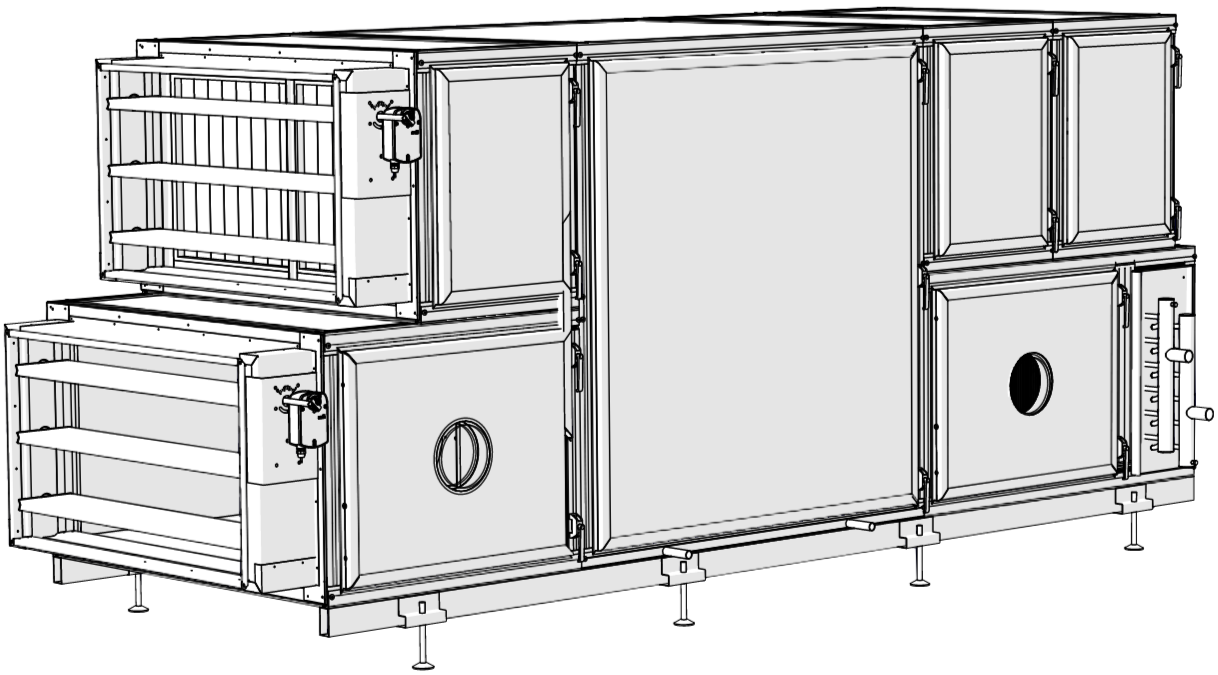


Recair

Ventilation unit installation and maintenance manual

RECAIR
ETS NORD GROUP

Contents

Installation manual for Recair modular air handling unit

Safety

⚠ Installation may be carried out only by qualified personnel.

- To avoid injury, read all documentation before using the unit.
- The unit must not be used to ventilate flammable and combustible gases, if not stated otherwise.
- All electrical connections must be carried out by a qualified electrician.
- It is the installer's responsibility to carry out a full safety assessment of the installed ventilation unit.
- All electrical and mechanical safety devices must be installed before turning on the ventilation unit.
- The electrical power of the unit must be disconnected before service and maintenance.
- Do not open the unit doors or hatches when the ventilation unit is operational.

Disclaimer

The manufacturer may not be held liable for any damage done to property or people caused by improper installation, start-up, use of the unit or failure to implement the procedures and instructions included in this manual.

Warranty

The delivered goods have a 2-year warranty, unless otherwise agreed. If a defect is found in the product during the warranty period, the seller's liability is limited to repairing the defective product or replacing the defective product with a faultless one, as selected by the seller.

The seller is only responsible for repairs to the product itself or the delivery of a new product, not for other costs related to repairing the defect or replacing the goods. The warranty does not cover equipment and/or parts thereof, which are considered to be so-called wearing parts. Such wearing parts include e.g. but are not limited to filters, belts, bearings.

