User MANUAL

Heat and energy recovery ventilators

HRU-MinistAIR-250/ -325/ -350-P

User Manual

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User Manual

1. About this manual

1.1. Ventilation system description

The complete ventilation system includes:

- MinistAir-P HRU (heat recovery air handling unit)

- Ducting with diffusers, plenum boxes, and air supply and extraction valves

- HRQ-BUT-PG15 controller (optional)

- HRQ-BUT-LCD-P5 controller (optional)

- Preheater HRQ-HDE-2.0-1.5-P (optional)

- Silencers (optional)

Forced ventilation provides the highest level of indoor comfort. Forced ventilation makes it very easy to manage the amount of air extracted and supplied from and to the inhabited indoor spaces.

Extraction valves are installed in bathrooms and kitchens. Supply valves are installed in other rooms, including the living room. All ductwork should be connected to the MinistAIR-P HRU. Under normal operating conditions (with the bypass closed and the frost protection deactivated),the HRU works in two directions of flow: supply and extraction. Supply air is aspirated from the outdoors and flows to the air supply valves through a plate heat exchanger. Extracted air is removed from the indoor spaces and flows to the outside through a heat exchanger.

The heat exchanger extracts and transfers the heat from the extracted air flow to the supply air flow without mixing of the two air flows. Using the HRQ-BUT-PG15 control panel or the control display, the air fan speed can be set manually (AWAY, HOME, or HOME+). If the HRU features the HRQ-BUT-PG15 control panel and has Internet connectivity, the three air fan speeds can be managed using the mobile app or via the web-based domain www.air.alnor.com.pl.

If optional CO2 and RH (relative humidity) sensors are installed, the air fan speed can be managed automatically according to the carbon dioxide and RH levels sensed.

1.2. How to use this manual

This manual is intended as a reference book by which qualified installers can install the HRUSlimAIR and all optional device as well. This device must be used according to its purpose. Make sure you have read and understood the manual before you install and/or use the device. Please be informed that we are constantly working on development and improvement of our products hence minor differences between this document and your unit are possible.

1.3. Original instructions

The original instructions for this manual have been written in Polish. Other language versions of this manual are a translation of the original instructions.

1.4. Admonitions

WARNING 'Warning' identifies a hazard that could lead to personal injury, including death.

NOTE 'Note' is used to highlight additional information.

2. Safety

2.1. General safety instructions

This product was designed and manufactured to ensure maximum safety during installation, operation and service. Always read these safety instructions before installing, maintaining or servicing the product, and strictly comply with these instructions. Parts of the device carry mains power, which is a potential lethal voltage. Disconnect power at supply line, circuit breaker or fuse before installing, servicing or removing the device. The device is designed for indoor use only. Do not expose the device to rain or moisture, to avoid short circuit. Short circuit may cause fire or electric shock hazard. Operate the device between 0°C and 40°C. For cleaning of the device use a soft damp cloth only. Never use any abrasive or chemical cleaner. Do not paint the device. This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall no be made by children without supervision.

2.2. Directives / Standards

• ERP 2018 - regulation 1253/2014 and 1254/2014

• Low Voltage Directive (LVD) 2014/35/EC i Electromagnetic Compatibility Directive (EMCD) 2014/30/EU

• EN 308 - Heat exchangers - Test procedures for establishing performance of air to air and flue gases heat recovery devices.

• EN 13141-7 Ventilation for buildings – performance testing of components/products for residential ventilation - Part 7.

• EN 3744 - Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure.

• EN ISO 5136 - Acoustics - Determination of sound power radiated into a duct by fans and other airmoving devices - In-duct method.

3. Technical data

3.1. General data

1.Dimensions: 780×560×550 mm (H×W×D)

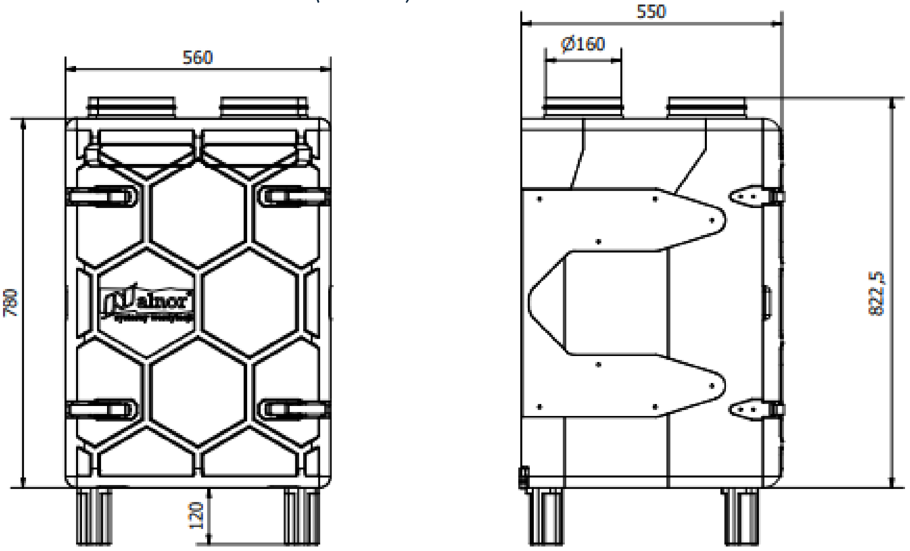


Figure1 HRU-MinistAIR-P control panel dimensions

2.Weight: 25kg
3. Heat exchanger: counterflow or enthalpic (optional)
4. Fans: fans with electronically commutated type motor
5. By-pass: built-in, automatic
6. Filters: ISO Coarse 70% (G4), optional ISO ePM1 55% (F7)
7. Pre-heater: build in
8. Installation: floor, wall: vertical or horizontal

3.2. Performance

-HRU-MinistAIR-250-H-P: 250 m3/h @ 100Pa

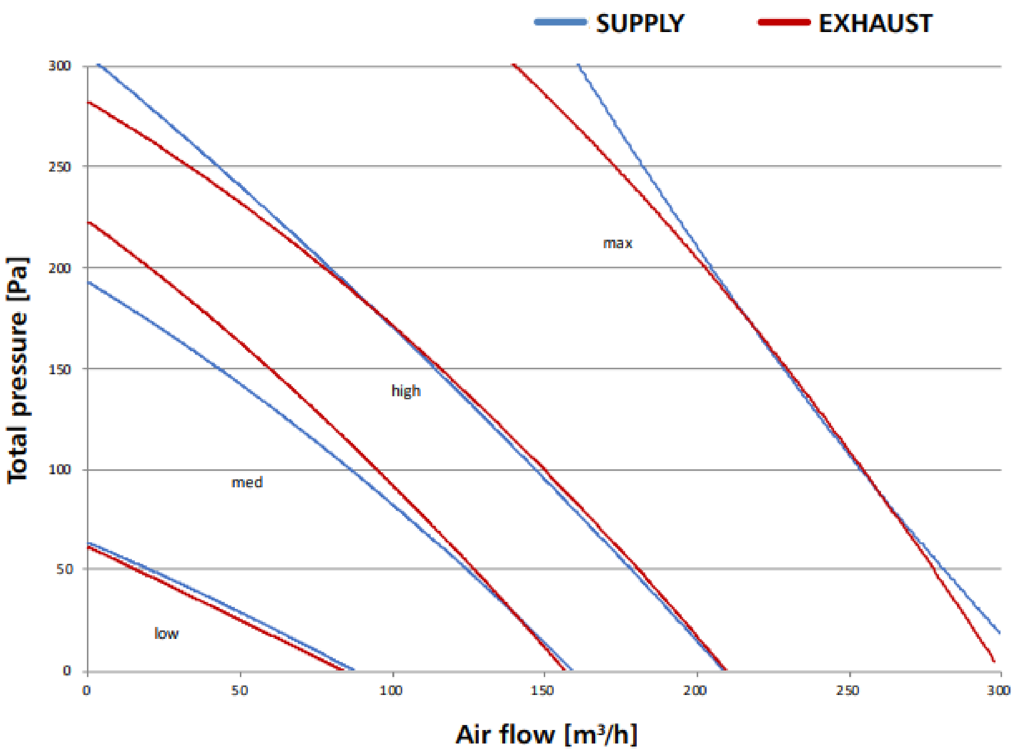


Figure2 Pressure for HRU-MinistAIR-250-H-P

- HRU-MinistAIR-325-H-P: 325 m3/h @ 100Pa

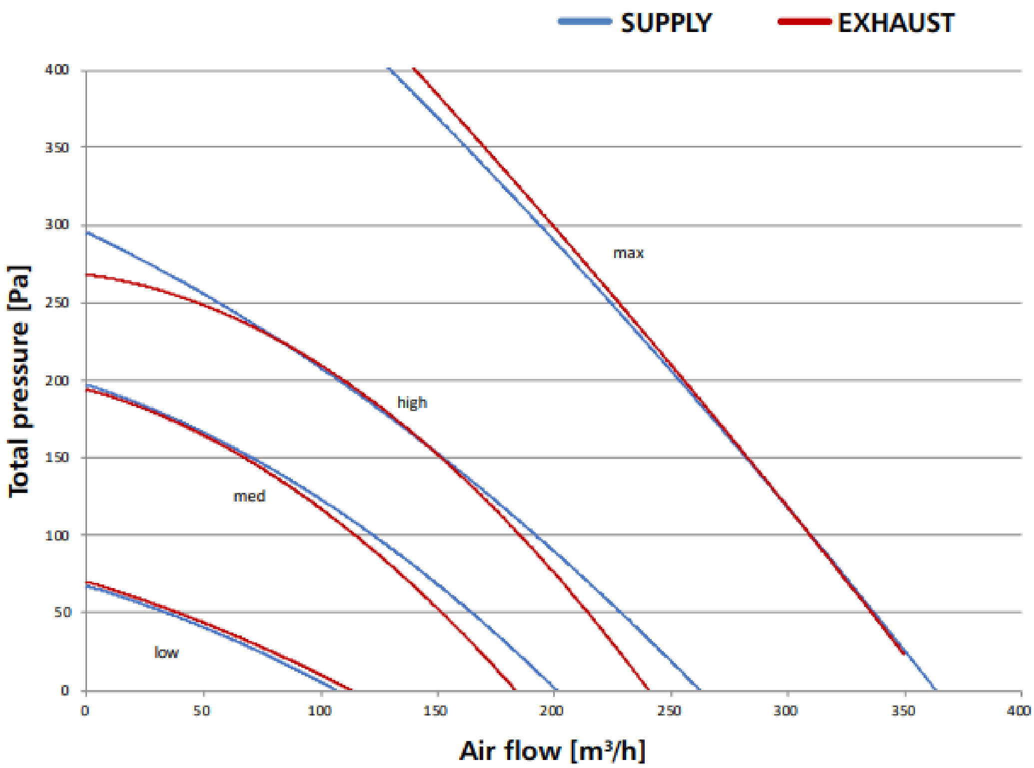


Figure 3 Pressure for HRU-MinistAIR-325-H-P

- HRU-MinistAIR-350-H-P: 350 m3/h @ 100Pa

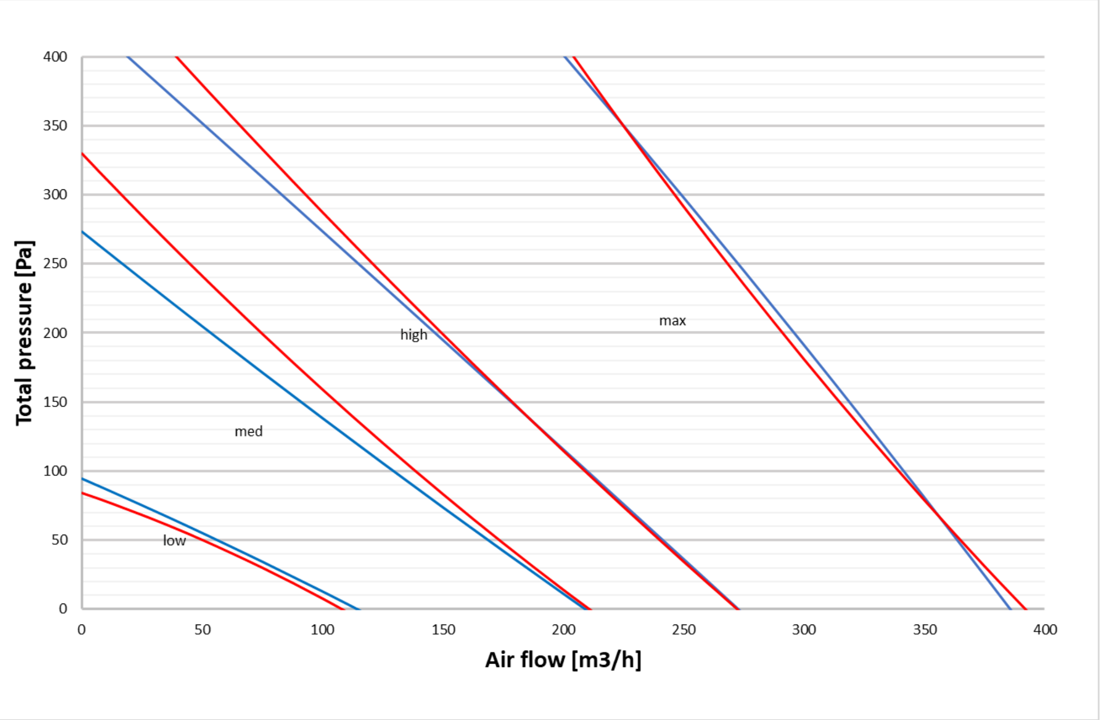


Figure 4 Pressure for HRU-MinistAIR-350-H-P

3.3. Tightness of the unit

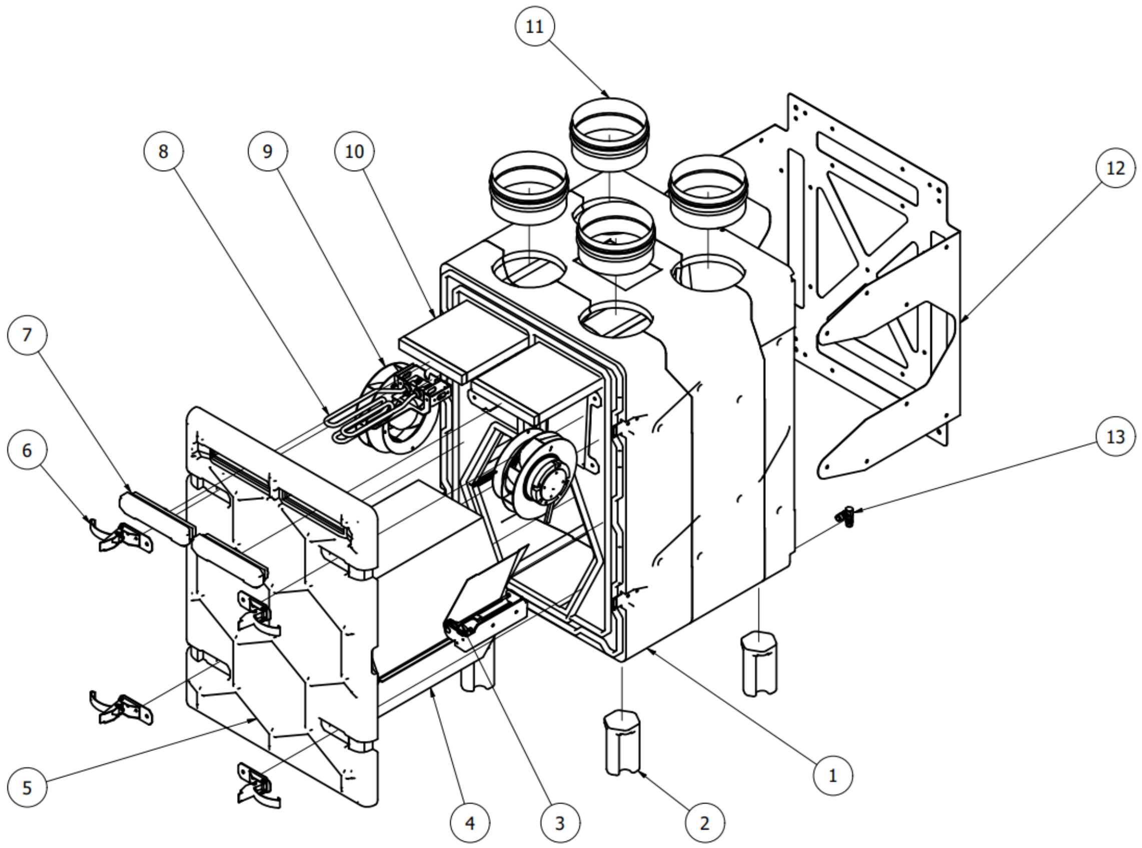
Internal tightness:

- HRU-MinistAIR-250-H-P: max. leakage 2.56% (class A1 according to EN 13141-7).
- HRU-MinistAIR-250E-H-P: max. leakage 2,8% (class A1 according to EN 13141-7).
- HRU-MinistAIR-325-H-P: max. leakage 1.96% (class A1 according to EN 13141-7).
- HRU-MinistAIR-325E-H-P: max. leakage 2,2% (class A1 according to EN 13141-7).
- HRU-MinistAIR-350-H-P: max. leakage 2,9% (class A1 according to EN 13141-7).
- HRU-MinistAIR-350E-H-P: max. leakage 2,05% (class A1 according to EN 13141-7).

External tightness:

- HRU-MinistAIR-250-H-P: max. leakage of 1.17% (class A1 according to EN 13141-7).
- HRU-MinistAIR-325-H-P: max. leakage 0.90% (class A1 according to EN 13141-7).
- HRU-MinistAIR-350-H-P: max. leakage 0,84% (class A1 according to EN 13141-7)

3.4. Construction



Number	Description
1	casing
2	Mounting foot (4pcs)
3	Bypass damper
4	Heat exchanger
5	Front cover
6	Clamp (4pcs.)
7	Air filter cover (2pcs.)
8	Heater
9	Fans (2pcs.)
10	Filters (2pcs.)
11	NSL-160 connectors (4pcs).
12	Handling chasis
13	Condensate drain plug (2pcs).

