is a fan fault.

6.10.1 Alarm restore

When an alarm is displayed on the controller, follow this procedure to go back to the normal functioning:

1. Refer to *"Alarm list"* for an explanation of the alarm and for the indication about resolving the alarm condition.
2. When the alarm condition is restored, an alarm acknowledge command is needed on the controller:

   HMI Path: Main menu -> Alarm handling -> Alarm list -> Acknowledge = Execute

3. If the alarm condition is correctly restored after the "***Execute***" command, the AHU goes back to normal functioning.

6.10.2 Alarm list

Next table shows all alarm strings that appears on screen when an alarm occurs, with the respective causes and solutions list.

Alarm String	Description	Possible causes & solutions		
Outside temp: *-no sensor* *-over range* *-under range* *-shortd loop*	Error condition on the outside temperature sensor: measured temperature out of the allowable range or error condition on the sensor.	**Error**	**Causes**	**Solutions**
		no sensor	Sensor not connected	Check the wiring connection of the temperature sensor with the controller or (if it is powered) with the electrical power
		over range	Measured value over max limit	If the measured value is wrong replace the sensor
		under range	Measured value under range	If the measured value is wrong replace the sensor
		shortd loop	The sensor could be broken	Disconnect the temperature sensor from the controller and measure the resistance value of the sensor. Refer to the datasheet of the sensor for the resistance nominal value of sensor
Room temp: *-no sensor* *-over range* *-under range* *-shortd loop*	Error condition on the room air temperature sensor: measured temperature out of the allowable range or error condition on the sensor.	**Error**	**Causes**	**Solutions**
		no sensor	Sensor not connected	Check the wiring connection of the temperature sensor with the controller or (if it is powered) with the electrical power
		over range	Measured value over max limit	If the measured value is wrong replace the sensor
		under range	Measured value under range	If the measured value is wrong replace the sensor
		shortd loop	The sensor could be broken	Disconnect the temperature sensor from the controller and measure the resistance value of the sensor. Refer to the datasheet of the sensor for the nominal resistance.
Return temp: *-no sensor* *-over range* *-under range* *-shortd loop*	Error condition on the return air temperature sensor: measured temperature out of the allowable range or error condition on the sensor.	**Error**	**Causes**	**Solutions**
		no sensor	Sensor not connected	Check the wiring connection of the temperature sensor with the controller or (if it is powered) with the electrical power
		over range	Measured value over max limit	If the measured value is wrong replace the sensor

Alarm String	Description	Possible causes & solutions		
		under range	Measured value under range	If the measured value is wrong replace the sensor
		shortd loop	The sensor could be broken	Disconnect the temperature sensor from the controller and measure the resistance value of the sensor. Refer to the datasheet of the sensor for the resistance nominal value of sensor
Supply temp: *-no sensor* *-over range* *-under range* *-shortd loop*	Error condition on the supply air temperature sensor: measured temperature out of the allowable range or error condition on the sensor.	**Error**	**Causes**	**Solutions**
		no sensor	Sensor not connected	Check the wiring connection of the temperature sensor with the controller or (if it is powered) with the electrical power
		over range	Measured value over max limit	If the measured value is wrong replace the sensor
		under range	Measured value under range	If the measured value is wrong replace the sensor
		shortd loop	The sensor could be broken	Disconnect the temperature sensor from the controller and measure the resistance value of the sensor. Refer to the datasheet of the sensor for the resistance nominal value of sensor
Pre-Heating temp: *-no sensor* *-over range* *-under range* *-shortd loop*	Error condition on the pre-heating air temperature sensor: measured temperature out of the allowable range or error condition on the sensor.	**Error**	**Causes**	**Solutions**
		no sensor	Sensor not connected	Check the wiring connection of the temperature sensor with the controller or (if it is powered) with the electrical power
		over range	Measured value over max limit	If the measured value is wrong replace the sensor
		under range	Measured value under range	If the measured value is wrong replace the sensor
		shortd loop	The sensor could be broken	Disconnect the temperature sensor from the controller and measure the resistance value of the sensor. Refer to the datasheet of the sensor for the resistance nominal value of sensor
		Causes		**Solutions**