The warranty also does not cover defects caused by incorrect storage, incorrect installation, defective or incorrect maintenance or any other cause beyond the seller's control. After the warranty period, the seller is free from liability for damages.

⚠ Warranty claim: warranty claim must be submitted to the seller immediately after this is known by the buyer. If the buyer fails to notify the seller immediately, then the buyer loses his right to claims. The seller will not reimburse the buyer for the removal, installation, transportation, suspension, or other (not limited to) costs of goods delivered under the warranty, or direct or indirect costs to the buyer's customer or others.

Intended use

ETS NORD Recair air handling units are designed to be used in almost any air handling unit applications and provide sufficient and healthy ventilation to the people and secure the good condition of the building structures.

Operating condition

ETS NORD Recair modular units are designed for indoor installation as standard. The ambient temperature must be above 0 °C.

Special solutions are available and unit series can be suitable for outdoor installation, poisonous or corrosive air, above 70 °C temperatures or extreme humidity applications.

Please consult technical documents whether the supplied unit is a standard or a special solution.

Please contact ETS NORD Recair sales for special applications such as outdoor installation, poisonous or corrosive air, above 70 °C temperatures or extreme humidity applications.

Recycling and disposal of the product

ETS NORD Recair air handling units are not to be disposed of with household waste. Local laws and regulations on safe and ecological disposal of the product are to be followed. Please ensure that the components are separated and sorted based on the material types.

Declaration of conformity

Declaration of conformity can be found on the manufacturer's homepage.

Receiving air handling units

Upon receiving device

Receiving the air handling unit shipment

Check the shipping list to make sure all equipment has been shipped. In particular, you should check spare filters, spare belts and mounting accessories. If any goods are missing, make a note of the defects in the consignment note and send a copy of the consignment note to ETS NORD Recair.

Markings

It is recommended to inspect the received goods in each unit. The symbols are marked on the units on protective plastic with a waterproof marker. The project number, unit ID, block number and block weight are also marked with a marker at the end of the unit block, inside the profile.

Installation equipment and spare parts

The installation equipment and this manual are delivered in separate installation accessory boxes. If possible, filters and spare filters are delivered inside the filter compartment in their own cardboard boxes. Maintenance instructions can be found in their own pocket on the side of the air handling unit.

Installation of the unit

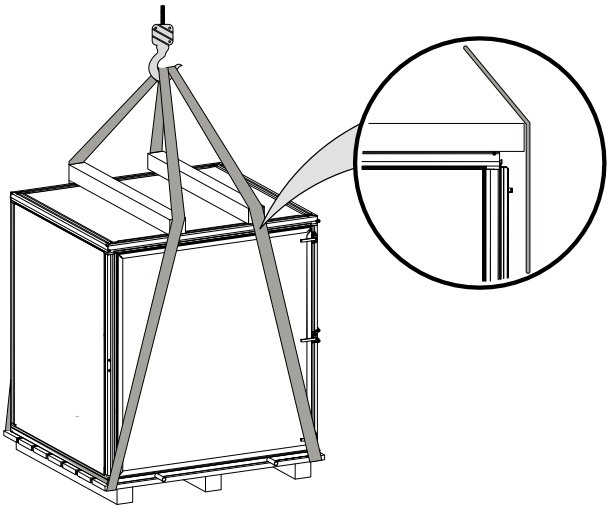
Transport and lifting

Lifting order

The lifting arrangement can be planned by comparing the unit printout and specification which shows the section numbers. The section numbers are marked with a marker, either in the package or at the end of the unit sections (for unpacked units).

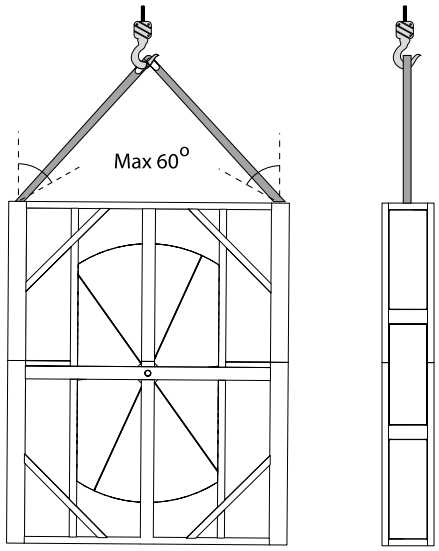
Air handling unit lifting and transport

All parts are delivered strapped on a wooden pallet unless otherwise agreed with the customer. The wooden pallet allows lifting from one side with forks and transfer with a pump cart or forklift. The parts should be lifted and moved to their installation location without unpacking them. This will prevent damaging the products during the haulage. Lifting with lifting slings should be done in the fork direction with slings under the wooden pallet.