3.5. Diagram of the main board(PCB)

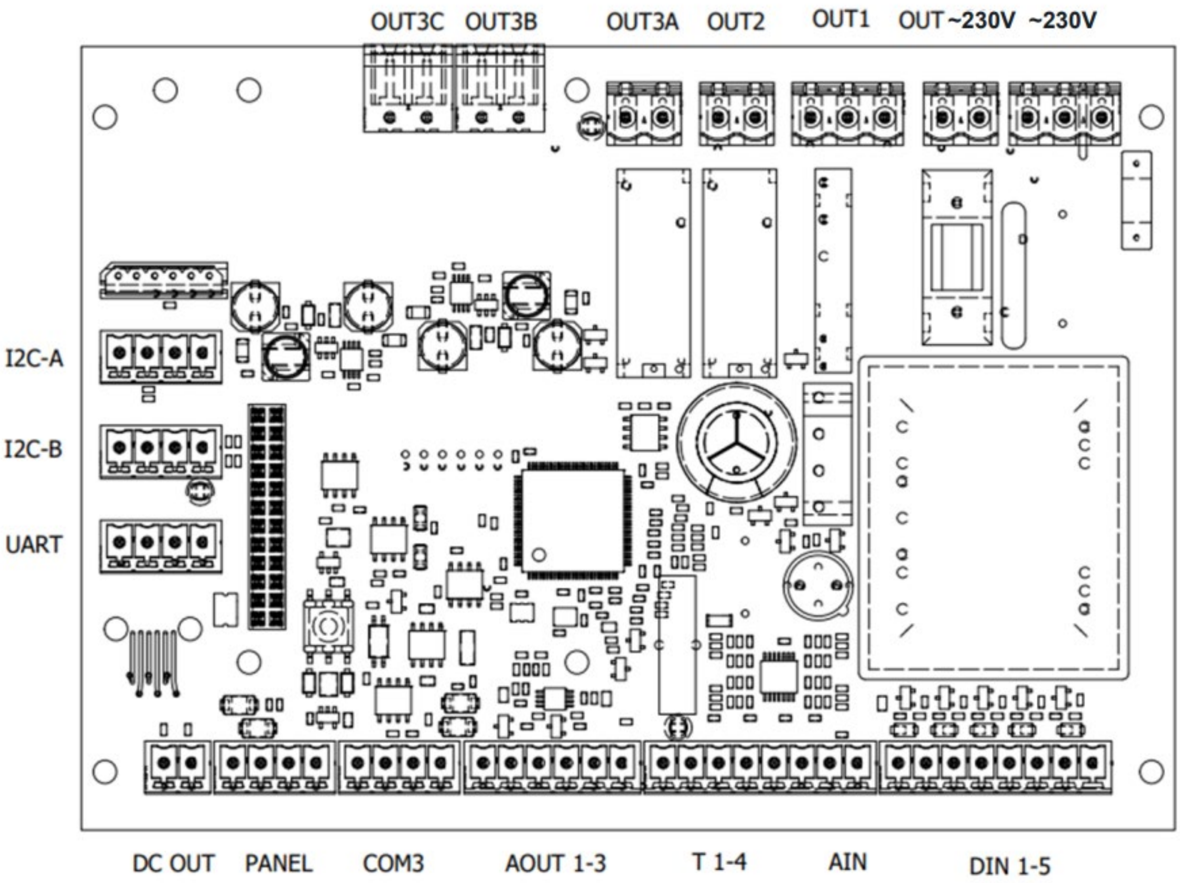


Figure 6 Main board A

Description of the connections of plate A	Nest number
Fan 1 (supply) - signal	AOUT1
Fan 2 (exhaust) - signal	AOUT2
Fan 1 (supply) - line L	WAGO L
Fan 1 (supply) - PE line	WAGO PE
Fan 1 (supply) - line N	WAGO N
Fan 2 (exhaust) - line L	WAGO L
Fan 2 (exhaust) - PE line	WAGO PE
Fan 2 (exhaust) - line N	WAGO N
Temperature of 1 of the supplied air	T1
Temperature of 3 of the inlet air	T3
Temperature of the 4 of the outlet	T4
Protection (thermostat) of the pre-heater	DIN1
Bypass control	AOUT3/PWM
ON/OFF preheater power supply	OUT2
Line L of bypass module	OUT ~230V L
N line of bypass module	OUT ~230V N
Power supply of bypass module	DC OUT
HRQ-BUT-PG15 panel/display	COM2
Supply fan pressure transmitter + built-in RH sensor	I2C-A
Exhaust fan pressure transmitter	I2C-B

Connection to the network - line L	WAGO L
Connection to the network - line N	WAGO N
Connection to the network - PE line	WAGO PE
WAGO L - list of connections	- Line L from the network - LINE L FAN 1 - LINE L FAN 2 - L-LINE FOR HEAT. INTRODUCTION
WAGO PE - list of connections	- PE line from the network - ~230V PE - LINE PE FAN 1 - LINE PE FAN 2 LINE OF THE PRE-HEATER
WAGO N - list of connections	- N line from the network - LINE N FAN 1 - LINE N FAN 2 -LINE N FOR INTRODUCTORY HEAT.
External CO2 , RH sensor	AIN1
Secondary heater thermostat, control panel, hood mode (needs 2 DIN inputs), SAP alarm, threshold CO2 , RH, PPM, temperature sensors	DIN2
Secondary heater thermostat, control panel, hood mode (needs 2 DIN inputs), SAP alarm, threshold CO2 , RH, PPM, temperature sensors	DIN3
Secondary heater thermostat, control panel, hood mode (needs 2 DIN inputs), SAP alarm, threshold CO2 , RH, PPM, temperature sensors	DIN4
Secondary heater thermostat, control panel, hood mode (needs 2 DIN inputs), SAP alarm, threshold CO2 , RH, PPM, temperature sensors	DIN5
Ground heat exchanger (optional-secondary heater ON-OFF, aftercooler ON-OFF)	OUT1
ON-OFF secondary heater, ON-OFF secondary cooler	OUT3A
MODBUS communication	COM3 ISO

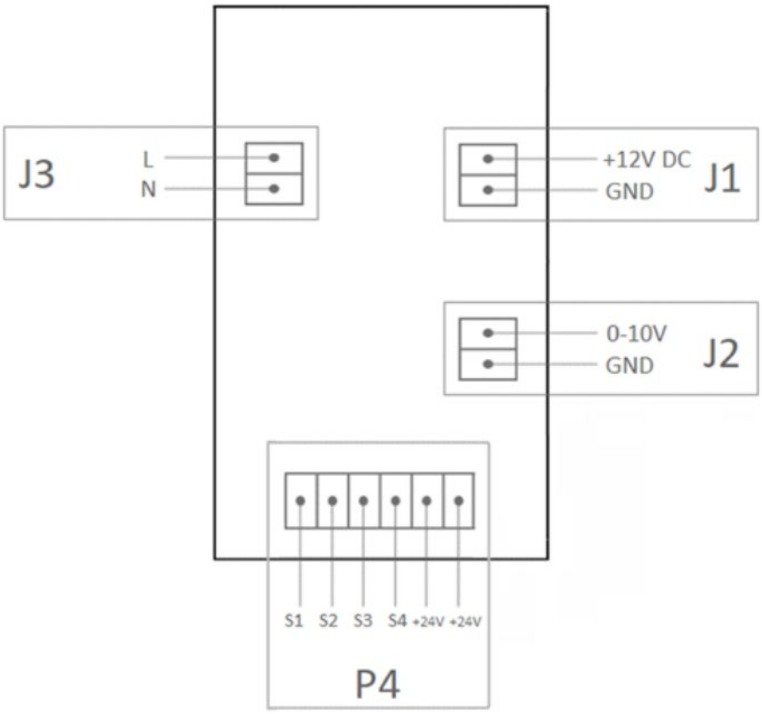


Figure 7 Bypass module board

Description of bypass module board connections	Nest number
Connection to bypass motor	P4
Powering the board	J3
Signal connection to board A	J2
Voltage connection to board A	J1

In order to connect an additional component to theunit, an additional configuration procedure must be carried out. After the correct physical configuration of component connections, it is necessary to perform confirmation of connections through configurations in the device software. To do this : turn on the unit OFF mode, and then go to the Manufacturer's Menu (enter code 2222)- Input/Output Configuration. Depending on the device component connected to the input, you need to configure analogue/double-state/embedded inputs, and relay outputs/analogue/0-10V/air panel operation signal, respectively.

4. Installation

4.1. Unboxing

The full set includes:

- - Heat recovery unit - 1 unit.
- - User Manual
- - Mounting feet - 4 pcs.
- - EPP plastic screws - 12 pcs.

- - Mounting kit: 4 × screw, 4 × dowel, 4 × washer
- - Wall mounting rack: length = 174 mm - 2 pcs.
- - Cardboard

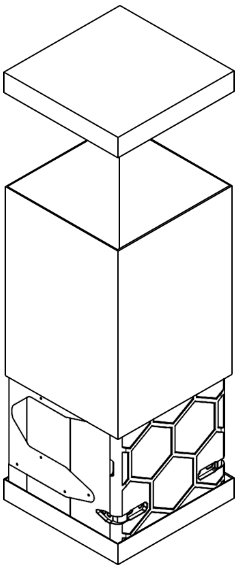


Figure 4: Unpacking the air handling unit

4.2. Floor mounting of the unit

In order to properly install the floor unit, you need to prepare 4 mounting feet and 12 pieces of EPP plastic screws. Then screw them with screws in the places for them according to Figure 5.

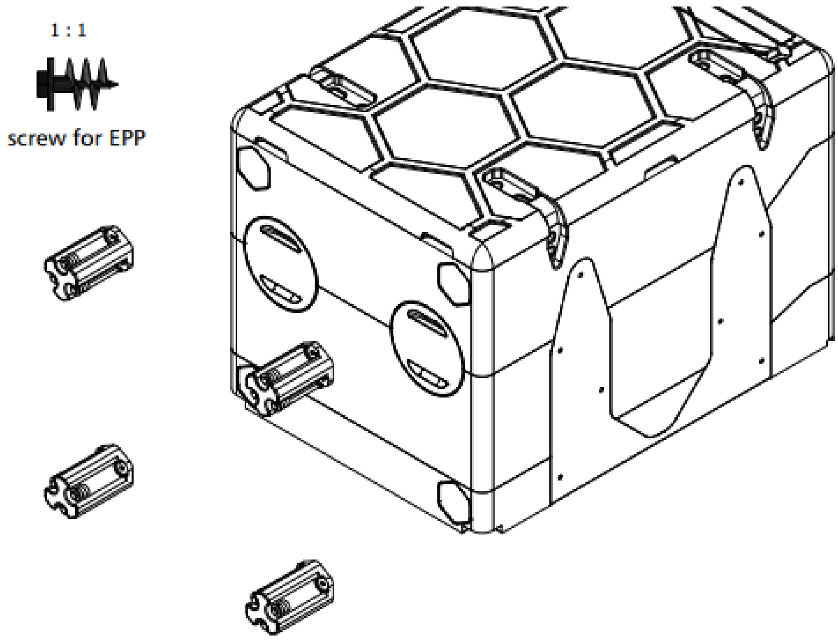


Figure 5: Assembling the feet

DIAMETER OF THE CONDENSATE DRAIN FI 16

To install the siphon in the given position, carefully put a flexible tube on the unblocked condensate spigot. Make the siphon. When the siphon is ready and connected to the sewage system, fill it with water.

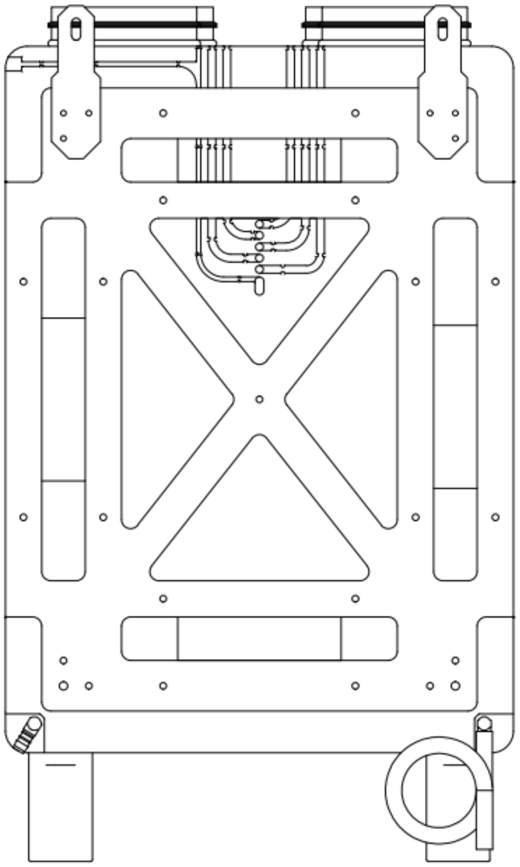


Figure 6... Installation of the condensate drain

4.3. Vertical wall mounting of the unit

The unit is designed to work in a vertical wall mounting arrangement. For this purpose, you can use one of the two mounting kits shown below. In addition, in the mounting shown in Figure 7, it is recommended to use screws to correct the angle of the unit for better condensation drainage.

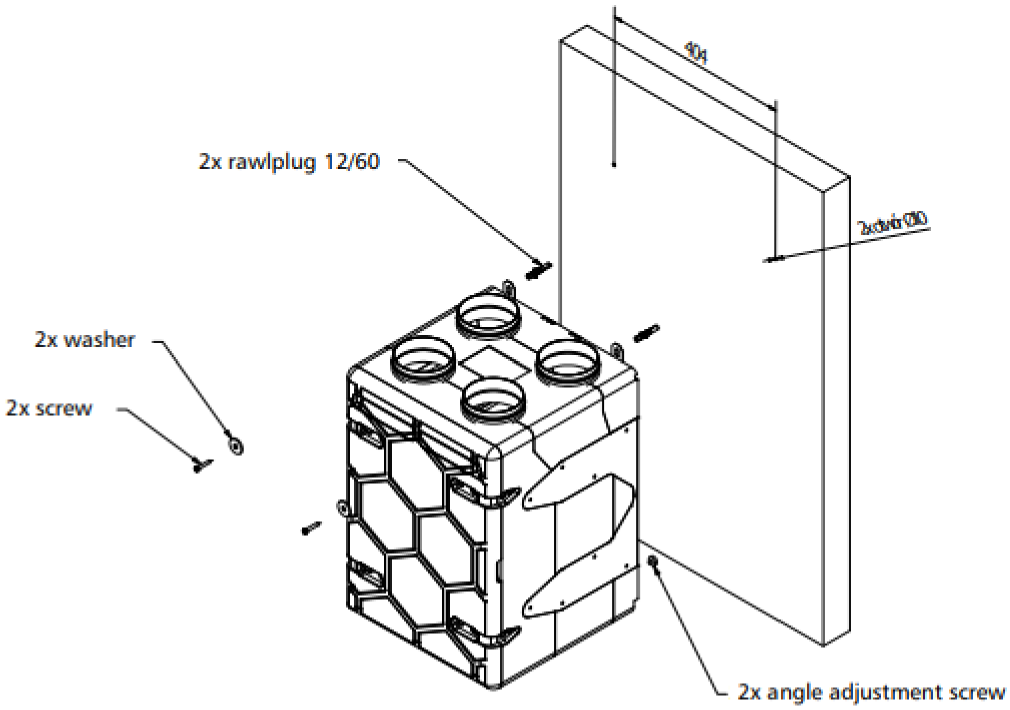


Figure 7: Vertical unit installation

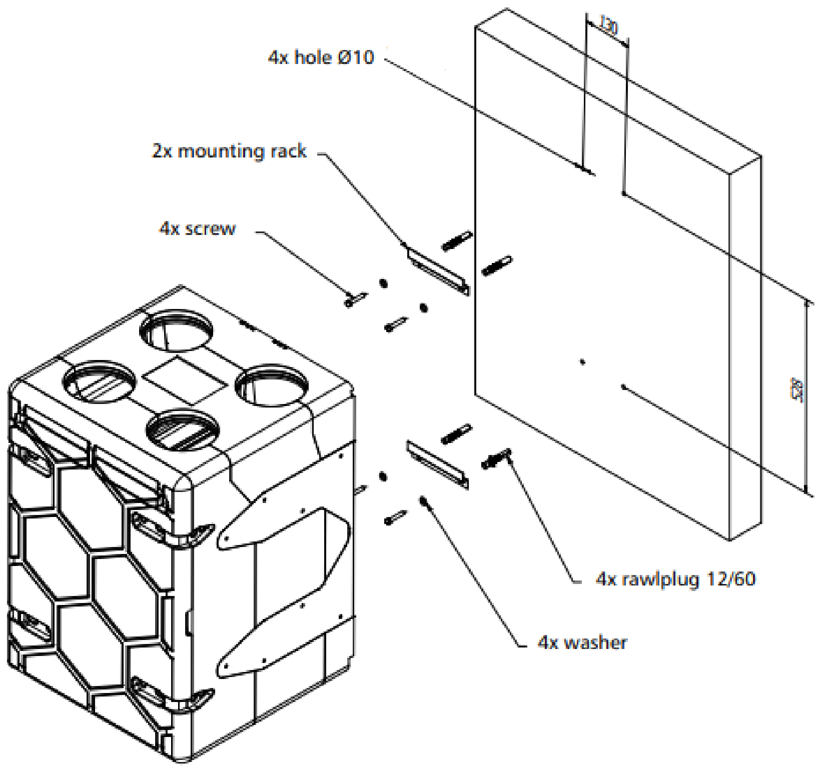


Figure 8: Vertical unit installation on the mounting rack

DIAMETER OF THE CONDENSATE DRAIN FI 16

To install the siphon in the given position, carefully put a flexible tube on the unblocked condensate spigot. Make the siphon. When the siphon is ready and connected to the sewage system, fill it with water.