Alarm String	Description	Possible causes & solutions	
Heating Pump: Alarm	Heating pump possible malfunction. This alarm occurs when the water pump communicate to the controller an alarm condition.	The alarm signal of the water pump is not connected to the controller	Check the wiring connection between the input “Cooling/Heating coil pump alarm” (water coils combined) or “Heating coil pump alarm” (water coils separated or only a heating water coil present) of the controller and alarm output of the pump
		The pump is in a fault state	- Refer to troubleshooting of the water pump - Check the electrical connection of the pump - Replace the pump if broken
Cooling Pump: Alarm	Cooling pump possible malfunction. This alarm occurs when the water pump communicate to the controller an alarm condition.	**Causes**	**Solutions**
		The alarm signal of the water pump is not connected to the controller	Check the wiring connection between the input “Cooling/Heating coil pump alarm” of the controller and alarm output of the pump
		The pump is in a fault state	- Refer to troubleshooting of the water pump - Check the electrical connection of the pump - Replace the pump if broken
Supply # filter Warning # = 1,2,3,4	Supply # filter warning. Filter is dirty, the warning is notified in the HMI, but unit can still run. It occurs when the measured differential pressure is greater than the warning threshold set in Setpoints submenu.	**Causes**	**Solutions**
		The filter is dirty	Plan to change the filter
Return # filter Warning # = 1,2	Return # filter warning. Filter is dirty, the warning is notified in the HMI, but unit can still run. It occurs when the measured differential pressure is greater than the warning threshold set in Setpoints submenu.	**Causes**	**Solutions**
		The filter is dirty	Plan to change the filter
		Causes	**Solutions**

Alarm String	Description	Possible causes & solutions	
Supply # filter Fault # = 1,2,3,4	Supply # filter Fault. Filter dirty. Filter is dirty, the fault is notified in the HMI, unit is stopped. It occurs when the measured differential pressure is greater than the fault threshold set in Commissioning→AHU Configuration→Config Functions submenu.	The filter is dirty	Change the filter
Return # filter Fault # = 1,2	Return # filter Fault. Filter dirty. Filter is dirty, the fault is notified in the HMI, unit is stopped. It occurs when the measured differential pressure is greater than the fault threshold set in Commissioning→AHU Configuration→Config Functions submenu.	**Causes**	**Solutions**
		The filter is dirty	Change the filter
Cooling DX: Alarm	This alarm occurs when the alarm signal from the external condensing unit is active	**Causes**	**Solutions**
		The alarm signal of the condensing unit is not connected to the controller	Check the wiring connection between the input “DX Coil step #1 (#2, or #3) Alarm” of the controller and alarm output of the condensing unit
		The condensing unit is in a fault state	- Refer to troubleshooting of the condensing unit - Check the electrical connection of the condensing unit
Supply fan: Alarm	Differential pressure error of the supply fan active or fan overload. This alarm occurs when the differential pressure of the supply fan is too high before and after the supply fan or if the fan is in overload.	**Causes**	**Solutions**
		The differential pressure transducer is broken.	Replace transducer
		The belt is broken	Change the belt
		The pressure switch is broken	Replace the pressure switch
		The fan is broken	Replace the fan
		The fan is in overload	Refer to the troubleshooting of the fan

Alarm String	Description	Possible causes & solutions	
Return fan: Alarm	Differential pressure error of the supply fan active or fan overload. This alarm occurs when the differential pressure of the return fan is too high before and after the fan or if the fan is in overload.	**Causes**	**Solutions**
		The differential pressure transducer is broken.	Replace transducer
		The belt is broken	Change the belt
		The pressure switch is broken	Replace the pressure switch
		The fan is broken	Replace the fan
		The fan is in overload	Refer to the troubleshooting of the fan
Supply Fan Deviation Alm: Alarm	Setpoint deviation alarm on the supply fan. This alarm occurs when fan actual controlled value (Pa or m^3/h) differs from the setpoint for a predefined period.	**Causes**	**Solutions**
		Supply fan is far from the set point for a predefined period	Check supply fan condition
Return Fan Deviation Alm: Alarm	Setpoint deviation alarm on the return fan. This alarm occurs when fan actual controlled value (Pa or m^3/h) differs from the setpoint for a predefined period.	**Causes**	**Solutions**
		Return fan is far from the set point for a predefined period	Check return fan condition
Retrn Hum rel: under range	Return/Room air humidity over limit or error condition on the air humidity sensor	**Causes**	**Solutions**
		The humidity sensor is not connected	Check the wiring connection of the humidity sensor
		The humidity sensor is broken	Replace the humidity sensor
Air qual (CO2): Alarm	Air quality alarm, percentage of CO_2 too high. This alarm occurs when the value of CO_2 is out the allowable range, or error condition in the air quality sensor	**Causes**	**Solutions**
		The percentage of CO_2 in the air is too high	Modify the settings of the AHU to reduce the percentage of CO_2: - Increase supply fan speed
		The air quality sensor is not connected	Check the wiring connection of the air quality sensor
		The air quality sensor is broken	Replace the air quality sensor
Electrical Heating: Alarm	Electrical heating device possible malfunction. This alarm occurs when the electrical heating device communicate to the controller an alarm condition through	**Causes**	**Solutions**
		The Electrical heating device is broken	Replace the Electrical heating device
		The Electrical heating device is not connected	Check the wiring connection of the Electrical heating device