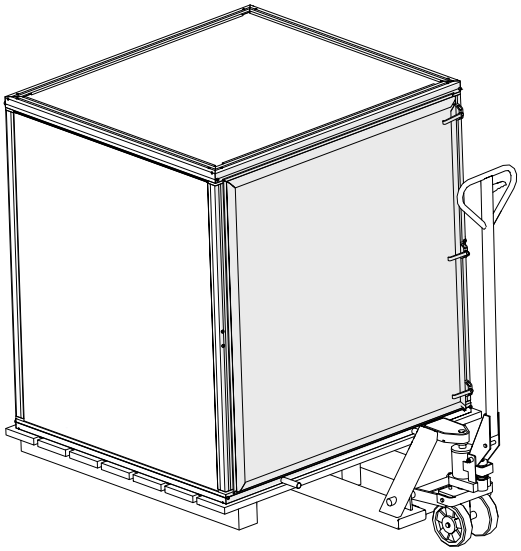


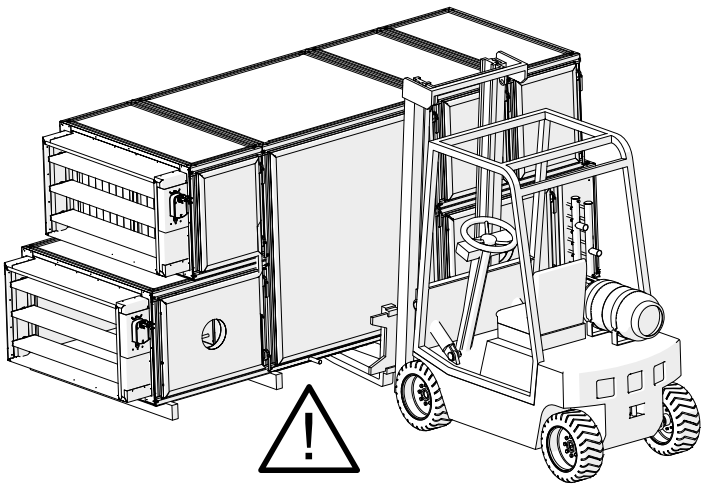
When lifting with slings, lift only from the corners of the platforms. The upper part must be protected with a transverse bracket.

The weight of each air handling unit section is specified in the documentation.



When lifting the rotor section make sure of the sling's proper angle.





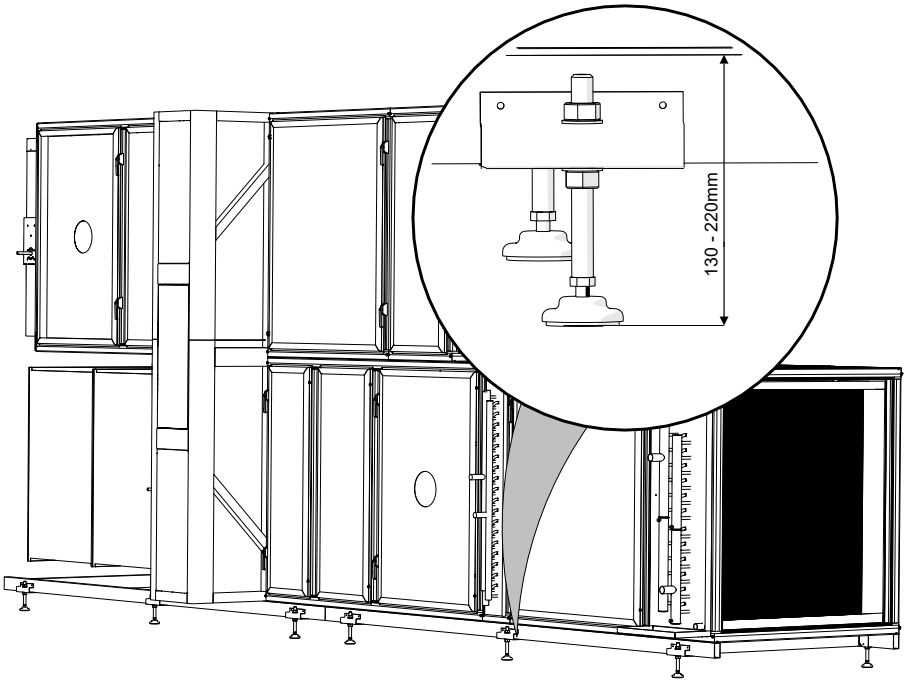
The center of gravity might not be in the center of the package.