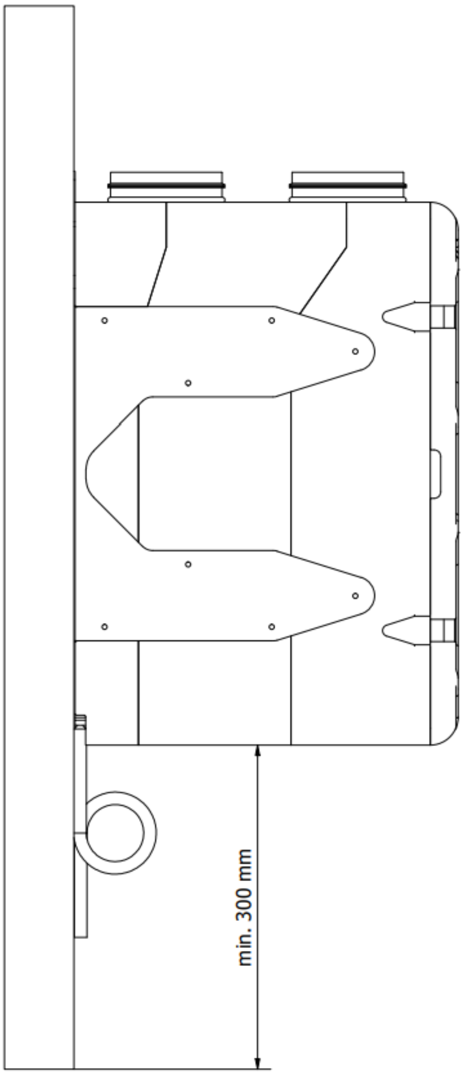


Figure 9. installation of the siphon in the vertical position

NOTES:

The supplied dowels are designed for concrete walls, solid bricks or cellular concrete. For other materials, use the appropriate wall plugs, screws, which can be purchased at a hardware store.

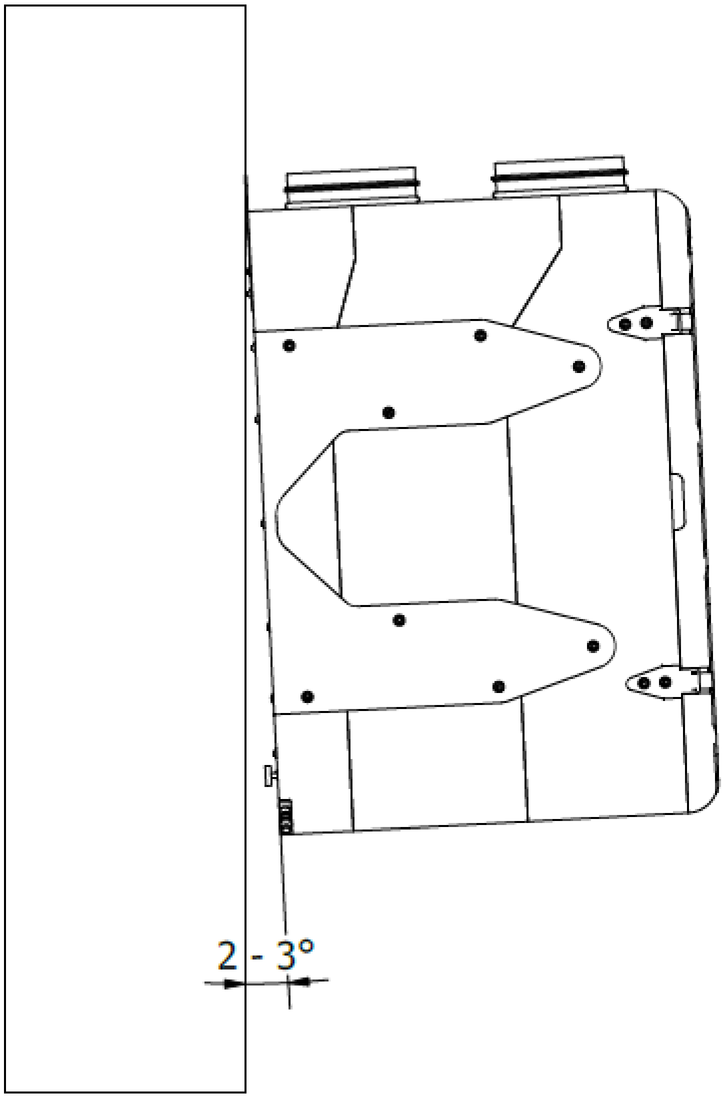
NOTES:

Remember to fill the siphon. If the siphon dries out, condensation is not drained from the housing and water may leak through the housing or damage the fan. Fill the trap by pouring water directly into it.

Do not fill the siphon while the air handling unit is running!

If there is no room for a condensate drain trap, a condensate pump should be purchased from HVAC wholesalers.

After mounting the air handling unit on the wall, adjust the angle of deviation from the wall by about 2 - 3 degrees in order to properly drain the condensate. For this you can use the correction screws built into the unit.



4.4. Horizontal mounting (on the wall or floor)

The unit is suitable for horizontal mounting on the wall or floor. To mount the unit horizontally on the wall, you can use the two methods shown in the figures below

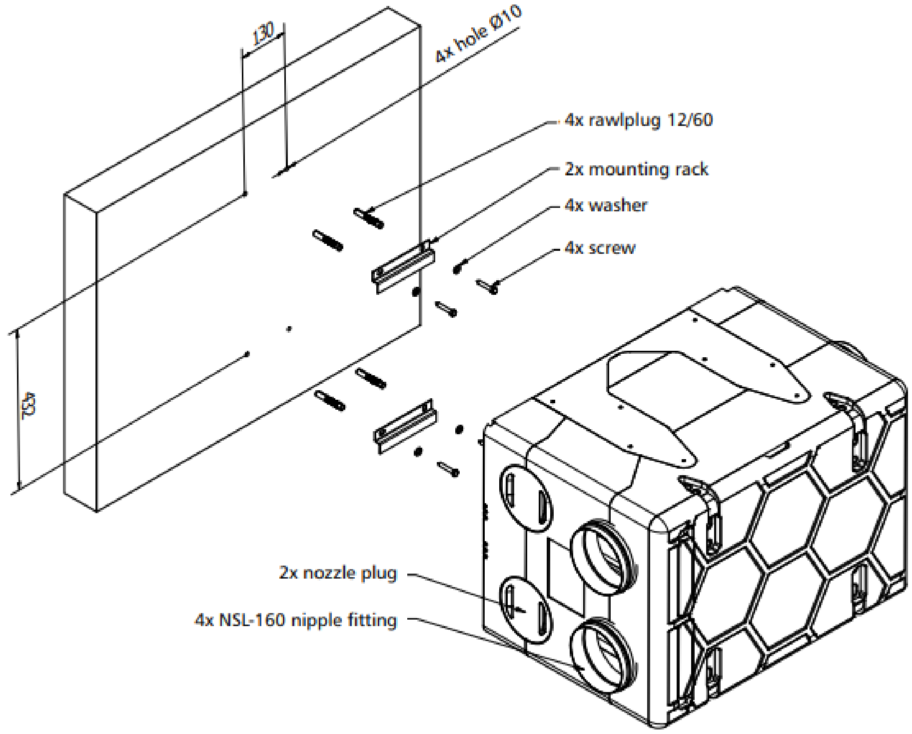


Figure 10: Mounting with a mounting rack

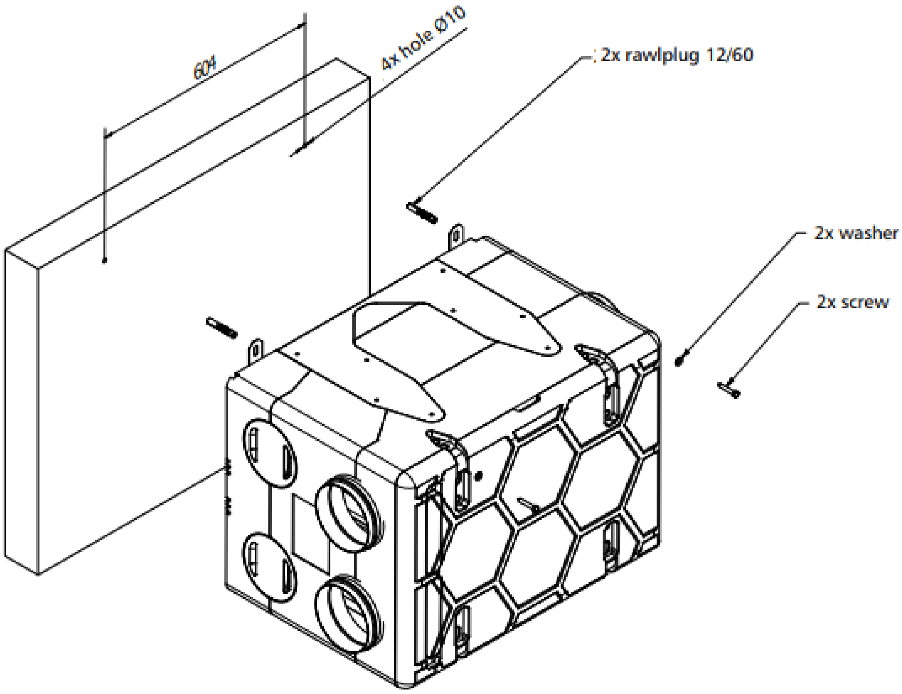


Figure 11: Mounting the unit horizontally on the wall

DIAMETER OF THE CONDENSATE DRAIN FI 16

To install the siphon in the given position, carefully put a flexible tube on the unblocked condensate spigot. Make the siphon. When the siphon is ready and connected to the sewage system, fill it with water.

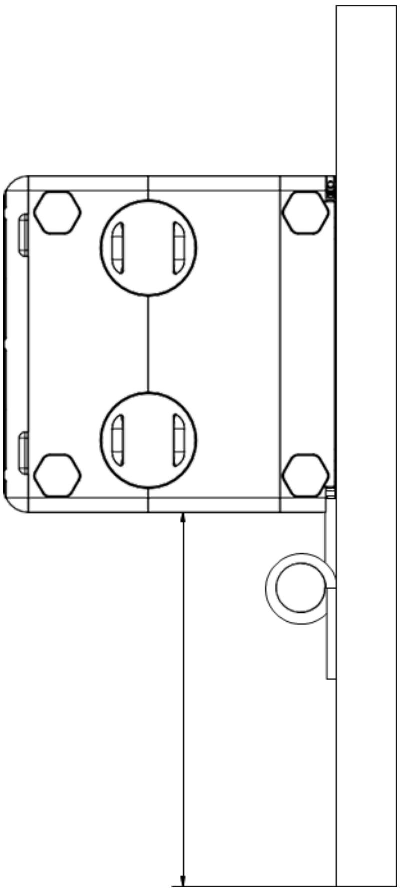


Figure 13: Mounting the siphon in a horizontal position

NOTES:

The supplied dowels are designed for concrete walls, solid bricks or cellular concrete.

For other materials, use the appropriate dowels, screws, which can be purchased at a hardware store.

NOTES:

Remember to fill the siphon. If the siphon dries out, condensation is not drained from the housing and water may leak through the housing or damage the fan. Fill the trap by pouring water directly into it.

Do not fill the siphon while the air handling unit is running!

If there is no room for a condensate drain trap, a condensate pump should be purchased from HVAC wholesalers.

NOTES:

If the unit still has a problem draining condensate from the heat exchanger during the winter season, it is recommended to set venting in the Time Program function. The venting function consists of setting the run (HOME+) in the "Time Program" for 15 minutes once every 24 hours of operation.

4.5. Duct installation

1.Usually you will connect your ducting directly to HRU Ø160 connectors

Although HRU-MinistAIR-P has very low Sound power level in some cases it is recommended to install additional silencers (on supply and extract sides) to provide high level of acoustic comfort.

Description of connections:

SUPPLY – warm fresh air incoming to house

EXHAUST – cool stale air exhausted to outside

EXTRACT – warm stale air extracted from house

OUTDOOR – cool fresh air taken from outdoor

2.If you want use different duct connectors it is possible to unmount NSL male connectors and easily install replacement fittings (for example elbow, offset bend, etc.). NSL connector are snap-on mounted, to unmount them you need to pull them up using a some force.

Optional fittings connected to HRU must be in male-ended according to ALNOR's dimension standards (see our SPIRAL® catalogue with dimension tolerances). To provide the best tightness we suggest to use ALNOR's products with gasket. We are not responsible for tightness if fitting are purchased from other companies..

3. The heat recovery unit is designed symmetrically, which makes it possible to operate in two configurations.

- The left side - the supply fan is located on the left side of the unit.
- The right side - the supply fan is located on the right side of the unit.

The configuration can be selected before purchasing the unit.

HRU-MinistAIR-...-L

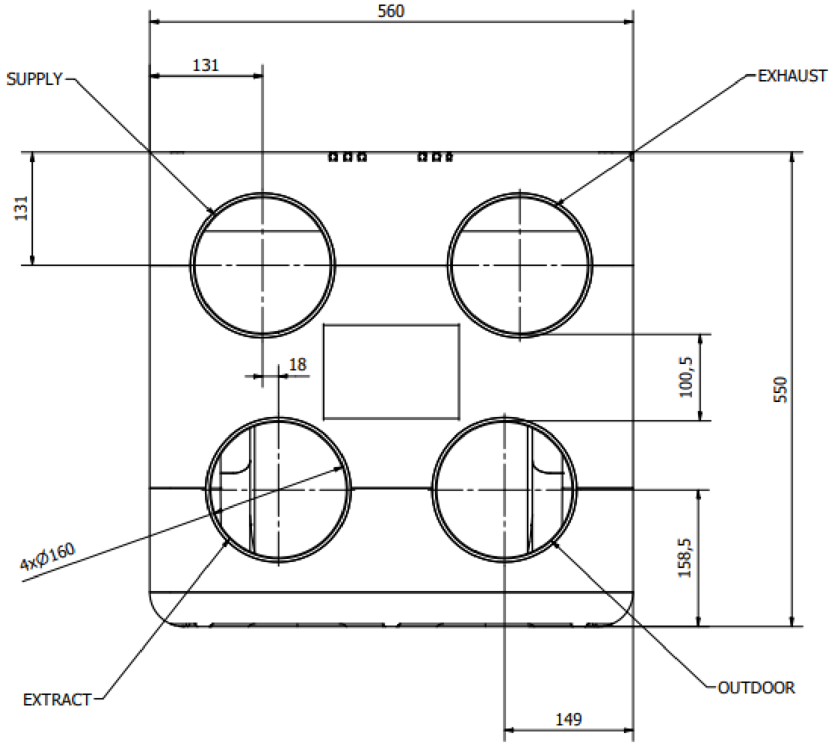


Figure 14: Dimensions of connectors for installation including space for insulation - LEFT

HRU-MinistAIR-P-...-R

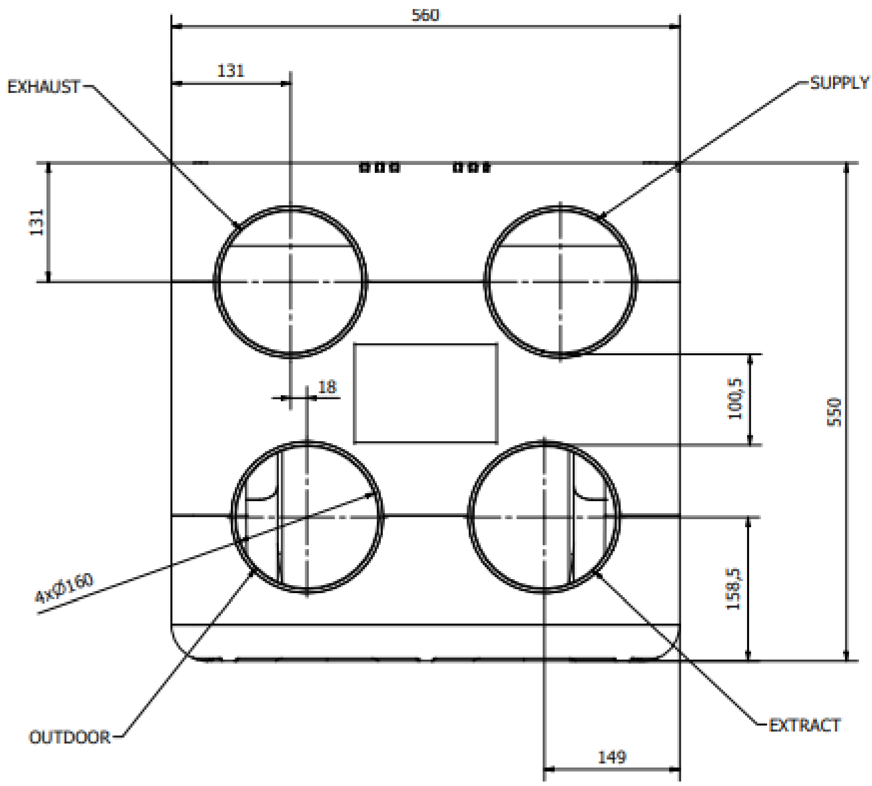
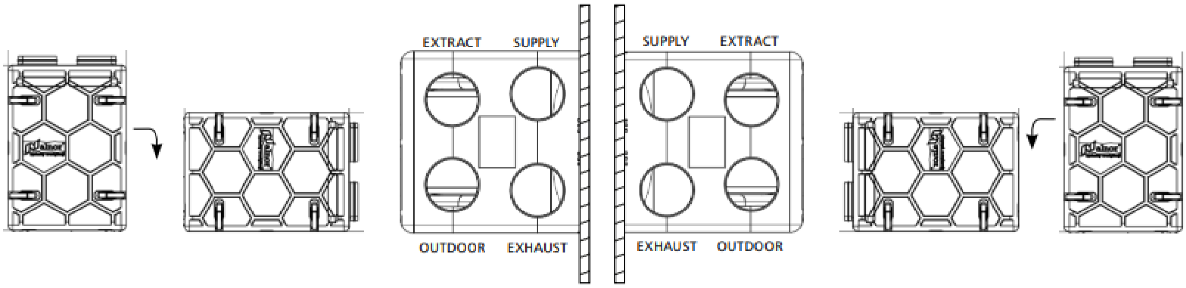


Figure 15: Dimensions of connectors for installation including space for insulation - RIGHT

1. The unit can also operate in the side position. The following figures show the possible configurations, depending on the version.