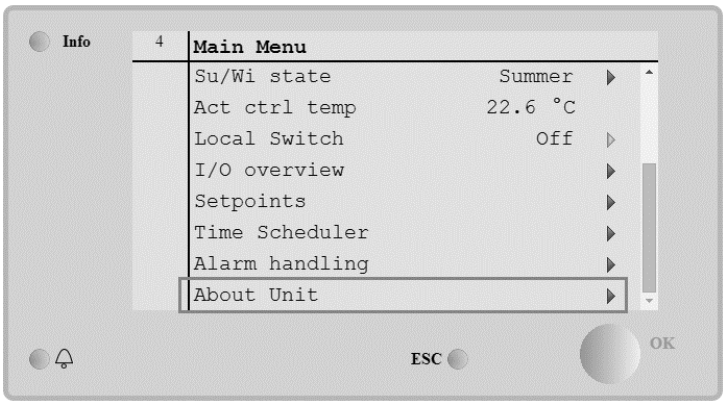
Alarm String	Description	Possible causes & solutions	
	the digital input “Electric Heaters Overload.”	The Electrical heating device is in over temperature	Check if there are some airflow problems before resetting the alarm
Supply press: under range	Problem with the supply air pressure sensor	**Causes**	**Solutions**
		Supply pressure sensor not connected	Check the wiring connection of the supply sensor. Check the electrical power of the device
		Supply pressure sensor broken	Replace the sensor
Return press: under range	Problem with the return air pressure sensor	**Causes**	**Solutions**
		Return pressure sensor not connected	Check the wiring connection of the return sensor. Check the electrical power of the device
		Return pressure sensor broken	Replace the sensor
Rtrn tmp fire alarm: Alarm	Return air temperature too high, possible presence of fire	**Causes**	**Solutions**
		Presence of fire	
		Return temperature sensor broken	Verify if in the alarm list there is some alarm related to the return temperature sensor and in this case refer to it
Supply tmp fire alm: Alarm	Supply air temperature too high, possible presence of fire	**Causes**	**Solutions**
		Presence of fire	
		Supply temperature sensor broken	Verify if in the alarm list there is some alarm related to the supply temperature sensor and in this case refer to it
Fire alarm: Alarm	Fire alarm active. This alarm occurs when the fire detector device detects the presence of fire	**Causes**	**Solutions**
		Presence of fire	
		If no fire is present, the fire alarm system could be broken	Check the Fire alarm system
Heating Frost: Frost	This alarm occurs when the external unit communicate to the controller (through the digital input “Frost Switch”) that there could be ice on the exchanger of the external unit	**Causes**	**Solutions**
		No heating from the exchanger	Check hydraulic circuits and his temperature, 3way valve, external unit
		Outside temperature very low	The alarm will auto-reset when “Frost Switch” deactivates. If this alarm occurs several times, try to increase “Frost sp” or “Frost Off Delay”.
Recovery Alarm		**Causes**	**Solutions**