Storage

Air handling units should be stored in a dry place, protected from rain and dirt. The protection of the products when leaving the factory is the plastic attached to the product. It is not advisable to store the products wrapped in plastic for more than a few days, as water may condense inside the package and damage the product. The packaging should be removed after the air handling unit has been installed.

Installing Recair base frame

Recair base frame is an optional accessory that we recommend using when possible. With this accessory Recair air handling unit (AHU) can be installed level and casings can be connected tightly and evenly. Base frame installation feet height can be adjusted so the base frame total height for Recair sizes A, B, C and D is between 130 to 220 mm. In sizes E, F and G Base Frame can be adjusted between 200 and 290 mm. The base frame feet are on a ball pivot, so foot angles can be adjusted during installation.



Delivery and Connection

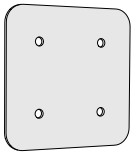
Recair base frames are always made to order. Base frames are marked with project number and AHU identifier.

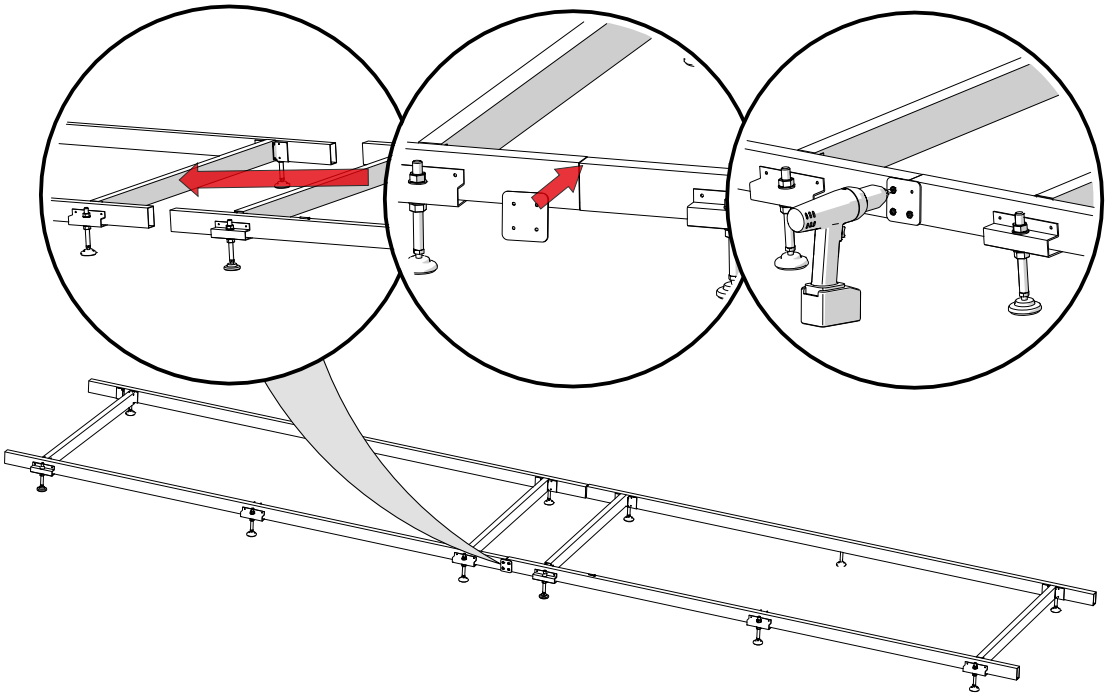
Base frame feet and installation parts are supplied in an accessory box which is located in the supply fan casing or the exhaust fan casing in case there is no supply fan. If there are no fans in the unit, the box is in the first casing it can fit. The accessory box location is marked on the delivery slip.