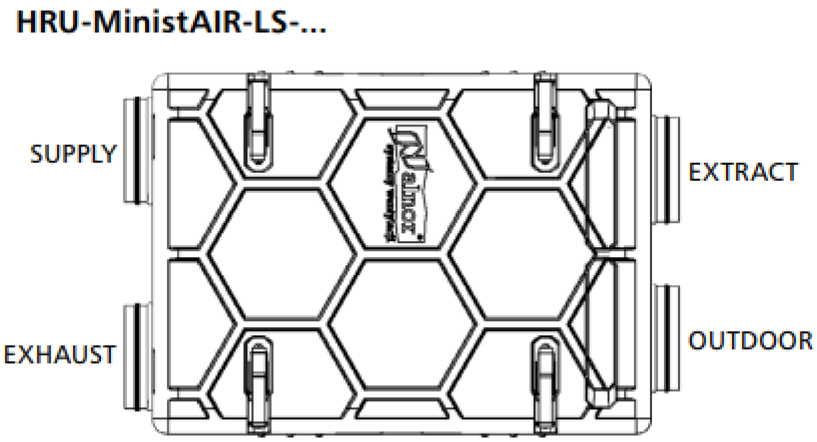


Figure 16: Connectors arrangement for L and LS versions

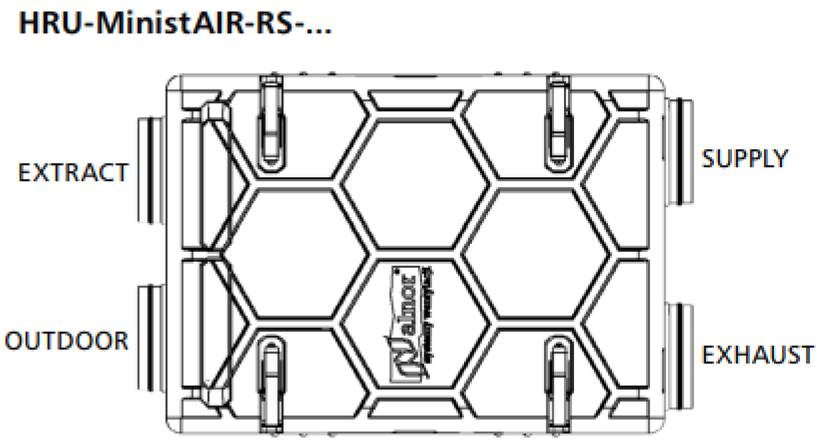
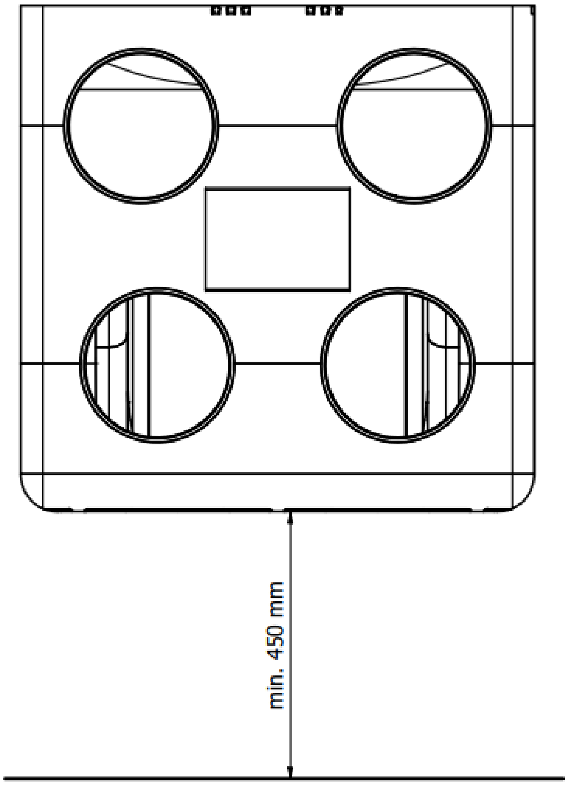


Figure 17: Connectors arrangement for R and RS versions

4.6. Maintenance space

Drawing shows minimal serivce distance for filter change or control circuit check. Please remember also to provide enaugh space to condensate drain service: from back or left side in floor mounting and from bottom or left side in wall mounting.



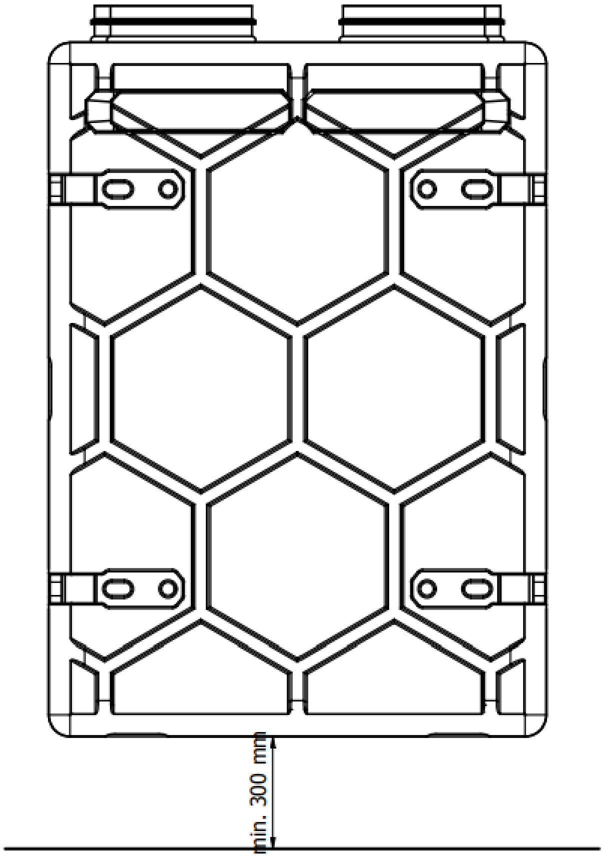


Figure 18: Maintenancee space for filter replacement and exchanger replacement

4.7. Installation of condensate drain in units with enthalpy exchanger

In the case of a unit with an enthalpy exchanger, it is possible to dispense with the installation of a condensate drain under certain operating conditions. The relative humidity in the rooms must not exceed 60%. Otherwise, condensate will form in the heat exchanger and must be drained off. Failure to drain the resulting condensate may result in damage to the unit. If the condensate drain is not used, the drain hole must be sealed with the cap included in the set.

5. First start-up

5.1. Connection to electric power

The control unit has a standard power cord (3 m long) for plugging into an outlet. After connecting to the electric power supply, the recuperation unit begins to start. First the bypass is closed, , which will perform a shutdown test, even if it is physically closed. Then the fans start up at the default speed.

6. Normal operation

6.1. Control operation

Depending on the choice of control panel, different modes of control and control of the control panel are available. For details, please refer to the instructions of each control panel. We can divide the main control modes of the control panel into:

- MANUAL MODE - responsible for manual setting of one of 4 fan operation settings for an indefinite period of operation,

- SCHEDULE MODE - responsible for manually setting one of 4 fan operation settings at a specific time schedule during a given day of the week. There are also time modes of unit operation:

- OUT- the unit enters a standstill mode for a user-specified time (default: 1h),

- AIRING - by turning off the supply fan, the speed of the room exhaust fan is increased. Duration and speed of the fan configurable by the user (default 5 min and 30% of the fan setting),

- PARTY - the unit changes the current fan settings to the maximum settings and the comfort temperature to the user-configured temperature within the specified operating time interval (default 20°C). The unit is equipped with an active season detection system. It allows blocking the operation of connected devices depending on the current season:

- SUMMER MODE - the operation of the heaters is blocked,

- WINTER MODE - the operation of the cooler and the operation of the bypass valve in cooling mode is blocked,

- VENTILATION - the operation of the heaters and the cooler is blocked. The protection algorithms of the device still remain active,

- AUTO - depending on the configuration of the mode settings and the outside temperature, the summer/winter mode is determined

NOTES:

We advise against turning off both fans for an extended period of time (several days or longer). This can lead to moisture accumulation, mold and mildew development. Even when the house is empty and there is no CO2 or human moisture generation, any construction materials emit numerous pollutants. We recommend setting the speed to low for the duration of your absence.

6.2. Temperature measurement

The temperature sensors have measurement capabilities ranging from -20°C to 60°C. All temperature sensors are located at the respective spigots. In addition, a sensor mounted on the exhaust in addition to the temperature measures the relative humidity from all the exhaust rooms.

Supply sensor

The supply sensor measures the temperature of the air entering the building after it passes through the heat exchanger.

Extract sensor

The extract sensor measures the temperature of air which is extracted from the building before it enters the heat exchanger or bypass valve.

Internal relative humidity level sensor (extract)

It is responsible for measuring the total relative humidity level from the exhaust rooms. When this value rises above the normal value of the humidity level, the ventilation system is activated, i.e. the current setting is increased (by 20% by default, the setting can be changed by the user). In this case, the operation of the unit in an increased gear continues until the relative humidity level decreases by at least 5% (user-adjustable setting) relative to the normal value of the humidity level. If the average value of the measurements taken has not decreased relative to the measurement before the increased gear, the unit will still operate on the setting until the measurement is taken again.

If the measurement values of the total relative humidity level from the exhaust rooms is below the normal humidity level, the slowdown of the exhaust fans from the rooms is activated. This occurs by changing the exhaust fan setting (by 20% by default, user-adjustable setting) relative to the current gear. This change is active until the room relative humidity level returns to normal.*.

*(Requires optional analog humidity sensor).

Exhaust sensor (exhaust)

The ejection sensor measures the temperature of the air exhausted from the building after it passes through the heat exchanger.

Ambient temperature sensor (intake)

The outdoor temperature sensor measures the temperature of air drawn from outside before it enters the heat exchanger or bypass chamber.

6.3. Frost protection

Protection against freezing of the heat exchanger is achieved by reducing the speed of the intake fan to a minimum level. The advantage of this method is that the flow of the system is less unbalanced, and it is possible to cooperate with the pre-heater during defrost operation.

The antifreeze mode will be activated when the temperature at the exhaust (**Texh**) reaches a temperature equal to or lower than the configured antifreeze mode activation temperature (**Tdef**).

$$\mathbf{Texh \leq Tdef}$$

The antifreeze mode will be deactivated when the temperature at the exhaust (**Tout**) reaches a temperature higher than the configured antifreeze activation temperature (**Tdef**) + antifreeze deactivation hysteresis (**Hdef**).

$$\mathbf{Texh > Tdef + Hdef}$$

Attention:

The anti-freeze mode is effective up to -2°C. When the unit is equipped with a built-in heater or an external preheater is connected to the system, if the temperature at the air intake (Tint) drops below -2°C (Tint < -2) the heater will be switched on.

6.4. Preheaters

6.4.1. Built-in pre-heater

The heater is a piece of equipment installed to protect the exchanger from freezing. The heater operates when the following conditions are met:

- heater operation enabled (Advenced settings > Heater settings),
- Active Work-Heat Mode,
- The global work permit flag is attached,
- The fans are working,
- The exchanger cleaning procedure is not active,
- The exchanger dehydration procedure is not active,
- The procedure for protection against too high a supply temperature is not active,
- winter seasonal mode,
- ventilate and exit time modes are not active,
- preheater overheating procedure is not active.
- the cyclic overheating procedure of any of the heaters is not active.

The heater will be switched on when the above conditions are met, and the outdoor temperature (Tout) reaches a temperature equal to or lower than the configured heater switch-on temperature (Tnws).

$$\mathbf{Tout \leq Tnws}$$

The preheater will be switched off when the outdoor temperature (Tout) reaches a level equal to the preheater switch-on temperature (Tnws) + the preheater switch-off hysteresis (Hws).

$$\mathbf{Tout \geq Tnws+Hws}$$

The preheater is equipped with an additional element to protect it from overheating. This element is thermostats, which shut down the operation of the heater when the temperature threshold of their operation is exceeded. In the event of a situation where the operation of the heater is interrupted due to the activation of thermostats (at least 3 times in an hour), the air handling unit goes into a cyclic overheating procedure. It consists in stopping the operation of the control panel, and signaling the occurrence of a failure in the Alarms Menu. The procedure can be deactivated by confirming the alarm by the user

6.4.2. External preheaters

6.4.2.1. Preheater HRQ-PRE-P-HDE-160-1,5 (optional)

The outdoor preheater is an additional accessory and can be installed to protect against freezing. To install the heater, you need the HRQ-PRE-P-HDE-160-1,5 (electric heater with a special plug). Figure 23 shows an example of how to connect the heater. We advise you to install a filter in front of the HRQ-PRE-P-HDE-160-1,5 to prevent fouling of the heaters and prolong the life of the product.

The heater operates when the following conditions are met:

- heater operation enabled (Installer menu (code 1111) > Heater settings),
- Active Work-Heat Mode,
- The global work permit flag is attached,
- The fans are working,
- The exchanger cleaning procedure is not active,
- The exchanger dehydration procedure is not active,
- The procedure for protection against excessive supply air temperature is not active,
- winter seasonal mode,
- ventilate and exit time modes are not active,
- preheater overheating procedure is not active.
- the cyclic overheating procedure of any of the heaters is not active.

The heater will be switched on when the above conditions are met and the outdoor temperature (**Tout**)reaches a temperature equal to or lower than the configured heater switch-on temperature (**Tnws**).

$$\mathbf{Tout \leq Tnws}$$

The preheater will be switched off when the outdoor temperature (**Tout**) reaches a level equal to the preheater switch-on temperature(**Tnws**) + preheater switch-off hysteresis (**Hws**).

$$\mathbf{Tout \geq Tnws+Hws}$$

The preheater is equipped with an additional element to protect it from overheating. This element is thermostats, which shut down the operation of the heater when the temperature threshold of their operation is exceeded. In the event of a situation where the operation of the heater is interrupted due to the activation of thermostats (at least 3 times in an hour), the air handling unit goes into a cyclic overheating procedure. It consists in stopping the operation of the control panel and signaling the occurrence of a failure in the Alarms Menu. The procedure can be deactivated by confirming the alarm by the user.

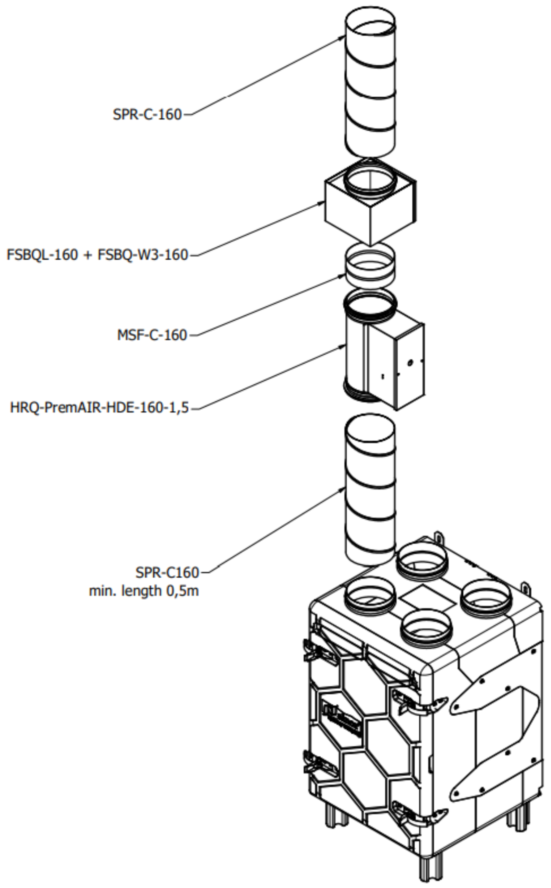
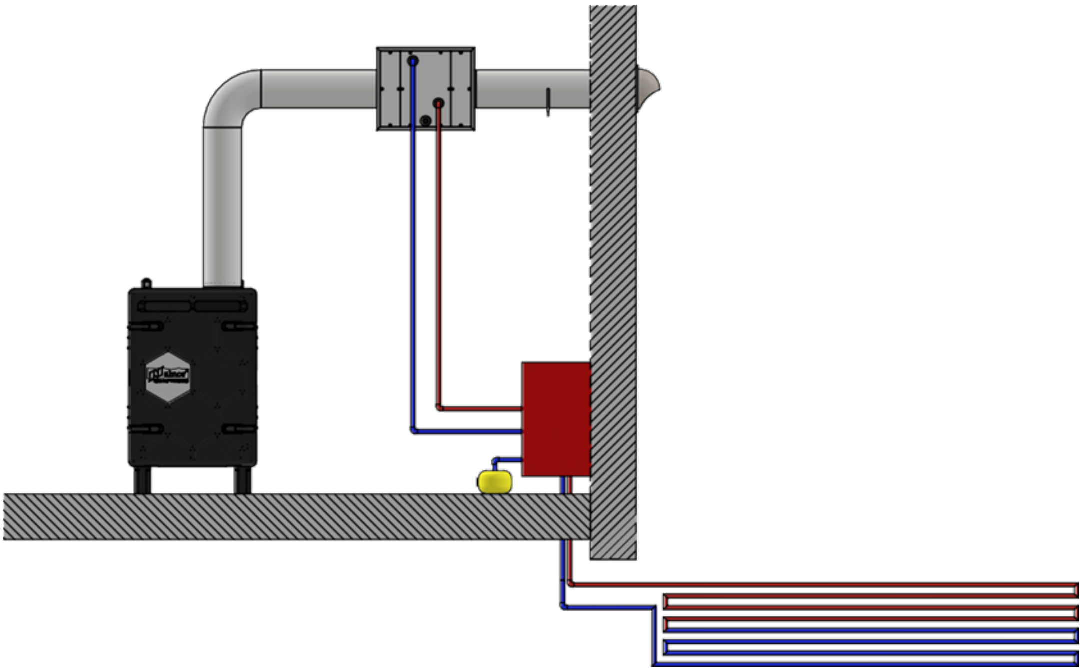


Figure 19: External preheater connection

6.4.2.1. CHDW-G-200 water preheater (optional)

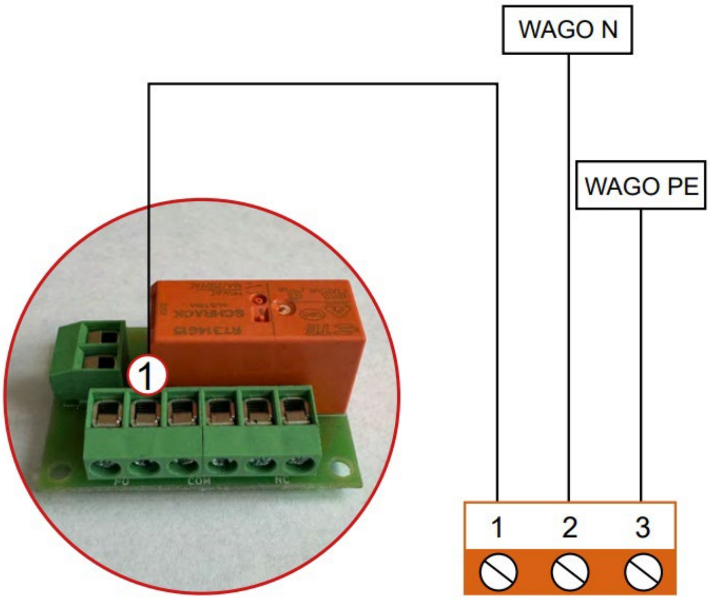
The unit has the ability to hook up a water preheater. The preheat function is designed to protect the heat exchanger from freezing. The unit, through an internal algorithm, is responsible for switching on the liquid circulation pump in the system. The preheater should be installed on the intake duct in front of the unit at a distance of not less than 0.5 m. An external air temperature sensor HRQ-SENS-5000-P should be brought out, which should be installed in the intake duct before the heater/cooler. The temperature sensor should be connected to the T3 connector. This will allow the device to monitor the actual temperature of the intake air before the heater.