Alarm String	Description	Possible causes & solutions	
	This alarm occurs when the Heat Wheel recovery device communicate to the controller (through the digital input "Heat Wheel Alarm") that an alarm state has been detected	Error on the Heat Wheel	Check the operating manual of the Heat Wheel
I/O Extension module: Alarm	Communication malfunction between the controller and an expansion module	**Causes**	**Solutions**
		One or more expansion modules are not connected to the controller	Check the wiring connection between the expansion modules and the controller
		One or more expansion modules are broken	Change the expansion module
		One or more expansion modules are not configured properly	Change the DIP switch value (refer to the wiring diagram)
ERQ 1 alarm: Alarm	Digital input related to the ERQ 1 is closed	**Causes**	**Solutions**
		Error on the ERQ	Check the operating manual of the ERQ
ERQ 2 alarm: Alarm	Digital input related to the ERQ 2 is closed	**Causes**	**Solutions**
		Error on the ERQ	Check the operating manual of the ERQ
ERQ 3 alarm: Alarm	Digital input related to the ERQ 3 is closed	**Causes**	**Solutions**
		Error on the ERQ	Check the operating manual of the ERQ
ERQ 4 alarm: Alarm	Digital input related to the ERQ 4 is closed	**Causes**	**Solutions**
		Error on the ERQ	Check the operating manual of the ERQ
Emergency Stop: Alarm	Digital input related to Emergency stop button is open	**Causes**	**Solutions**
		Emergency stop button pressed	Release the emergency stop button

6.11 About Unit

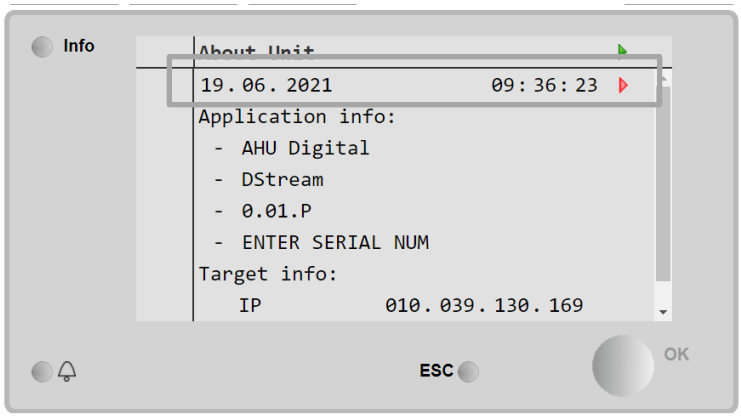
About Unit is the last item of the controller main menu and gives general information about the AHU controller.

HMI Path: Main Menu -> About Unit

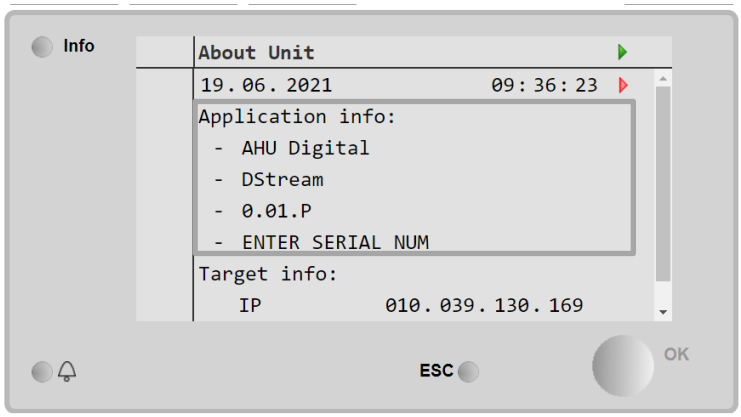


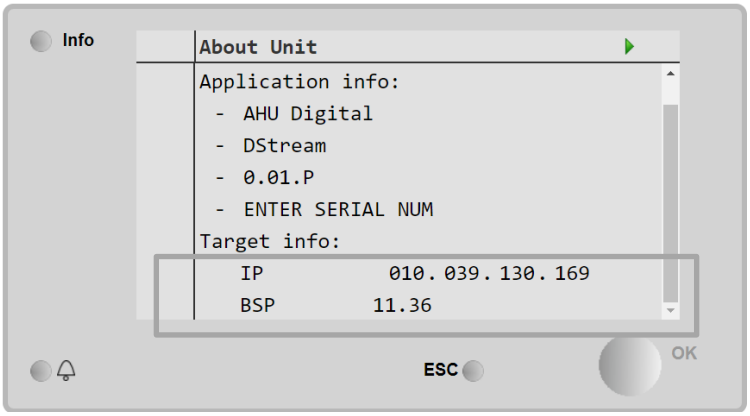
Through this section it is possible to:

- Visualize and modify date and time;



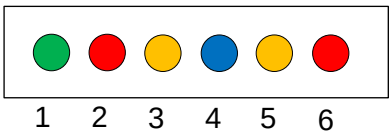
- Visualize useful information about software application installed;