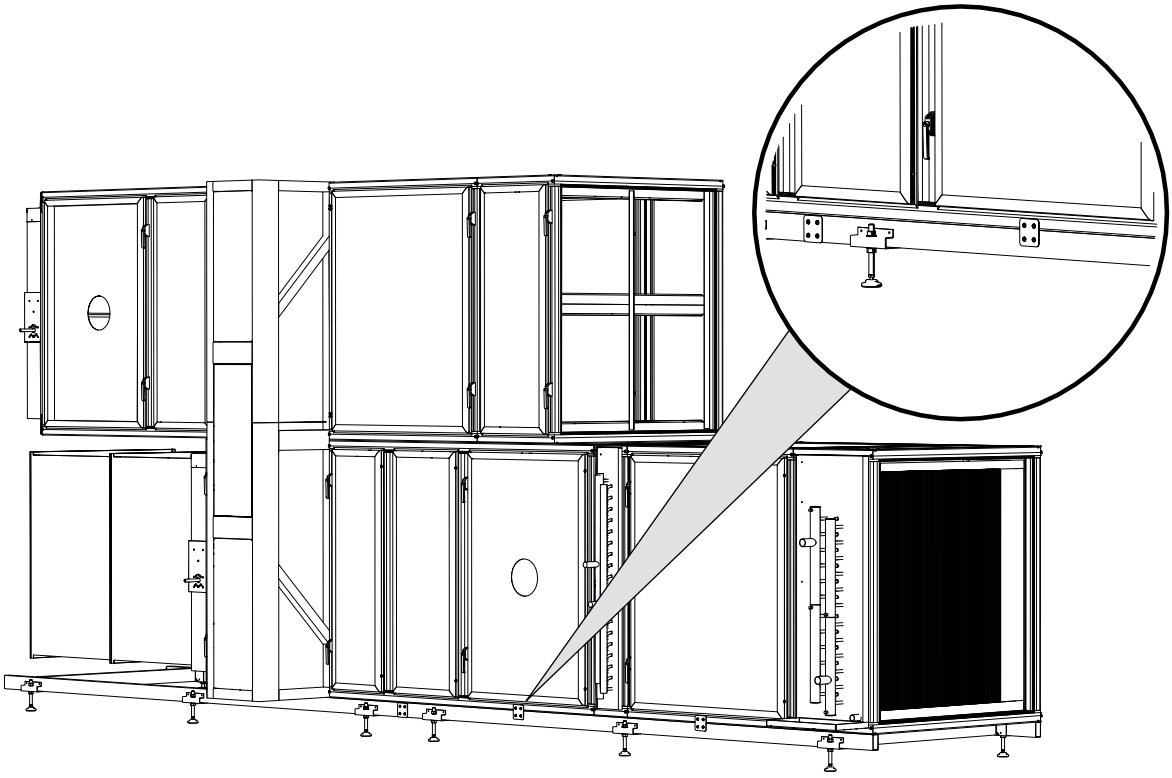
As standard base frames are delivered the length of the unit is rounded up to the next 100 mm. The base frame is available extended so additional equipment can be installed on the same base frame with AHU. This option needs to be ordered separately.

The shortest base frame is 1000 mm. If the AHU length is over 4000 mm the base frame will be delivered in two equal lengths. Example: 5000 mm unit, two 2500 mm base frames. If the length is over 8000 mm in three and if over 12000 mm in four equal lengths.