With the installation of the CHDW-G-200 water preheater, it is recommended to remove the filter on the intake duct in the unit.



The heater is controlled by sending a signal to the pump responsible for circulating the medium.

The pump is powered directly from the unit motherboard.



1.	NO
2.	WAGO N
3.	WAGO PE

Changing the type of preheater is found in the unit's installer settings.

Device parameters -> Service access -> Enter installer service access code (1111)

-> Heater settings -> Pre-heater type -> Water ON.

Changes to the device settings should be carried out by a qualified person. Making changes other than those suggested by the manufacturer may lead to malfunction of the device.

6.5. Recirculation (optional)

The unit has the ability to connect the Alnor Recirculation System, which works in the anti-freeze function. This function allows you to control the HRQ-REC damper, which returns air from the exhaust to the unit's inlet (depending on external temperature conditions). During recirculation, the speed of the exhaust fan is also increased to increase the efficiency of the unit, heat the heat exchanger and get rid of condensation

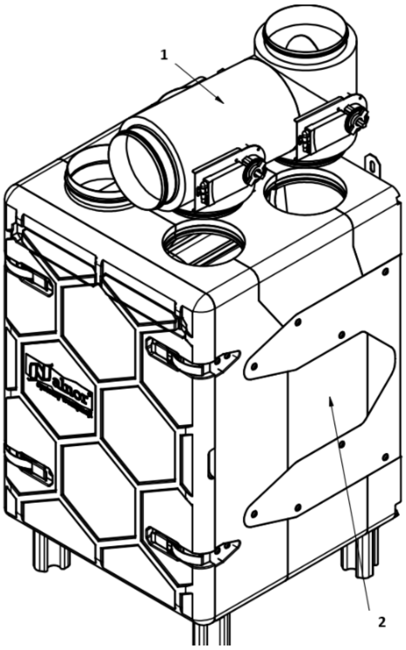


Figure 25: Connection of the recirculation module to the unit: 1. HRQ-REC 2.MinistAIR-P unit

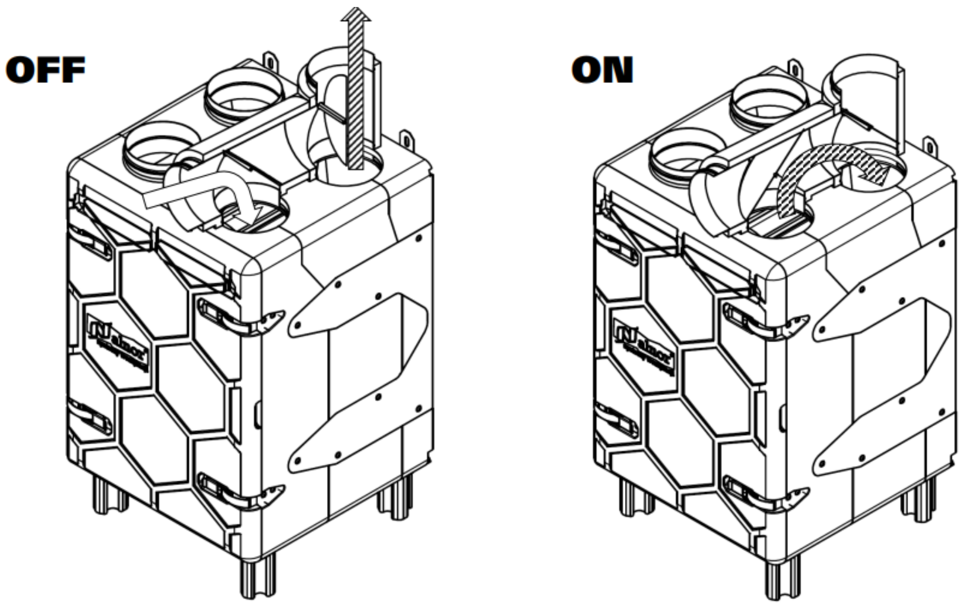


Figure 25: Operation of the recirculation module

In order to connect the recirculator to the unit, an additional configuration procedure must be carried out. The HRQ-REC recirculator damper should be connected to the OUT 1 output, then confirm the connections through configurations in the device software. To do this, turn on the OFF mode of the unit, and then go to the Manufacturer's Menu Service Settings (code 2222) - Input/Output Configuration. It is necessary to select the option - Recirculation at the OUT 1 output The option to expand - Air recirculation will appear. There are two modes of operation: cyclic operation mode and continuous operation mode.

6.5.1. Cyclic operation mode

Cyclic mode is the standard mode of operation of the recirculator based on the external temperature. The recirculator dampers remain open until the algorithm is activated. It activates when the outdoor temperature drops to a sufficiently low level. As long as the temperature does not rise to the switch-on value with hysteresis, the damper cyclically opens and closes according to the tested scheme.

Deciding to operate the recirculator in this mode, it is necessary in the manufacturer's menu to disable operation of the antifreeze mechanism of the exchanger.

6.5.2. Continuous operation mode

A CO2 sensor is required for continuous operation of the recirculator. The recirculator remains closed until the limit CO2 concentration in the air is exceeded. When this level is exceeded, the damper opens and fresh air is supplied until the CO2 concentration is reduced.

6.6. By-pass

The control of the bypass valve depends on the mode of operation selected by the user. There are three possible modes of bypass operation available from the Bypass Menu:

- Bypass open - regardless of conditions, the bypass valve remains open,

- Bypass closed - regardless of conditions, the bypass valve will remain closed,

- Auto - the bypass valve will be controlled according to the corresponding operating algorithm.

6.6.1. Passive heating

Passive heating can be used to heat a building with outside air when the room temperature is lower than the outside temperature and lower than the set temperature. For example, in the spring, after a cold night, a cooled building can be heated with outside air warmed by the sun during the day. Passive heating can also be called "free heating," as the consumption of any conventional energy is not needed. Bypass operation is possible if the condition of no active winter control mode and the following conditions are met:

$$\mathbf{Tsupply < Tcomfort - 1}$$

$$\mathbf{Tinlet \geq Tsupply + 1}$$

6.6.2. Passive cooling

Passive cooling can be used to cool a building with outside air when the room temperature is higher than the outside temperature and higher than the set temperature. For example, in the summer, a heated building can be cooled with outside air on a cool night. Passive cooling can be referred to as "free cooling" because no conventional energy input is needed, or as "night ventilation" because it is at night that this type of ventilation usually occurs. Bypass operation is possible if the condition of no active winter control mode and the following conditions are met:

Tsupply> Tcomfort + 1

Tinlet ≤ Tsupply -1

6.7. Protection against too high a supply temperature

Supply temperature (Tsupply) that exceeds the set threshold (Tpgw) (default 50°C) activates the procedure against too high temperature of the supply air:

• The unit's alarm is triggered and the unit switches to standby mode for a set duration

• The secondary heater is switched off and locked for a period of time set by the user (the lock remains on if the temperature does not fall below the alarm limit temperature)

Protection against excessively high supply temperature switched on

Tsupply > T pgw

Protection against excessively high supply temperature switched of

Tsupply < T pgw

6.8. Protection against too low a supply temperature

If the supply air temperature(Tsupply) falls below the configured threshold (Tpgn) (default 5°C) and is maintained for the configured time period (tpgn) (default 3 minutes), the procedure for protection against too low supply air temperature will be activated:

- unit alarm is reported along with switching the unit to the configured standstill mode downtime,

- the secondary heater is switched on (if there is no condition blocking the heaters) until the room supply temperature (Tsupply) rises above the set threshold (Tpgn), including the threshold hysteresis value (Hpgw) (default 3°C)

Enabling protection against too low a supply temperature

Tsupply < T pgn for a period of (tpgn)

Disable protection against too low a supply temperature

Tsupply > T pgw + H pgw

6.9. Filters

The air handling unit is equipped with two ISO COARSE 70% class filters (former designation G4). It is also possible to install an ISO ePMI 55% filter (former designation F7), as an accessory. The controller reports the need to replace the ventilation filters by triggering a permanent alarm on the screen.

When the alarm occurs, press the confirmation button, which will trigger the filter replacement procedure and stop the operation of the air handling unit. After the active replacement procedure alarm is displayed, disconnect the air handling unit from the electrical power supply and replace the filters. When the power supply is switched on again, go to the User Menu then go to the Filter Replacement

Procedure Menu, where you must select the class of filters to be replaced, and confirm the replacement of filters. After confirming the filter replacement, press the confirmation button, which will allow you to return to the Filters Menu and, using the "Has the filter replacement been completed?" parameter, additionally confirm the completion of the replacement procedure.

NOTES:

Note that additional filters can increase the pressure drop across the ventilation system.

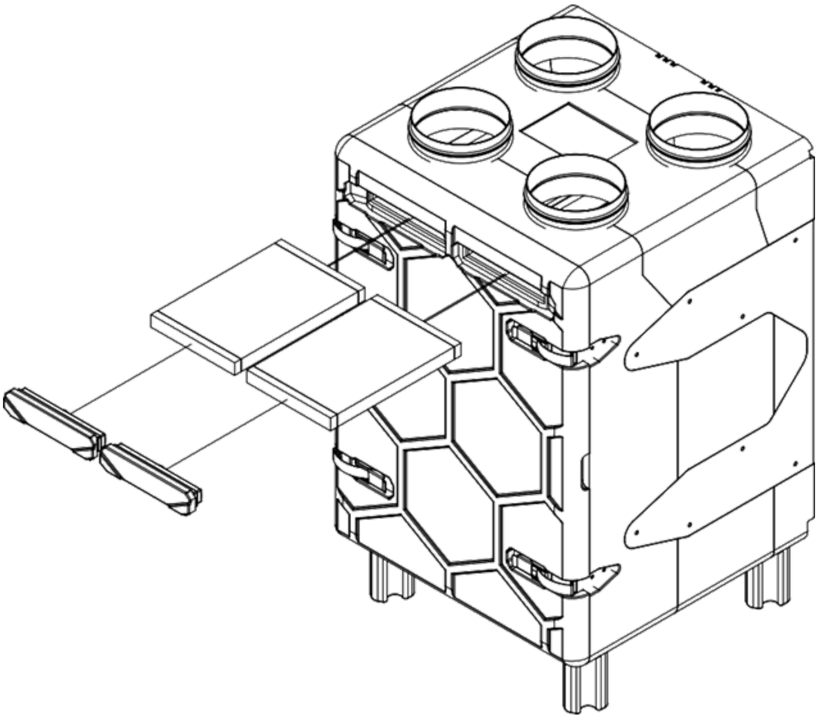


Figure 20: Filter replacement

6.10. Cleaning the heat exchanger

The heat exchanger should be cleaned at least once a year. The amount of dust built up on the heat exchanger depends on: the frequency of filter changes and the quality of the air inside and outside. The heat exchanger can be washed with warm water and mild detergent (pH 6 to 8).

Replacement instructions for the exchanger:

- Turn off the power
- Open the four hooks attached to the side walls and remove the cover
- Remove the exchanger by pulling the strap
- Insert a clean or new exchanger
- Replace the cover (check that the cover fits evenly to the rest of the case)
- Close the hooks
- Turn on the power

6.11. Additional wiring

On the back of the unit there are prepared channels for cable routing. The power cable and USB are already routed out of the PCB compartment. On the other hand, the four remaining holes (marked in red in the figure below) are blanked off and are used for routing additional cables, e.g. from the GWC or the kitchen hood.

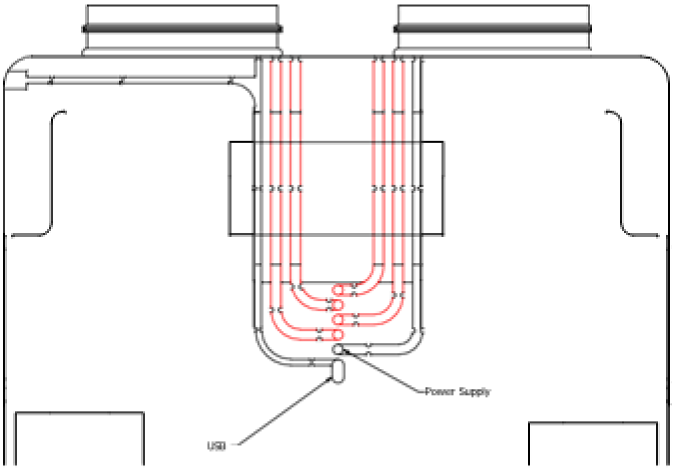


Figure 21: Additional ducts for cable management

6.12. Connecting the ground heat exchanger

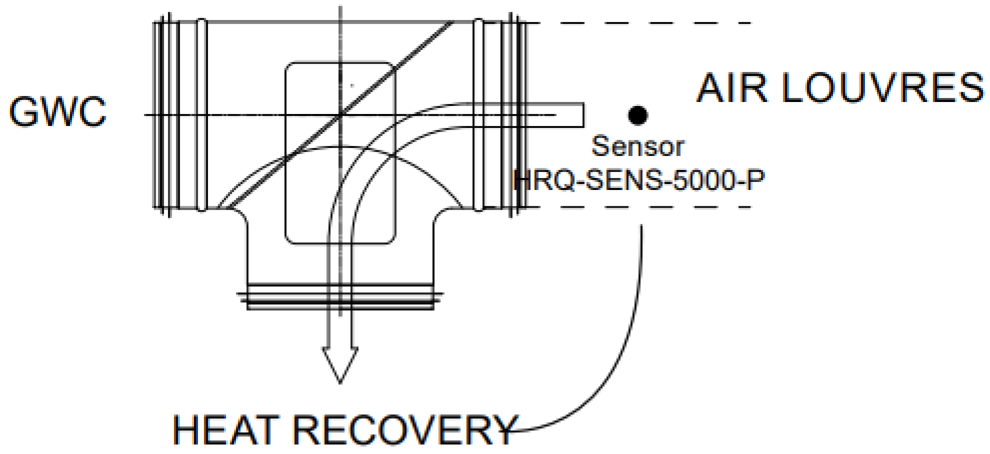
The unit has the ability to hook up a ground heat exchanger. The function allows you to control a valve that optionally supplies air through the ground-to-air heating system. For this purpose, install a dedicated bypass damper under the actuator (DATVTML). The dampers are driven by an electric actuator DM-ML-06-230. For quick installation of actuators, we recommend specially designed DA-SUP-S and DA-SUP-M stands.

Matching actuators for DA-SUP-S	Matching actuators for DA-SUP-M
Alnor DM-ML-06	Alnor DM-ML-06
Belimo CM	Alnor DM-ML-08
Belimo LM	Belimo CM
Belimo TR	Belimo NM

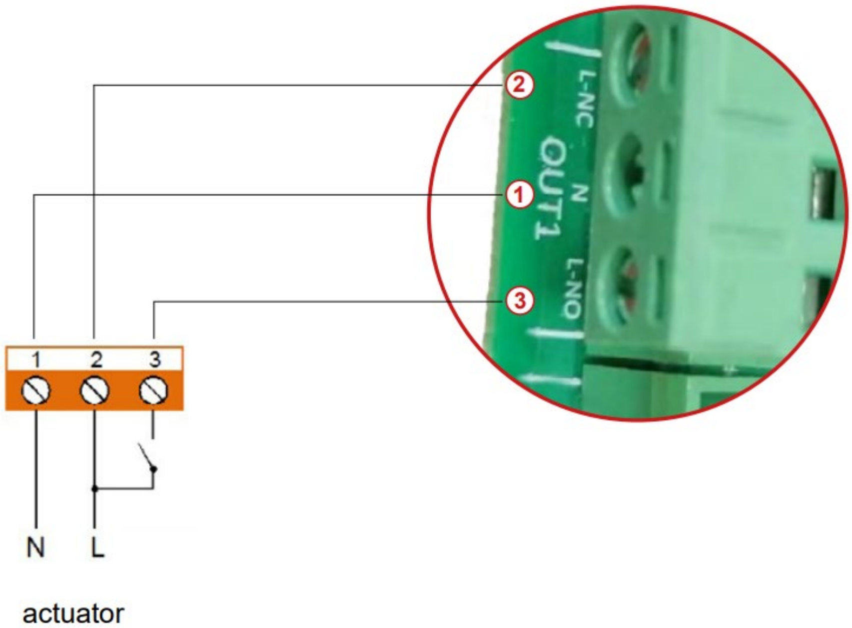
When installing the actuator to the damper, make sure that:

- The damper was open in the direction of the Unit-CERP (not the GWC),

- the external air temperature sensor HRQ-SENS-5000-P should be brought out and connected in the intake duct, before the damper with actuator. The temperature sensor should be plugged into the T3 connector on the unit control board.