- Visualize the actual controller IP address and firmware version installed;

7 Modbus nodes diagnostic and alarms



Led #	Color	Manager	State	Meaning
1	Green	Board firmware	Alive	Node is powered on
2	Red	Board firmware	Hardware Error	The firmware has detected an EEPROM error. If this error occurs the Node must be removed and replaced. Contact factory.
3	Yellow	Board firmware	I/O Error	The firmware has detected an error in the I/O of the Node.
4	Blue	MT4 / DStream	Communication OK	Modbus communication is established and is properly operating
5	Yellow	MT4 / DStream	Not Used	Not Used
6	Red	MT4 / DStream	Not Used	Not Used

7.1 Node#HardwareErr	
Description	The firmware has detected an EEPROM error.
Notification	MT4, LED 2 (Red)
Delay	No
Reset type	Automatic
Countermeasure	Replacement, contact factory.

***7.2* Node#CommErr**	
Description	The node # is offline from the Modbus communication
Notification	MT4, LED 5 (Yellow)
Delay	10sec
Reset type	Automatic
Countermeasure	Node# could be offline because of a Hardware Error or because is not powered on (Led alive off). If not in the preceding cases, check Modbus cable connection to the node. If all nodes are in communication error state, check integrity of root connection to MT4.

7.3 Node#InOutErr	
Description	On node # an I/O error has occurred. This could mean: • AIN1 fault - Open Loop/ Short Circuit • AIN2 fault - Open Loop/ Short Circuit • AIN3 fault - Open Loop/ Short Circuit • I/O general purpose fault - Open Loop/ Short Circuit • AO1 fault • AO2 fault • AO3 (I/O general purpose) FAULT
Notification	MT4, LED 3 (Yellow)
Delay	No
Reset type	Automatic
Countermeasure	Check connection/integrity of probes/actuators

7.4 Node#DP1Err	
Description	Differential pressure transducer #1
Notification	MT4
Delay	No
Reset type	Automatic
Countermeasure	Check polarity of flow tubes (+/-). Check connection/integrity of transducer board

7.5 Node#DP2Err	
Description	Differential pressure transducer #2
Notification	MT4
Delay	No
Reset type	Automatic
Countermeasure	Check polarity of flow tubes (+/-). Check connection/integrity of transducer board

7.6 Modbus nodes troubleshooting

7.6.1 Node#InOutErr interpretation

Alarms `Node#InOutErr` on MT4 will be notified together with the specific device alarm. Below some examples of combined notification.

1. Supply temperature sensor, connected to Node4, is broken or not connected.

   ```
   Node4InOutErr
   SplyTmpSenf
   ```

2. Return temperature sensor and return fan differential pressure transducer are broken or not connected

   ```
   Node2InOutErr
   Node7InOutErr
   RtrnTmpSenf
   RtrnFanPressSenf
   ```

   In order to associate Node#InOutErr with each sensor fault it is necessary to browse the I/O section in the HMI or examine the wiring diagram.

7.6.2 Node#CommErr behaviour

A whatever node offline error causes AHU Stop.

If a Node must be disabled it has to be physically excluded by the network, disconnecting power and communication in-out cables. This action is allowed provided that devices on the specific Node are not absolutely essential to the AHU operation.

This would be the case, for example, of filters.

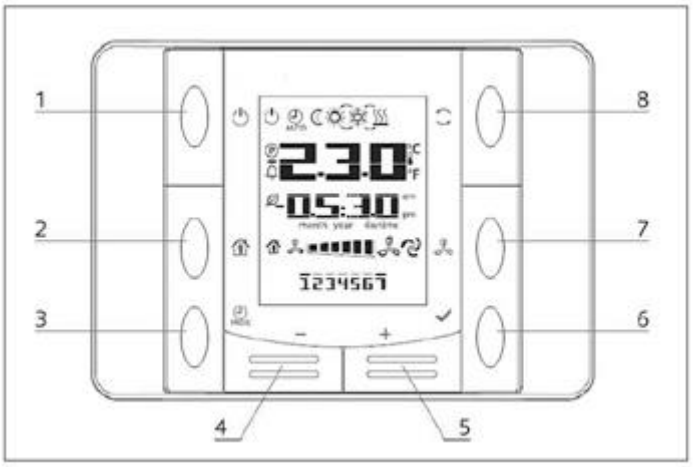
Note that all Nodes I/O arrangement is the result of an optimization algorithm. In most cases, filters differential pressure transducers will be placed on the same Node of those of fans. This arrangement doesn't allow exclusion of filters Node.