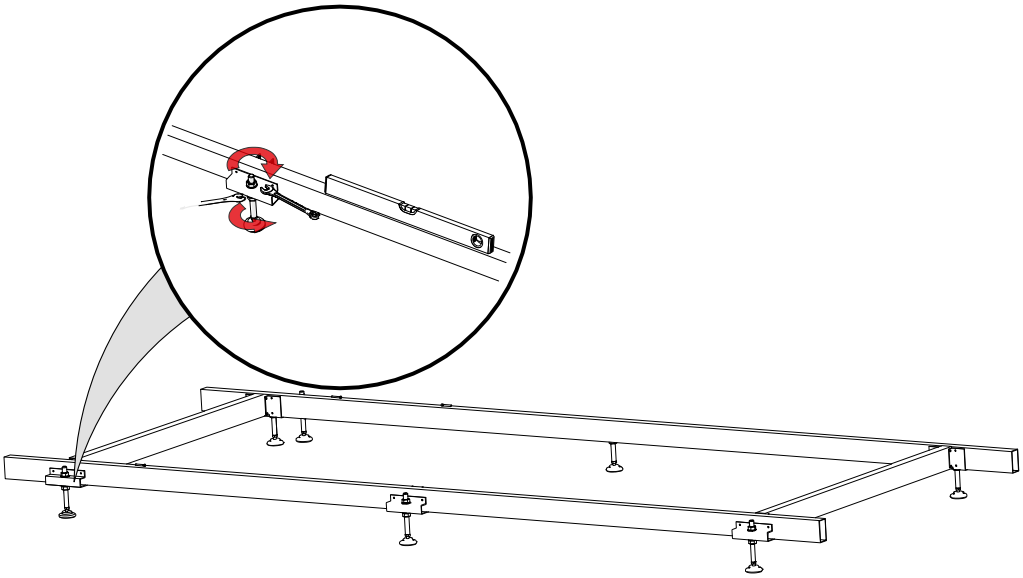
If the unit contains multiple base frames, the accessory box will contain connection plates. Connection plates can be used to connect to base frames at the end, so they won't slide out during the installation of the AHU casing. The screws for connecting the plates are not supplied in the accessory box.







The amount of base frame feet is dependent on unit weight. Usually, the feet are every 1500 to 2000 mm. After installation of the base frame, it needs to be checked that it's completely level, and base frame feet are tightened from both sides with bolts.



Recommended installation checklist

1. Locate all base frames associated with the AHU number to be installed.
2. Install base frames and in case of multiple base frames, connect them with connection plates.
3. Check that base frames are level and that base frame feet nuts are tightened.
4. Check the casing installation sequence from the AHU dimensioning picture.
5. Place the heaviest or furthest casing first.
6. Check the casing location from the dimensioning picture.
7. Slide the next casing on the base frame close to the first casing.
8. Connect the casings next to each other with Recair casing connectors.
9. Repeat the process for all casings.

The casing that comes on top of the unit can usually slide on the bottom casing. Check that the casing you are trying to slide is not too heavy and if there are some small protruding screws on the bottom casing or deformed aluminum they can be filed down.

Installing unit blocks

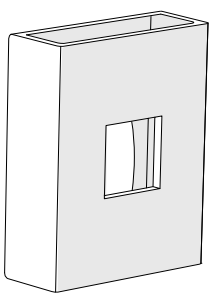
Recair air handling unit can be delivered as one unit or in multiple blocks. The delivery method is determined by the type and size of the unit and by the order request.