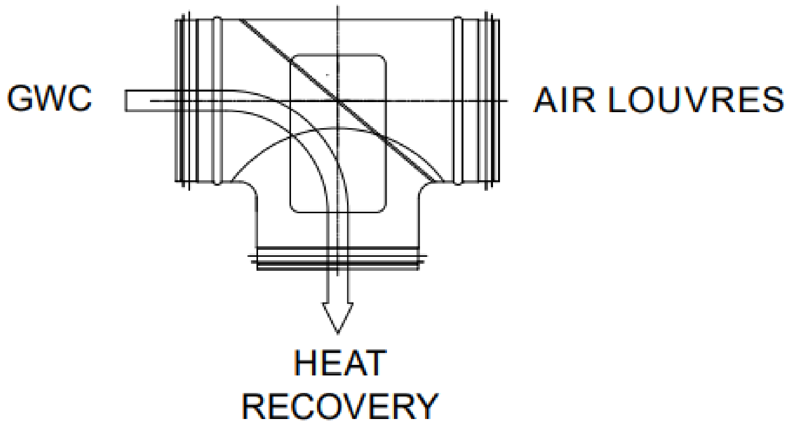


In order for the valve to operate properly, the throttle with electric actuator DM-ML-06-230 must be connected to the OUT1 connector in order:



	OUT1
1	N
2	L-NC
3	L-NO

Activation or deactivation of the operation of the Ground Heat Exchanger can be made using the parameter "GWC operation" from the Installer Menu (submenu GWC Settings / Mixer / Refrigerator). Automation controls the valve based on the temperature at the intake port. Depending on the season (winter/summer), the GWC valve opens for a certain time or when the opening condition is not met.



Summer season

Tinlet > TGWC(l)

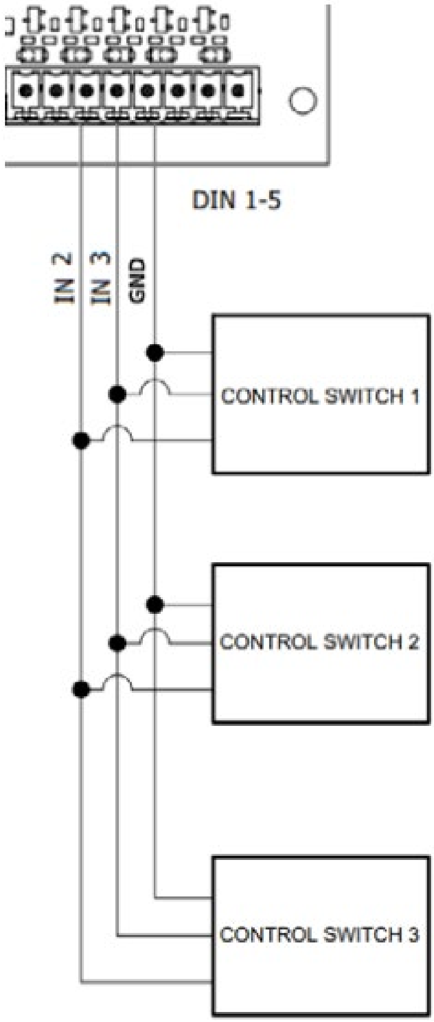
Winter season

Tinlet< TGWC(z)

The values of Summer Opening Temperature [T(GWC(l))] and Winter Opening Temperature [T(GWC(z))] of the GWC are set to 25°C and 5°C by default. They can be edited from the "GWC" user menu. In order to protect the ground in the winter season from cooling, and in the summer season from getting too hot, the unit has a protection system. This system is developed on the basis of the "regeneration time" (default 3h) and "maximum opening time" (default 6h) of the GWC. It is possible to change the maximum opening and regeneration time of the GWC valve in the user menu -> GWC -> GWC settings.

6.13. Connecting the control switch / hood

The unit has the ability to connect a control switch or hood. This function allows you to temporarily or permanently change the speed of the fans. There are two digital inputs, which can be freely configured under the selected option. For this purpose, we use DIN 2 and DIN 3 inputs. It is possible to connect multiple switches in parallel to control from different rooms.



It is possible to set the duration of the cycle from 1 to 60 minutes. If you set 0 in the run time option, the change in fan speed will continue until the input is restored to normal.

6.14. Connecting the post heater, post cooler, post cooler with heating option

The unit has the ability to hook up a secondary water/electric heater, water cooler or water heater/cooler. The secondary heating/cooling function is designed to improve the comfort temperature in the supply rooms. The unit, through an internal algorithm, is responsible for driving the actuator mounted on the three-way valve or a relay in the case of an electric secondary heater. The heater/cooler should be mounted on the supply duct behind the unit at a distance of not less than 1m. It is possible to bring out an external air temperature sensor HRQ-SENS-5000-P, which should be mounted in the supply duct behind the heater/cooler. This allows us to monitor the actual supply air temperature behind the heater/cooler. When using a heater or heater-cooler operating in heating or cooling mode only, a 3-way valve must be used. On the other hand, if the heater-cooler operates alternately in heating and cooling mode, a 6-way valve is required.

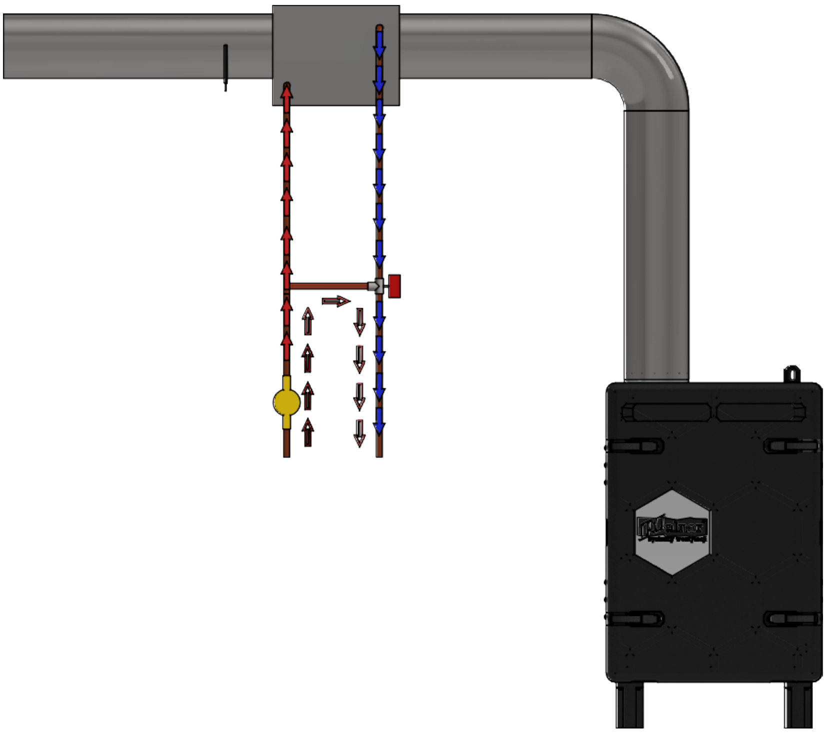


Figure 22. heater/cooler wiring diagram

Automation controls based on the reading of the temperature of extract air from the rooms, and the set comfort temperature. According to the formulas:

- Secondary heating:

Extract temperature < Comfort temperature - 2°C

- Aftercooling:

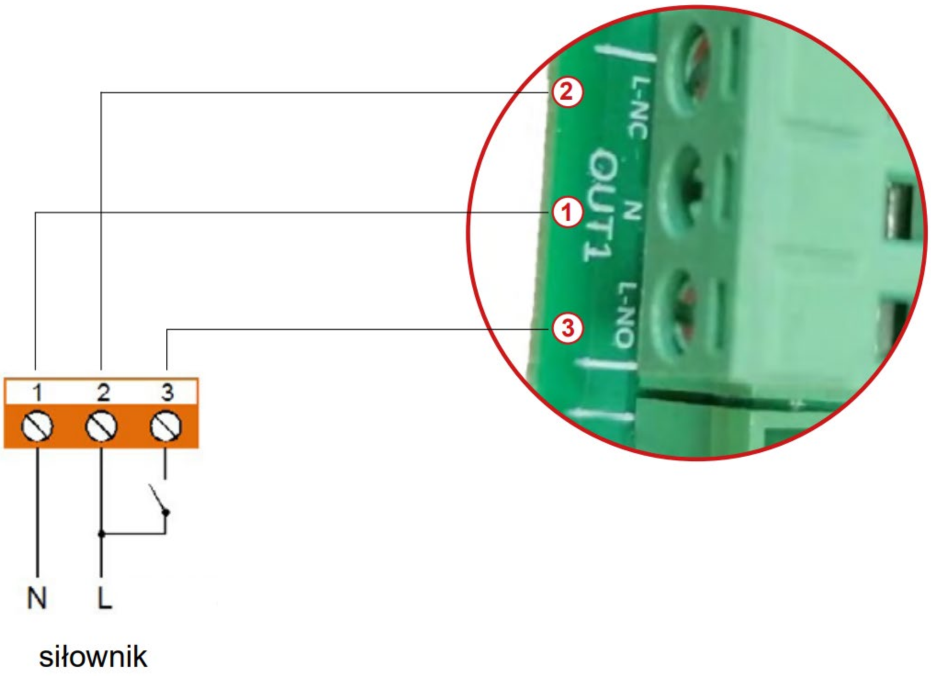
Extract temperature > Comfort temperature + 2°C

6.14.1. Connecting a secondary heater, cooler or water heater/cooler

Use to control the three-way valve:

Function	Matching water heaters or heater/cooler (diameter of spigots unit):	Matching actuators:	Matching three-way or six-way valves:
Heater	HDW-160	Belimo TRY230 2Nm Powered by 230VAC	R3015-1-B1 (DN15, kvs-1.0)
Heater	HDW-200	Belimo TRY230 2Nm Powered by 230VAC	R3015-1P6-B1 (DN15, kvs-1.6)
Heater	CHDW-160	Belimo TRY230 2Nm Powered by 230VAC	R3015-P63-B1 (DN15, kvs-0,63)
Cooler	CHDW-160	Belimo TRY230 2Nm Powered by 230VAC	R3015-1-B1 (DN15, kvs-1,0)
Heater-cooler	CHDW-160	Belimo LR230A 5Nm Powered by 230VAC	R3015-1-P63-B2 (DN15, kvs1,0/0,63)

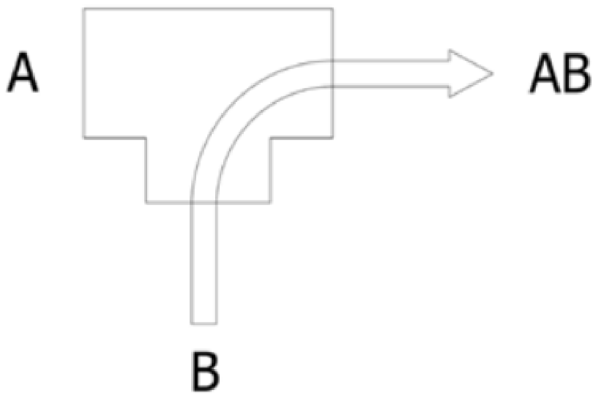
To make the system work properly, connect the valve with an electric actuator to the OUT1 connector in order:



	OUT1
1.	N
2.	L-NC
3.	L-NO

Before installing the actuator on the three-way valve, pay special attention to their initial position setting.

Example connection of three-way valve R3015-1-B1 (DN15, kvs-1.0) with Belimo TRY230 actuator:



A	Heater output/ cooler
B	Heater bypass/ cooler
AB	Back to the layout heating/cooling

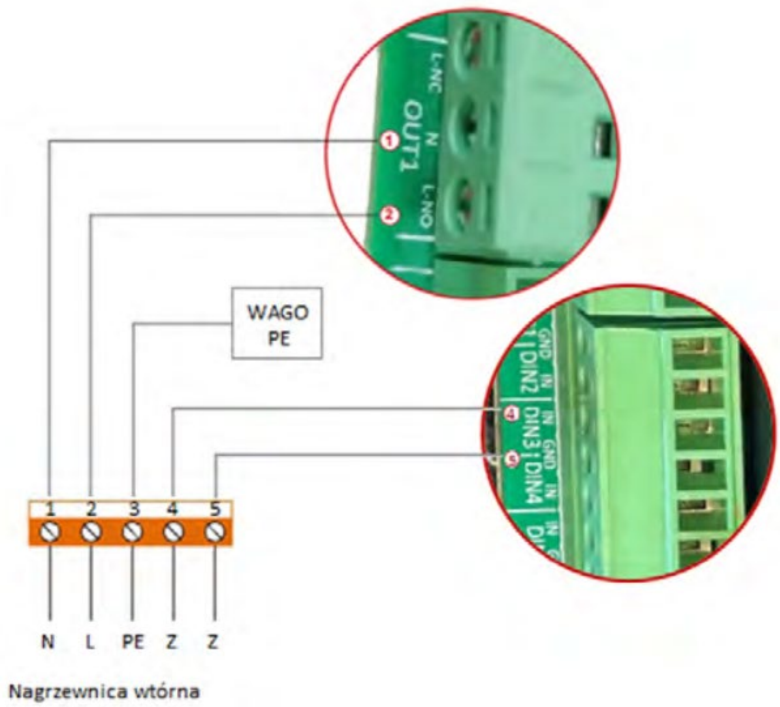
The three-way valve should be manually set in such a position that the liquid flow is only in the B -> AB direction (diagram above).

The next step is to set the actuator in the closed position. To do this, manually move the actuator to such a position that its only possible movement is to the left (in the direction of opening the A -> AB permeability).

Then make changes to the control board according to the following instructions: (changes can be made from the HRQ-BUT-LCD display, the AlnorAIR application, or the domain).

6.14.2. Connecting a secondary electric heater

When using an electric secondary heater, make the connection to the OUT1 connector in order:



Heater output	Connection
1.	OUT1-N
2.	OUT1- L-NO
3.	WAGO PE
4.	DIN3-IN
5.	DIN3-GND

Depending on the diameter of the connecting ducts to the unit, you need to choose the appropriate model of electric secondary heater:

- Channel diameter 160 mm - HRQ-P-HDE-160-1,0

- Channel diameter 200 mm - HRQ-P-HDE-200-1.0

Then make changes to the control board according to the following instructions: (changes can be made from the HRQ-BUT-LCD display, the AlnorAIR application, or the domain).

6.14.3. Control

Attention!

Making changes to the device settings should be carried out by a qualified person. Making changes other than those suggested by the manufacturer may lead to improper operation of the device.

To activate the heater/secondary cooler go to the manufacturer's settings in the following steps :

Device Parameters -> Service Access -> Enter the manufacturer's service access code (2222)-> Input/Output Settings -> Output Settings -> Relay Output Settings -> OUT1 -> Select "Secondary Heater" or "Refrigerator".

Then make changes to the device installer settings

Device parameters -> Service access -> Enter installer service access code (1111) -> Heater settings -> Secondary heater type -> Water ON/OFF /Electric ON/OFF*.

*When using a secondary electric heater, the signal input for the heater thermostat signal must also be activated. The secondary heater thermostat must be activated to protect against overheating by blocking the operation of the heater.

In the event of repeated tripping of the electric heater thermostat (at least 3 times in an hour), a cyclic overheating procedure will be initiated, which consists in stopping the entire control panel. This procedure can be deactivated by the user by confirming the alarm.

To do this, go to activation from the manufacturer's settings:

Device parameters -> Service access -> Enter the manufacturer's service access code (2222) -> Input/output settings -> Input settings -> Two-state input settings -> DIN3 -> Secondary heater thermostat

7. Fireplace mode

Fireplace mode is a timed mode that can be accessed from the mobile application and the Air.Alnor.com.pl website. It allows temporary control of the exhaust fan by setting a preset difference from the supply fan

8. Alarms

Emergency operation is allowed only under user supervision until service arrives and the fault is corrected. If user supervision is not possible, the regulator should be disconnected from the power supply.

<table>
<tr><th>Alert</th><th>Possible cause</th><th>The effect of the alarm</th><th>Display</th></tr>
<tr><td>Defective supply air temperature sensor.</td><td rowspan="3">The sensor has been damaged, misconnected or unconfigured.</td><td rowspan="3">Alarm signaling, output ALARM active, stopping the operation of the control panel.</td><td rowspan="3">Continuously since the cause was noted.</td></tr>
<tr><td>Defective temperature sensor behind the exchanger.</td></tr>
<tr><td>Defective ejector temperature sensor.</td></tr>
</table>

Defective intake temperature sensor.			
Defective exhaust temperature sensor.			
Defective GWC temperature sensor.			
Defective leading temperature sensor.	The regulation lead sensor has been damaged, misconnected or unconfigured.	Alarm signaling, ALARM output active, stopping the operation of the control panel.	Continuously since the cause was noted.
SAP alarm - the control panel was stopped due to an external signal.	Active signal from the fire control panel.	Alarm signaling, output **ALARM** active, SAP operating procedure.	Constantly after noting the reason.
A periodic review is coming up.	The periodic inspection is approaching contact the manufacturer's service department.	Alarm signaling.	Less than 3 days until the deadline for the general review.
Required general inspection by manufacturer's service	General inspection required-contact the manufacturer's service department.	Alarm signaling, output **ALARM** Active.	Until the installer enters a new review.
The supply air temperature to the room was noted to be too high.	The supply air temperature to the room was noted to be too high.	Alarm signaling, output **ALARM** Active, a procedure to protect against excessive heat.	Continuously since the cause was noted.
The supply air temperature was noted to be too low.	The supply air temperature to the room was noted to be too low.	Alarm signaling, ALARM output active, under-temperature protection procedure.	Continuously since the cause was noted.
Active water preheater thermostat. Warm-up procedure.	The signal from the thermostat of the water preheater was noted - the warm-up procedure was started.	Alarm signaling, ALARM output active, warm-up procedure.	Constantly after noting the reason.
Active thermostat of the secondary water heater. Warm-up procedure.	A low temperature or signal from the thermostat of the water secondary heater was noted - the warm-up procedure was started.	Alarm signaling, output **ALARM** Active, annealing procedure.	Continuously since the cause was noted.
Possible overheating of the preheater.	The primary electric heater thermostat has been noted to be tripped. It may need to be reset.	Alarm signaling, output **ALARM** Active, electric heater alarm procedure.	Continuously since the cause was noted.
Overheating of the heater electric preliminary - 3x tripping thermostat	High temperature of the primary electric heater - the thermostat tripped three times. Too low airflow, the heater thermostat may need to acknowledge the alarm.	Alarm signaling, output **ALARM** Active, electric heater cyclic alarm procedure.	Continuously since the cause was noted.