Never modify I/O arrangement of a Node. This will compromise AHU operation!

8 Appendix A: Room Unit Module - POL822

This chapter explains the functionality of the Room Unit module (POL822) that is used to measure the room temperature and to manage basic control of the AHU, like:

- AHU state changeover
- Summer/Winter mode changeover
- Offset on the temperature setpoint
- Enabling and disabling of the “Occupancy” function
- Set date and time
- View actual fan speed



8.1 Buttons Overview

(1) On/Off
• AHU state changeover.

(2) Home
• Return button & Enabling/Disabling Occupancy mode.

(3) Program PROG
• Set date/time.

(4) Minus — and (5) Plus +
• Adjust temperature setpoint and menu navigation.

(6) OK
• Confirm button.

(7) Fan Speed
• Display the actual percentage speed of supply and return fans

(8) Summer/Winter Mode
• Switch between Cooling (Summer) and Heating (Winter) mode.

8.2 Display Overview

The table below explains all the symbols available on the display:

Display	Meaning
	Room Temperature
	Time
	Actual speed of the AHU fans
	Day of the week 1= Monday 2= Tuesday etc…
	On/Off This icon is: 1. On - when the unit is in On, Ventilation or Economy state. 2. Off - when the unit is Off. 3. Blinking - when the unit is in Test mode or in off state by Panel Switch.
	This icon is On when the AHU is in Auto mode. The actual AHU state and the relative icon (On/Off, Ventilation or Economy) are based on Time Scheduler settings.
	Heating
	Cooling
	This icon is On when the AHU is in Ventilation mode
	This icon is On when the dehumidification control is active
	Occupancy mode active
	Economy mode active
	Blinking when the AHU is in Alarm state
	This icon is On when the AHU Summer/Winter changeover is set to Auto or Pursuit mode (if available) on the main controller (POL638/687). For more details see **Summer/Winter state.**

Two examples of main screen display:

Economy mode, cooling

Ventilation mode, heating

8.3 AHU On-Off (1)

This button allows the user to change AHU actual operating state. The user can cycle and choose all available AHU states (Auto, On, Off, Ventilation, Economy) through this menu.

To change the AHU state follow these steps:

1. Press the On-Off button
2. Navigate through the different available states by pressing + or – buttons
3. Confirm the change of state by pressing for at least 1 second the Confirm button
4. To return to the main screen page without taking any action, either press the Home button or wait for 5 seconds

8.4 Occupancy On-Off (2)

The Occupancy is a function that allows to run the AHU for fixed period (defined on the main controller under "*Status/Settings -> Occupancy Tm*") when it is Off via time scheduler.

This means that the Occupancy function can only work when the AHU is controlled via time scheduler

HMI Path: Main Page → Ctrl Source = Local
HMI Path: Main Page → Local Switch = Auto

To activate/deactivate the Occupancy function follow these steps:

1. Press the Home button

2. Navigate through the different available states by pressing + or – buttons

3. Confirm the change of state by pressing for at least 1 second the Confirm button

4. To return to the main screen page without taking any action, either press the Home button again or wait for 5 seconds

8.5 Date and time (3)

To change the date and time displayed on the main screen follow these steps:

1. Press PROG button for less than 1 second (hours blinks), then set the hour with the + and –
2. Press OK button (the hour is saved and the minutes blink), then set minutes with + and –
3. Press OK button (minutes are saved and the entire time blinks), then set the time display format (12/24 hour) with + or –
4. Press OK (the display format is saved and the year blink), set the desired year with + and –
5. Press OK (the year is saved and the display shows the month/day, the month blinks) set the month with the + and –
6. Press OK (the month is saved and the day blinks), set the day with the + and –
7. Press OK (month and day are saved, display returns to the time)
8. Press PROG (the display returns to normal view)

The display automatically returns to normal view when the PROG button is not pressed within one minute.

8.6 Temperature Setpoint Offset (4 & 5)

The buttons + or - are used to define an offset from the Heat/Cool setpoint set on the main controller.

By single pressing the + or - buttons on the main screen, the actual setpoint is being displayed. Every other press increases/decreases the temperature set point of 0.1 °C.