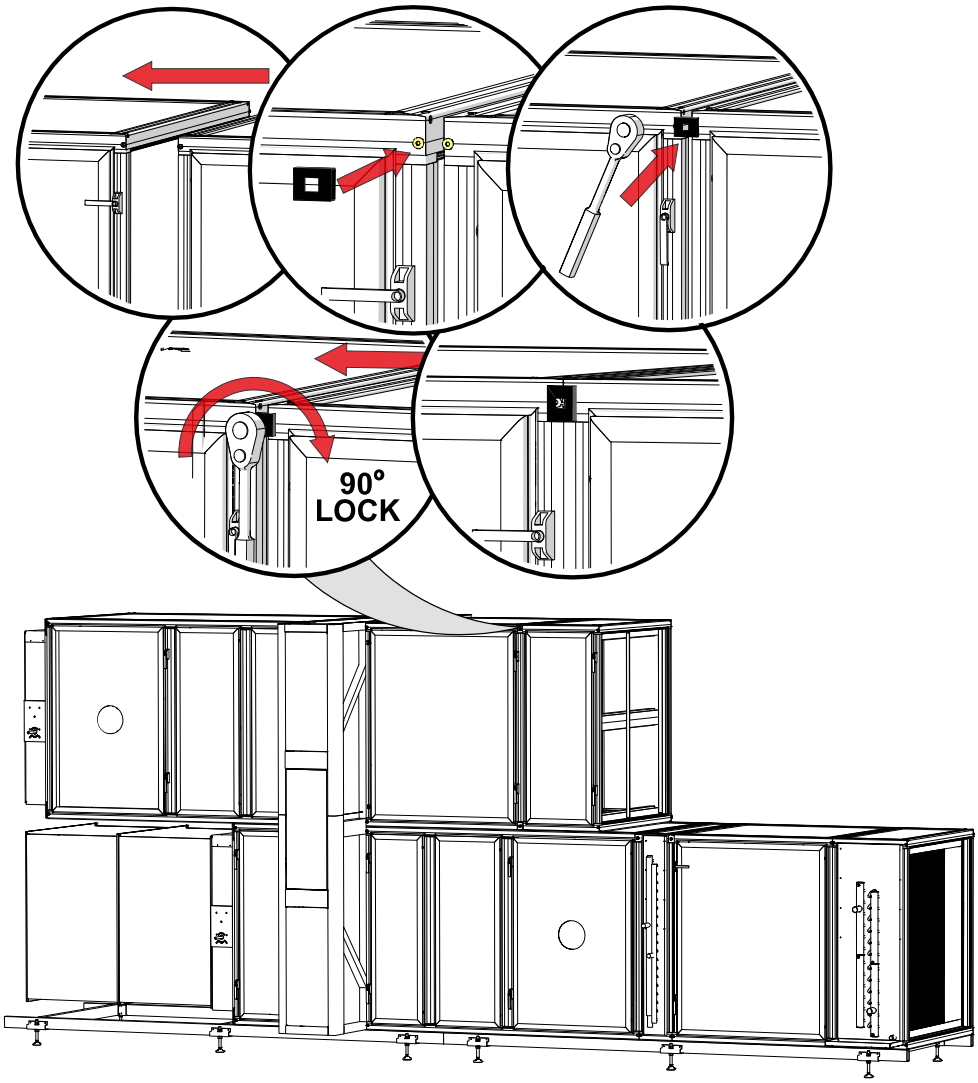
The connection seal of the unit blocks of the Recair air handling units is already installed at the factory. The blocks are connected with a fast-coupling system developed by Recair. Locking pieces are delivered in the accessory box. There are 4 locking points per joint, at each corner. An “A” ratchet is recommended for installing the locking pieces.

Installing unit blocks on a frame:

1. Make sure the base frame is level and the adjustment feet are locked.
2. Check the air handling unit structure from the documentation provided by Recair.
3. Place the heaviest (weight (kg) in the profile) block or one of the fan sections on the base frame first.
4. Check the exact location of the block from the unit documentation.
5. Move the unit blocks side by side on the platform.
6. Connect the unit blocks with Recair quick-release locking pieces.
7. Repeat with all the blocks.

Locking peace

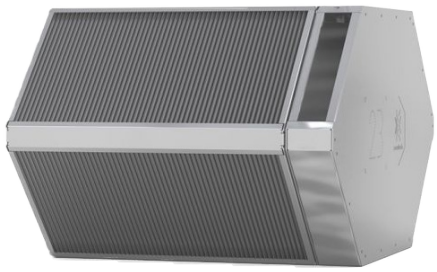



90°
LOCK

Counterflow plate heat exchanger

General

A counterflow plate heat exchanger is an energy recovery solution where extract air heat energy is transferred to supply air. In plate heat exchangers supply and extract air are not mixed.



The plate heat exchanger is already installed inside the casing in the Recair factory with section defrost dampers and 100% bypass.

Counterflow plate heat exchanger should always be installed the way that the exhaust air flows downwards. This is due to possible condensation that can occur in the plate heat exchanger extract air section. The condensation must have free gravitational flow out of the heat exchanger and to the drainage.

In cold environments where exhaust air includes moisture, we recommend installing a preheater for the plate heat exchanger to reduce the risk of freezing in the heat exchanger.

The plate heat exchanger's maximum operating temperature is 80 °C.