Possible overheating of the secondary heater	The secondary electric heater thermostat has been noted to be tripped. It may need to be reset.	Alarm signaling, output **ALARM** Active, electric heater alarm procedure.	Continuously since the cause was noted.
Overheating of the heater secondary electrical - 3x tripping thermostat	High temperature of the electric secondary heater - the thermostat tripped three times. Too low airflow, the heater thermostat may need to acknowledge the alarm.	Alarm signaling, output **ALARM** Active, electric heater cyclic alarm procedure.	Continuously since the cause was noted.
Heater thermostat tripped	The thermostat of one of the electric heaters has been reported tripped. It may need to be reset.	Alarm signaling, output **ALARM** Active, electric heater alarm procedure.	Continuously since the cause was noted.
Triple tripping of the heater thermostat - required confirmation	High temperature of one of the electric heaters tripped the thermostat three times. Too low airflow, the heater thermostat may need to acknowledge the alarm.	Alarm signaling, Electric heater cyclic alarm procedure.	Continuously since the cause was noted.
Installer settings error. Possible resetting of settings	Deletion or failure to confirm settings in the service menu.	Alarm signaling, output **ALARM** active, stopping the operation of the control panel	Continuously since the cause was noted.
Control panel manufacturer's settings error. Possible resetting of settings	Deletion or failure to confirm settings in the manufacturer's menu.	Alarm signaling, ALARM output active, stopping the operation of the control panel.	Continuously since the cause was noted.
Unauthorized Startup - device locked	Unauthorized attempt to start the device. Contact the installation service to remove the lock.	Alarm signaling, stopping and blocking the operation of the control panel.	Continuously since the cause was noted.
Lack of communication with regulator	Possible damage to the transmission cable connecting the panel to the controller.	Alarm signaling, further operation of the control panel.	Continuously since the cause was noted.
Communication error from pressure / flow sensor for supply	Communication error between the controller and the built-in sensor for the supply duct. Possible damage or improper connection of the sensor.	Alarm signaling, output **ALARM** Active, further operation of the headquarters.	Continuously since the cause was noted.
Communication error from pressure / flow sensor for exhaust	Communication error between the controller and the built-in sensor for the exhaust duct. Possible damage or improper connection of the sensor.	Alarm signaling, ALARM output Active, further operation of the headquarters.	Continuously since the cause was noted.

The deadline is approaching replacing the air intake filter	The deadline for filter replacement is approaching - depending on the settings of the air handling unit, purchase filters or contact the service center	Alarm signaling.	Constantly after noting the cause, will cease upon acceptance of the alarm.
The deadline is approaching exhaust filter replacement	The deadline for filter replacement is approaching - depending on the settings of the control panel, purchase filters or contact the service center.	Alarm signaling.	Constantly after noting the cause, will cease upon acceptance of the alarm.
Fouling of the supply air filter. Turn off switchboard and replace the filter	Possible contamination of the filter on the supply duct. Turn off the air handling unit and replace the corresponding filter.	Alarm signaling, output **ALARM** Active.	Constantly after noting reasons. Once the alarm is accepted, the procedure for filter replacement proceeds.
Fouling of the exhaust filter. Turn off switchboard and replace the filter	Possible contamination of the filter on the exhaust duct. Turn off the air handling unit and replace the corresponding filter.	Alarm signaling, output **ALARM** Active.	Continuously after noting Causes. After accepting the alarm, the filter replacement procedure is proceeded.
Fouling of the supply air filter. Call for service	Possible contamination of the filter on the supply duct. Call for service to replace air filters.	Alarm signaling, output **ALARM** Active.	Continuously after noting the cause.
Fouling of the exhaust filter. Call for service	Possible contamination of the filter on the supply duct. Call for service to replace air filters.	Alarm signaling, output **ALARM** Active.	Continuously after noting the cause.
Replacement procedure filters	The filter replacement procedure is active, which caused the air handling unit to stop working.	Alarm signaling, stopping the operation of the control panel.	Continuously after noting the cause.
Failure mode - worn filters	The dirtiness of one of the filters has exceeded the alarm condition. It should be replaced immediately.	Alarm signaling, output **ALARM** active; alarm procedure filter fouling	Continuously after noting the cause.
No confirmation of supply fan operation	Possible mechanical damage to the supply fan. Turn off the air handling unit and contact the installation service.	Alarm signaling, output **ALARM** Active.	Continuously after noting the cause.
No confirmation of exhaust fan operation	Possible mechanical damage to the exhaust fan. Turn off the air handling unit and contact the installation service.	Alarm signaling, output **ALARM** Active.	Continuously after noting the cause.
Filter dirt test. Do not turn off the control panel	The procedure for testing the condition of the filters is active. Do not turn off the control panel until the procedure is completed.	Alarm signaling.	Continuously after noting the cause.

Communication error with ecoPRESS sensor 1 -4	Communication with one of the ecoPRESS sensors has been lost (each sensor generates a separate alarm).	Alarm signaling.	Continuously after noting the cause.
Internal error of ecoPRESS sensor 1 - 4	The connected ecoPRESS sensor has been damaged or misconfigured (each sensor generates a separate alarm).	Alarm signaling.	Continuously after noting the cause.

9. Modbus communication

The controller has a built-in software module that allows communication using the Modbus RTU protocol.

This protocol makes it possible to read a register/group of registers containing current values of parameters and write values to selected parameters. The controller supports three Modbus commands: read command 0x03, single register modification command 0x06 and register group modification command 0x10. Communication is carried out on the controller's isolated port (COM3 ISO), which is a slave port.

Communication is carried out in the RS485 standard. To ensure the reliability of transmission, it is mandatory to connect the signal wires D+ and D- to the corresponding ports of the master and the controller (slave).

1. Modbus RTU communication settings are in the menu:

Installer menu (code 1111) " Modbus settings In order to implement communication correctly, the following parameters must be set:

- Modbus address - the address of the controller on the Modbus bus.

- Baud rate - the desired Modbus baud rate; possible to set: 9600, 19200 or 115200.

- Number of stop bits - the number of bits terminating a Modbus frame; settable: 1 stop bit or 2 stop bits.

- Parity - the ability to check for errors by assimilating the sum of the frame to the value of an additional parity bit; possible settings: none (no parity check is used), even (the parity bit is used for validity check), odd (the odd bit is used for validity check).

- Activate Modbus - allow communication using Modbus protocol; setting the parameter to NO will block communication using the protocol

- Parameter editing - permission to edit parameters using Modbus; if the parameter is set to NO then 0x06 and 0x10 modification commands will be blocked.

- Control panel - allow control by Modbus; if the parameter is set to NO, control of the controller using the protocol will be prevented.

2. communication settings :

The Modbus communication protocol makes it possible to read a register (or group of registers) containing the current values of parameters. The read command frame consists of (looking from the beginning of the frame):

- The address of the device being queried (1 byte),

- command (1 byte, in the case of a read command - 0x03),

- The number of the first of the read registers (2 bytes),

- Number of registers read (2 bytes); CRC (2 bytes).

Sample question:

01 03 00 04 00 02 85 CA

According to the protocol specification, the above command defines the reading of 2 (00 02) data registers counting from register 4 (00 04) from the device with address 1 (01) using the 0x03 (03) read command.

Sample answer:

01 03 04 00 03 00 01 CB F3

According to the protocol specification, the above frame informs that two consecutive registers (4 bytes in total - 04) of the device with address 1 (01) have values: 3 (00 03) and 1 (00 01), and the read command (03) was used to read these values.

3. modification command 0x06

The Modbus communication protocol allows modification of the value of 1 register containing the current value of the parameter. The command frame consists of (looking from the beginning of the frame):

- The address of the device being queried (1 byte),

- command (1 byte, in the case of the modification command - 0x06),

- The number of the modified register (2 bytes); the value to be set (2 bytes); CRC (2 bytes).

Sample question:

01 06 00 04 00 03 88 0A

The compliance frame is identical to the previously sent modification command frame. Error frame The response to the modification command depends on whether the value change operation is successfully executed. If it does, a compliance frame will be returned. If not, an error frame will be returned. It consists of (looking from the beginning of the command):

- The address of the device being queried (1 byte),

- The echo of the command + the error marker (1 byte, in the case of a read command - 0x86),

- error code; CRC (2 bytes).

Sample answer:

01 86 03 02 61

According to the protocol specification, the above frame informs that in the device with address 1 (01), the process of modifying the value of a single parameter (86) failed due to the forbidden value of the data (03).

4. modification command 0x10

The Modbus communication protocol allows modifying the values of multiple registers containing the current values of parameters. The command frame consists of (viewed from the beginning of the command):

- The address of the device being queried (1 byte),

- command (1 byte, in the case of a modification command - 0x10),

- The number of the first of the modified registers (2 bytes),

- The number of modified registers (2 bytes),

- The number of modified bytes (2x the number of modified registers),

- value to be set (2 bytes) in the register,

1, 2, ...

- CRC (2 bytes).

Sample question:

01 10 00 27 00 02 04 00 15 00 16 20 5B

According to the protocol specification, the above command defines the modification of the values of the data registers counting from register number 39 (00 27) in the device with address 1 using frame 0x10 (10).The values of 2 (00 02) registers, a total of 4 bytes (04), are to be modified. They are to be set to values 21 (15) and 22 (16), respectively.

The response to the modification command depends on whether the value modification operation is successfully executed. If it does, a compliance frame will be returned. If not, an error frame will be returned. The compliance frame echoes the modification command frame, differing only in the lack of information about the value to be set. The error frame consists of (looking from the beginning of the frame):

- The address of the device being queried (1 byte),

- echo of the command + error marker (1 byte, in the case of a read command - 0x90),

- error code,

- CRC.

Sample answer:

01 90 03 0C 01

According to the protocol specification, the above frame informs that the device with address 1 (01) failed to carry out the process of modifying multiple parameters (90) due to the forbidden value of the data (03).

Modbus table									
Index BMS	Modbus address	Variable name	Description	Type signal	Min.	Value Max.	Home.	Variable type	Comments
1	0	Program version	Program series	O	0	0xFFFF	0	hex	Format: SXXX.YYY XXX - older byte, YYY - junior byte
2	1	Serial NO	Unit serial number	O	1	65535	0	integer	
3	2	STATUS_OK	Work status	O	0	1	1	integer	
4	3	EMERGENCY	Status failure	O	0	1	0	integer	
5	4	WORK_MODE	Regulator operation mode	I/O	0	6	3	integer	0 - Off, 1 - Standstill, 3 - User1, 4 - User2, 5 - User3, 6 - User4
6	5	Tmain	Lead sensor	O	0	2	0	integer	0 - exhaust sensor, 1 - supply sensor, 2 - panel sensor
7	6	Tsup	Supply temperature (T2)	O	-40.0	60.0	0.0	integer	999 - if sensor failure
8	7	Texh	Exhaust temperature (T3)	O	-40.0	60.0	0.0	integer	999 - if sensor failure
9	8	Tinl	Intake/outlet temperature (T4)	O	-40.0	60.0	0.0	integer	999 - if sensor failure
10	9	Tout	Temperature of the launcher (B4)	O	-40.0	60.0	0.0	integer	999 - if sensor failure
11	10	Trec	GWC temperature (T5)	O	-40.0	60.0	0.0	integer	999 - if sensor failure
12	11	Theat	Temperature after the secondary heater (T1)	O	-40.0	60.0	0.0	integer	999 - if sensor failure
13	12	Tpanel	Temperature of the main panel	O	-40.0	60.0	0.0	integer	999 - if sensor failure
14	13	Q1-limit	Air quality sensor (Q1-0/1)	O	0	1	0	integer	1 - opened contact 2 - shorted contact
15	14	-	-	-	-	-	-	-	
16	15	TR1	Preheater thermostat (N1)	O	0	1	0	integer	1 - opened contact 2 - shorted contact
17	16	TR2	Secondary heater thermostat (N2)	O	0	1	0	integer	1 - opened contact 2 - shorted contact
18	17	BYPASS	Status of bypass actuator	O	0	1	0	integer	1 - forfeit. ON, 2 - przep. OFF
19	18	SAP	SAP external signal	O	0	1	1	integer	1 - SAP, 2 - no SAP
20	19	IN1	External signal IN1	O	0	1	0	integer	1 - inactive, 2 - active
21	20	IN2	External signal IN2	O	0	1	0	integer	1 - inactive, 2 - active

22	21	ECO	External signal ECO (control panel).	O	0	1	0	integer	1 - inactive, 2 - active
23	22	N1	Preheater (N1)	O	0	1	0	integer	1 - inactive, 2 - active
24	23	N2	Secondary heater (N2)	O	0	1	0	integer	1 - inactive, 2 - active
25	24	N2 control	Secondary heater (N2) actuation	O	0	100	0	integer	Overdrive in %
26	25	Y1 control	Radiator control (CH1)	O	0	100	0	integer	Overdrive in %
27	26	GWC	Ground heat exchanger actuator	O	0	1	0	integer	1 - INACTIVE, 2 - active
28	27	SBP1	Exchanger bypass actuator - supply (SBP1)	O	0	100	0	integer	Overdrive in %
29	28	SM1	Mixing chamber actuator (SM1)	O	0	100	0	integer	Exposure in %
30	29	Clean	Mode CLEANING EXCHANGER	O	0	1	0	integer	1 - inactive, 2 - active
31	30	Clean_MANUAL	Manual start of exchanger cleaning	I/O	0	1	0	integer	1 - exclusions, 2 - incorporate
32	31	Mode_MANUAL	Manual control mode	O	0	1	0	integer	1 - inactive, 2 - active
33	32	Mode_WINDOW	OPEN WINDOWS mode	I/O	0	1	0	integer	1 - inactive, 2 - active
34	33	Mode_OUT	OUT OF HOUSE mode	I/O	0	1	0	integer	1 - inactive, 2 - active
35	34	Mode_PARTY	IMPREHENSION mode	I/O	0	1	0	integer	1 - inactive, 2 - active
36	35	Mode_OVERPRES	Mode SUSPENSION (fireplace)	I/O	0	1	0	integer	1 - inactive, 2 - active
37	36	OVERPRESS_value	Overpressure value	I/O	-100	100	-20	integer	Change in %
38	37	SCHEDULER	Work according to schedule	I/O	0	1	0	integer	1 - OFF, 2 - on
39	38	-	-	-	-	-	-	integer	
40	39	Temp_USER 1	Set temperature in USER 1 mode	I/O	8	30	20	integer	Unit: °C
41	40	Temp_USER 2	Set temperature in USER 2 mode	I/O	8	30	20	integer	Unit: °C
42	41	Temp_USER 3	Set temperature in USER mode 3	I/O	8	30	20	integer	Unit: °C
43	42	Temp_USER 4	Set temperature in USER mode 4	I/O	8	30	20	integer	Unit: °C
44	43	W1	Supply fan, current control	O	0	100	50	integer	Overdrive in %

45	44	W2	Exhaust fan, current control	O	0	100	50	integer	Exposure in %
46	45	W1_EN	Permission to operate the supply fan (W1)	O	0	1	1	integer	1 - inactive, 2 - active
47	46	W2_EN	Exhaust fan operation permit (W2)	O	0	1	1	integer	1 - inactive, 2 - active
48	47	-	-	-	-	-	-	-	
49	48	Speed_W1_ USER1	W1 speed in mode USER 1.	I/O	dyn. (25)	dyn. (100)	50	integer	Overdrive in %
50	49	Speed_W1_ USER2	W1 speed in mode USER 2.	I/O	dyn. (25)	dyn. (100)	50	integer	Exposure in %
51	50	Speed_W1_ USER3	W1 speed in mode USER 3	I/O	dyn. (25)	dyn. (100)	50	integer	Overdrive in %
52	51	Speed_W1_ USER4	W1 speed in mode USER 4	I/O	dyn. (25)	dyn. (100)	50	integer	Overdrive in %
53	52	Speed_W1_ ECO	W1 speed in ECO mode	I/O	dyn. (25)	Dyn. (100)	50	integer	Overdrive in %
54	53	-	-	-	-	-	-	-	
55	54	Speed_W2_ USER1	W2 speed in mode USER 1.	I/O	dyn. (25)	dyn. (100)	50	integer	Overdrive in %
56	55	Speed_W2_ USER2	W2 speed in mode USER 2.	I/O	dyn. (25)	dyn. (100)	50	integer	Overdrive in %
57	56	Speed_W2_ USER3	W2 speed in mode USER 3	I/O	dyn. (25)	dyn. (100)	50	integer	Overdrive in %
58	57	Speed_W2_ USER4	W2 speed in mode USER 4	I/O	dyn. (25)	dyn. (100)	50	integer	Overdrive in %
59	58	Speed_W2_ ECO	W2 speed in ECO mode	I/O	dyn. (25)	dyn. (100)	50	integer	Exposure in %
60	59	-	-	-	-	-	-	-	
61	60	DATE_day	Day of the month	I/O	1	31	1	integer	
62	61	DATE_month	Month	I/O	1	12	1	integer	
63	62	DATE_year	Year	I/O	15	99	16	integer	
64	63	TIME_hour	Hour	I/O	0	23	1	integer	
65	64	TIME_minutes es	Minute	I/O	0	59	1	integer	
66	65	Stop_time_E CO	Cycle stop time in ECO mode	I/O	1	24	1	integer	Unit: hours
67	66	Work_time_ ECO	Cycle length weathering in ECO	I/O	0	100	10	integer	Unit: minutes
68	67	Filter_time_r emaining	Time remaining to replace filters	O	0	999	1500	integer	Unit: day
69	68	Service_time _remaining	Time remaining for general review	O	0	999	90	integer	Unit: day