A long press of the + or - buttons display the actual temperature offset determined with the room unit respect the main setpoint.

8.7 Fan Speed Display (7)

This button allows the user to view the actual percentage speed of Supply and Return fans.

To display the actual percentage speed of AHU fans follow these steps:

1. Press the Fan Speed button
2. Navigate through Supply fan and Return fan (if present) visualization by pressing + or – buttons
3. To return to the main screen page either press the Home button or wait for 5 seconds

8.8 Summer/Winter changeover (8)

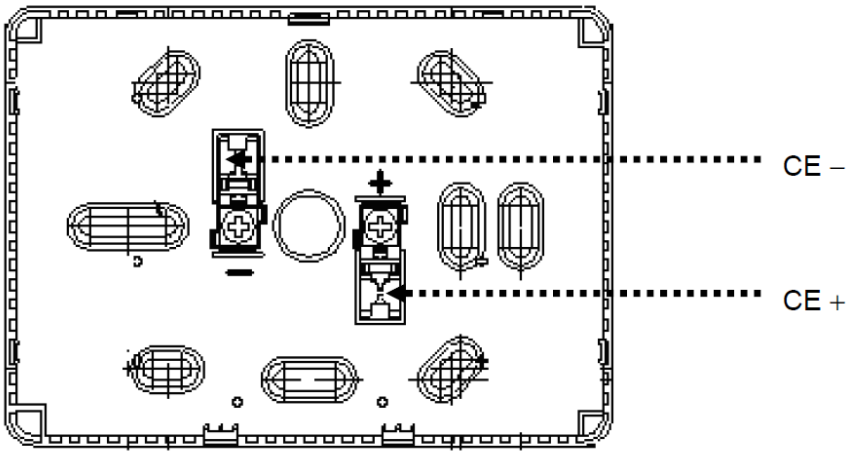
This button allows the user to change AHU Summer/Winter state (or Cool/Heat state).To change the Summer/Winter state follow these steps:

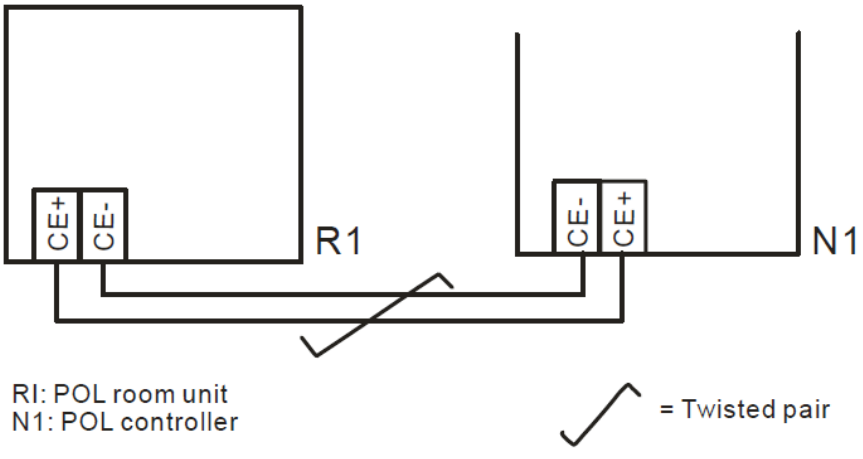
1. Press the Summer/Winter changeover button
2. Navigate through the different available states by pressing + or – buttons
3. Confirm the change of state by pressing for at least 1 second the Confirm button
4. To return to the main screen page without taking any action, either press the Home button or wait for 5 seconds

NOTE! When the icon Ⓟ appears on the Room Unit main screen, the Su/Wi change source on the main controller is set on Auto or Pursuit and Summer/Winter mode cannot be changed via Room Unit. For more details see Summer/Winter state section.

8.9 Mounting instructions

- The room unit receives its power from the connected controller via the 2-wire interface (low voltage, SELV). The room unit must be connected to the controller with an unscreened two-core twisted pair cable.





- The unit should not be mounted in recesses, shelving, behind curtains or doors or above or near direct heat sources.
- Avoid direct sun and draught.
- The conduit must be sealed on the device side, as currents of air in the conduit can affect the sensor reading.
- The admissible ambient conditions must be observed.
- Local installation regulations must be observed.
- After an interruption of the connection to the 2-wire interface, parameter initialization will restart.

NOTE! ***The equipment is not protected against accidental connection to AC 230 V.***

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