70	69	GWC_Enable	Work permit GWC	I/O	0	2	1	integer	1 - CLOSED, 2 - auto, 3 - open
71	70	GWC_Winter	Upper threshold for GWC activation - winter	I/O	5	20	8	integer	Unit: °C
72	71	GWC_Summer	Lower threshold for switching on GWC - summer	I/O	10	30	18	integer	Unit: °C
73	72	SM1_Enable	Activation of the mixing chamber (SM1)	I/O	0	1	0	integer	1 - inactive, 2 - active
74	73	SM1_Limit	Opening limit of the mixing chamber actuator (SM1)	I/O	0	100	100	integer	Unit: %
75	74	BMS_address	Device address for communication BMS	O	0	256	1	integer	
76	75	-	-	-	-	-	-	-	
77	76	BMS_change_en	Changing the settings from BMS	O	0	1	1	integer	1 - exclusions, 2 - incorporate
78	77	BMS_STOP_ en	START_STOP with BMS	O	0	1	1	integer	1 - exclusions, 2 - incorporate
79	78	-	-	-	-	-	-	-	
80	79	UID1	UID - characters 1 and 2	O	12336	23130	-	ASCII	
81	80	UID2	UID - characters 3 and 4	O	12336	23130	-	ASCII	
82	81	UID3	UID - characters 5 and 6	O	12336	23130	-	ASCII	
83	82	UID4	UID - characters 7 and 8	O	12336	23130	-	ASCII	
84	83	UID5	UID - characters 9 and 10	O	12336	23130	-	ASCII	
85	84	UID6	UID - characters 11 and 12	O	12336	23130	-	ASCII	
86	85	UID7	UID - characters 13 and 14	O	12336	23130	-	ASCII	
87	86	UID8	UID - marks 15 and 16	O	12336	23130	-	ASCII	
88	87	UID9	UID - marks 17 and 18	O	12336	23130	-	ASCII	
89	88	UID10	UID - characters 19 and 20	O	12336	23130	-	ASCII	
90	89	UID11	UID - mark 21	O	48	90	-	ASCII	The younger byte is sign, older skip
91	90	P1_value	Measured supply pressure	O	0	4000	0	integer	Unit: Pa
92	91	P2_value	Measured pressure exhaust	O	0	4000	0	integer	Unit: Pa
93	92	Flow1_value	Measured supply flow	O	0	4000	0	integer	Unit: m3/h
94	93	Flow2_value	Measured exhaust flow rate	O	0	4000	0	integer	Unit: m3/h
95	94	P1_setPoint	Supply set pressure	O	0	4000	50	integer	Unit: Pa
96	95	P2_setPoint	Pressure setpoint exhaust	O	0	4000	50	integer	Unit: Pa
97	96	Flow1_setPoint	Set flow rate supply	O	0	4000	50	integer	Unit: m3/h
98	97	Flow2_setPoint	Exhaust preset flow	O	0	4000	50	integer	Unit: m3/h
99	98	Reg_sett	Adjustment mode	I/O	0	3	0	integer	1 - standard, 2 - constant pressure,

									3 - fixed expense
100	99	Pressure_W1 _USER1	Supply setpoint pressure - user mode 1	I/O	0	4000	50	integer	Unit: Pa
101	100	Pressure_W1 _USER2	Supply setpoint pressure - user mode 2	I/O	0	4000	50	integer	Unit: Pa
102	101	Pressure_W1 _USER3	Supply setpoint pressure - user mode 3	I/O	0	4000	50	integer	Unit: Pa
103	102	Pressure_W1 _USER4	Supply setpoint pressure - user mode 4	I/O	0	4000	50	integer	Unit: Pa
104	103	Pressure_W2 _USER1	Exhaust setpoint pressure - user mode 1	I/O	0	4000	50	integer	Unit: Pa
105	104	Pressure_W2 _USER2	Exhaust setpoint pressure - user mode 2	I/O	0	4000	50	integer	Unit: Pa
106	105	Pressure_W2 _USER3	Exhaust setpoint pressure - user mode 3	I/O	0	4000	50	integer	Unit: Pa
107	106	Pressure_W2 _USER4	Exhaust setpoint pressure - user mode 4	I/O	0	4000	50	integer	Unit: Pa
108	107	Flow_W1_US ER1	Preset supply flow - user mode 1	I/O	0	4000	50	integer	Unit: m3/h
109	108	Flow_W1_US ER2	Preset supply flow - user mode 3	I/O	0	4000	50	integer	Unit: m3/h
110	109	Flow_W1_US ER3	Preset supply flow - user mode3	I/O	0	4000	50	integer	Unit: m3/h
111	110	Flow_W1_US ER4	Preset supply flow - user mode 4	I/O	0	4000	50	integer	Unit: m3/h
112	111	Flow_W2_US ER1	Exhaust preset flow - user mode 1	I/O	0	4000	50	integer	Unit: m3/h
113	112	Flow_W2_US ER2	Exhaust preset flow - user mode 3	I/O	0	4000	50	integer	Unit: m3/h
114	113	Flow_W2_US ER3	Exhaust preset flow - user mode3	I/O	0	4000	50	integer	Unit: m3/h
115	114	Flow_W2_US ER4	Exhaust preset flow - user mode 4	I/O	0	4000	50	integer	Unit: m3/h
116	115	k_fac_W1	The k-factor supply fan	I/O	0	1000	0	float	
117	116	k_fac_W2	The k-factor exhaust fan	I/O	0	1000	0	float	
118	117	PSA_W1	Launch level supply fan	I/O	dyn. (25)	dyn. (100)	30	integer	Overdrive in %

119	118	PSA_W2	Launch level exhaust fan	I/O	dyn. (25)	dyn. (100)	30	integer	Overdrive in %
120	119	maxPres_AI N1	Max. supply pressure - analog sensor	I/O	0	4000	100	integer	Unit: Pa
121	120	maxPres_AI N2	Max. exhaust pressure - analog sensor	I/O	0	4000	100	integer	Unit: Pa

Summary of BMS alarms

Index BMS	Modbus address	Variable name	Description	Type signal	Min.	Value Max.	Home.	Variable type	Comments
122	200	SAP_AL	SAP alarm	O	0	1	0	integer	1 - Inactive, 2 - Active
123	201	Service_AL	Required overview	O	0	1	0	integer	1 - Inactive, 2 - Active
124	202	Filter_AL	Required filter replacement	O	0	1	0	integer	1 - Inactive, 2 - Active
125	203	Filter_AL_SU P	Dirty supply air filter - pressure switch tripped	O	0	1	0	integer	1 - Inactive, 2 - Active
126	204	Filter_AL_EX H	Dirty exhaust filter - pressure switch tripped	O	0	1	0	integer	1 - Inactive, 2 - Active
127	205	Sensor_T2_ AL	T2 sensor failure	O	0	1	0	integer	1 - Inactive, 2 - Active
128	206	Sensor_T3_ AL	T3 sensor failure	O	0	1	0	integer	1 - Inactive, 2 - Active
129	207	Sensor_T4_ AL	T4 sensor failure	O	0	1	0	integer	1 - Inactive, 2 - Active
130	208	Sensor_T5_ AL	T6 sensor failure	O	0	1	0	integer	1 - Inactive, 2 - Active
131	209	Sensor_T6_ AL	T5 sensor failure	O	0	1	0	integer	1 - Inactive, 2 - Active
132	210	Sensor_T1_ AL	T1 sensor failure	O	0	1	0	integer	1 - Inactive, 2 - Active
133	211	-	-	-	-	-	-	-	-
134	212	sup_HT_AL	High discharge temperature	O	0	1	0	integer	1 - Inactive, 2 - Active
135	213	sup_LT_AL	Low supply temperature	O	0	1	0	integer	1 - Inactive, 2 - Active
136	214	Hex_frost_A L	Frosting of the exchanger	O	0	1	0	integer	1 - Inactive, 2 - Active
137	215	N1_HT_temp _AL	Possible overheating of the preheater	O	0	1	0	integer	1 - Inactive, 2 - Active
138	216	N2_HT_temp _AL	Possible overheating of the secondary heater	O	0	1	0	integer	1 - Inactive, 2 - Active
139	217	N1_HT_AL	Overheating of the electric preheater	O	0	1	0	integer	1 - Inactive, 2 - Active

140	218	N2_HT_AL	Overheating electric secondary heater	O	0	1	0	integer	0 - Inactive, 1 - Active
141	219	Frost_AL	Start-up of secondary heater heating	O	0	1	0	integer	1 - Inactive, 2 - Active

10. AlnorAIR and AlnorServiceAIR Application

As a user, you must download the AlnorAIR app available on the AppStore or Google Play. For service users, download the AlnorServiceAir app available on the AppStore or Google Play.

AlnorAIR

Download on the App Store

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AlnorServiceAIR

Download on the App Store

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11. Disposal

There is a crossed-out waste bin symbol on the device. 

It means that after the product is used up, it must not be disposed of in the municipal waste garbage can, but must be taken to an electrical and electronic waste collection point, or returned to the distributor when a replacement is purchased. It is the user's responsibility to dispose of the device properly after use. Failure to do so may result in penalties established by waste disposal regulations. Proper collection of waste and its further recycling, processing and environmentally compatible disposal of used equipment prevents unnecessary damage to the environment and possible associated health risks, and promotes recycling of the materials used in the equipment. Further information on waste collection and disposal can be found at your local waste disposal facility or at your appliance dealer's store. Manufacturers and importers meet their obligation to recycle, process and environmentally compatible disposal either directly or by participating in collective programs.

12. Troubleshooting

Problem	Cause	Solution
Unpleasant smell in the air aired	A canopy installed too close to the launcher.	Change the location of the intake and exhaust.
	The secondary trap (summer) is empty.	Fill the siphon.
Water is leaking from the control panel	Incorrect connection of the duct system	Check the connection of the channels - chapter 4.4
	Incorrectly connected condensate drain hose	Check the siphon connection - chapter 4.2

	Poorly leveled control panel	Check the leveling of the control panel - chapter 4.2
Water is "bubbling" in the headquarters	The siphon is not connected	Connect the trap according to the guidelines in section 4.2
	The siphon is empty	Fill the siphon with water according to the guidelines in section 4.2
Passive cooling is insufficient	-	Passive cooling does not mean air conditioning (active cooling). To increase passive cooling, increase the speed of the fans.

13. Energy class

Model	Sound power level LWA dB(A)	Air flow rate [m3/h]	Energy class			
			Manual control	Clock control	Central demand control (1 sensor)	Local demand control (2 sensors)
HRU-MinistAIR-250-H-P	48	250	A	A	A	A+
HRU-MinistAIR-250E-H-P	48	250	A	A	A	A
HRU-MinistAIR-325-H-P	49	325	A	A	A	A+
HRU-MinistAIR-325E-H-P	49	325	B	A	A	A
HRU-MinistAIR-350-H-P	53	350	A	A	A	A+
HRU-MinistAIR-350E-H-P	53	350	B	A	A	A

14. Declaation of conformity

Alnor Systemy Wentylacji Sp. z o.o.,
Aleja Krakowska 10, 05-552 Wola Mrokowska,
tel.: + 48 22 737 40 00, fax.: + 48 22 737 40 04,
e-mail: alnor@alnor.com.pl, www.alnor.com.pl.

EU DECLARATION OF CONFORMITY

No 003/04/24

1. Product type / model:
   Residential air handling unit with heat recovery of the HRU-MinistAIR series

2. Name and address of the manufacturer:
   ALNOR-SYSTEMY WENTYLACJI SP. Z O.O.
   00-719 Warszawa ul. Zwierzyniecka 8b POLAND

CE 21

3. This declaration of conformity is issued under the sole responsibility of the manufacturer.

4. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:
   Radio Equipment Directive 2014/53/EU
   Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment ROHS III 2015/863
   Commission Regulation (EU): 1253/2014, 1254/2014

5. References to the relevant harmonised standards used, or references to the specifications in relation to which conformity is declared:
   EN 60335-1:2012/A11:2013/A13:2017/A14:2019/A2:2009, PN-EN 60335-2-80:2007/A2:2009E, ETSI EN 300 220-1 V3.1.1:2017, ETSI EN 300-220-2 V3.2.1:2018, ETSI EN 301 489-1 v2.1.1:2017 ETSI EN 301 489-3 v2.1.1:2019, EN 60730-1: 2016

Signed for and on behalf of: (name, function)

Wola Mrokowska, 08.07.2024
(place and date of issue)

Grzechowiak Piotr
....
Piotr Grzechowiak,
testing and certification coordinator
(signature)

15. Warranty conditions – Heat Recovery Unit

1) The warranty is granted for a period of 24 months from the date of commissioning the device, however not longer than 27months from the date of sale.
2) During the warranty period, the Manufacturer is obliged to remove any defects and malfunctions of the device free of charge due to causes inherent in the product or caused by the Manufacturer.
3) The commissioning of the heat recovery unit requires installation by an authorized installer with confirmation of assembly on the warranty card or in the appropriate acceptance protocol of the heat recovery unit.
4) The warranty is valid under the condition of regular inspection of the device and ventilation system throughout the warranty period. The cycle is valid: 1 review for 6 months of system operation. In the event of failure to perform subsequent reviews of the heat recovery unit and ductwork by an authorized service technician, confirmed by an appropriate entry and a stamp on the warranty card, the guarantee automatically expires.
5) The warranty applies to the possible replacement of parts of the device, but it does not apply to the provision of services. The warranty is valid only in the case of electrical installation and connection are carried out by a qualified electrician, which is each time confirmed by an appropriate acceptance protocol and a stamp on the warranty card. The warranty becomes void if installation of the device was made by an authorized persons.
6) The warranty does not apply to heat recovery units installed in ventilation systems made only from flexible ducts or in systems in which the main ductwork is made of flexible ducts.
7) The warranty does not apply to heat recovery units instal- led in ventilation ductwork using uninsulated ducts. This does not apply to installations made of plastic ventilation ducts placed in concrete floor screeds.
8) The manufacturer is not liable for faulty operation of the installation or the heat recovery unit caused by a faulty installation of the ventilation system. In particular, if the ventilation system does not have appropriate design documentation or as built documentation containing all the parameters of the ventilation system operation, such as air flows, compressor, installation performance, confirmed by appropriate measurement protocols and the ventilation system acceptance protocol. Lack of technical documentation of the ventilation system will void the warranty
9) The warranty covers the goods for which the Complainant presented a valid warranty card and proof of purchase.
10) Any irregularities in the device operation should be repor- ted to the seller / serviceman.

11) The warranty does not cover: mechanical damage to the equipment and defects caused by them, damage and defects resulting from: Misuse, abuse or improper maintenance, failure to follow operating instructions about assmeby, storage and transportation. Unauthorized repairs and alterations. Force majeure actions, e.g. lightning strikes, floods, electric network overvoltage, extreme weather conditions, damages resulting from the activities of animals or insects. Damage caused by improper protection of installation while carrying out other construction works, repair or assembly, including damage involving contamination of the HRV' s interior. Damage caused by improper workmanship or connecting the electricity network. Damage resulting from the contamination of the device, damages resulting from the operation of the device with extremely contaminated filters or as a result of the device's operation without filters and as a result of highly contaminated ventilation ductwork. Damage resulting from the installation of the device in a ventilation system made incorrectly or not having the appropriate technical documentation confirmed by appropriate measurement protocols and the acceptance protocol of the installation or in the appropriate HRV receipt report.
12) The warranty does not cover the travel costs of the service technician appointed by the manufacturer if the unit cannot be disassembled.
13) The obligatory paid service inspection includes the following activities: replacement / cleaning of HRV filters, control of the HRV operation, control of the condition of ventilation ducts, cleaning the exhaust and supply grille, system operation control.
14) Complaints about any missing items in the delivered goods or hidden defects must be reported in writing. The user should effectively report any equipment malfunction or disclosure of its defect in an efficient manner in order to avoid serious damage. The costs of removing dama- ges caused as a result of further operation of the device which is not fully functional is the responsibility of the User.
15) Warranty repair does not include the activities provided in the user's manual for which the user is obliged to per- form on their own and at their own expense, i.e. to start the equipment, check the operation and maintenance (filter replacement, cleaning of diffusers).
16) The warranty does not cover other materials used for possible covering of the ductwork by the buyer, in parti- cular if in the process of installation the free access to regulatory devices such as electrical components, dampers or other regulation elements of the installation was not guaranteed.
17) The warranty becomes void if any modification, or altera- tion has been made to the product by the user and when using spare parts not recommended by the manufacturer.
18) All disputes arising in relation to the granted warranty shall be settled by the court competent for the Seller.
19) The proof of purchase and the user's manual should be kept for the warranty period, i.e. for 24 months, and without damage.
20) The warranty card damaged or with visible traces of mo- difications is invalid. The warranty without the seal of the company installing the device is invalid.

<table>
<tr><th>No.</th><th>Date of notification</th><th>Date of service</th><th>Maintenance service</th><th>Signature & stamp of serviceman</th></tr>
<tr><td colspan="5">Unit model: ....

Serial number: ....

Sale date: ....
Signature and stamp of the Distributor

Start up date: ....
Signature and stamp of the Installer</td></tr>
<tr><td>6 months</td><td></td><td></td><td>Please, circle the correct answer:
Cleaning HRV filters
YES/NO
Cleaning extract louvers and inlet diffusers
YES/NO
Ventilation ductwork checkup
YES/NO
Additional regulation
YES/NO
Other ....
....</td><td></td></tr>
<tr><td>12 months</td><td></td><td></td><td>Please, circle the correct answer:
Cleaning HRV filters
YES/NO
Cleaning extract louvers and inlet diffusers
YES/NO
Ventilation ductwork checkup
YES/NO
Additional regulation
YES/NO
Other ....
....</td><td></td></tr>
<tr><td>18 months</td><td></td><td></td><td>Please, circle the correct answer:
Cleaning HRV filters
YES/NO
Cleaning extract louvers and inlet diffusers
YES/NO
Ventilation ductwork checkup
YES/NO
Additional regulation
YES/NO
Other ....
....</td><td></td></tr>
<tr><td>24 months</td><td></td><td></td><td>Please, circle the correct answer:
Cleaning HRV filters
YES/NO
Cleaning extract louvers and inlet diffusers
YES/NO
Ventilation ductwork checkup
YES/NO
Additional regulation
YES/NO
Other ....
....</td><td></td></tr>
</table>