Installation

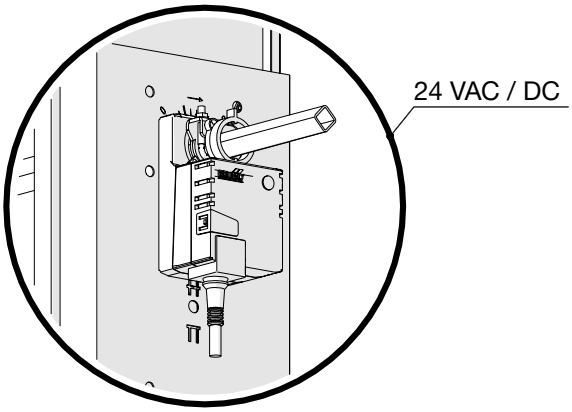
Actuators

The plate heat exchanger is installed inside the AHU casing in the Recair factory. The unit with a plate heat exchanger is equipped with defrost dampers to enable heat exchanger defrosting. Each defrost damper has multiple defrost sections and one bypass section.

Units can be ordered with installed damper actuators or without damper actuators.

Actuators are mounted on the damper shaft. The shaft diameter is 12 mm. The actuator type of the defrost section is open/close. The bypass section has a modulating actuator.

Unit size	Number of defrost sections	Number of actuators	Actuator torque, Nm
R2A	2	3	1
2A, A2A	3	4	1
R2B	3	4	1
2B, A2B, R3B	3	4	2
2C. A2C	4	5	2
3A	2	3	2
3B, A3B	3	4	2
3C, A4C	4	5	2
3D, A3D	3	4	2
4B, A4B	3	4	3
4C, A4C	4	5	3
4D, A4D	3	4	4
4E, A4E	3	4	4
4F	4	5	5
5C	4	5	4
5D	3	4	4
5E	3	4	5
5F	4	5	4



ETS NORD Recair cannot be held responsible for the block melting function if the delivery does not include Recair section defrost automation.

Drainage connection

The counterflow system includes a drain tray on both the supply and exhaust air sides to gather condensate. These drain trays have separate drain connections and should be connected to the water trap on site. The drain connection size is 32 mm.

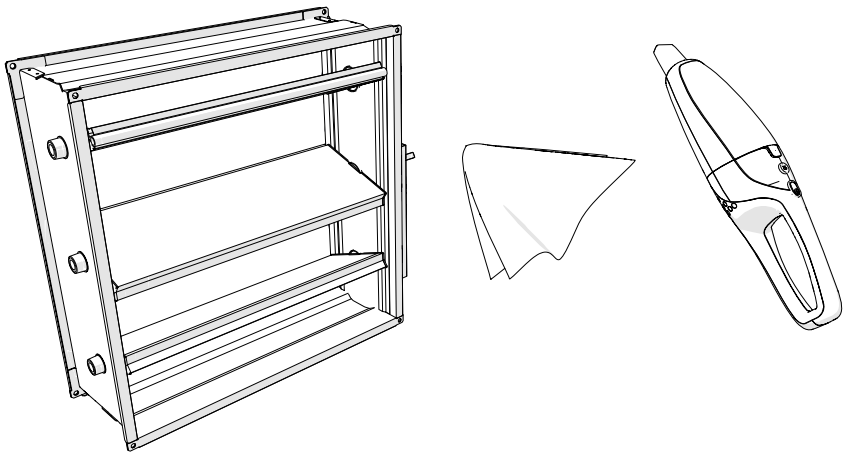
Maintenance

Regularly changing the filters approved by the manufacturer can reduce or eliminate the need for heat exchanger maintenance. In smaller units, if the heat exchanger gets dirty, it can be carefully removed and cleaned using a soft brush. Alternatively, a brush attachment for a vacuum cleaner can be used to vacuum the dirt. After cleaning, any remaining fine dust should be removed by blowing air through the heat exchanger (with a vacuum cleaner). If necessary, a disinfectant or antibacterial agent suitable for cleaning and disinfecting aluminum and plastic can be applied to the heat exchanger. It is important to allow the heat exchanger to dry completely before reinserting it into the unit.

⚠ When cleaning, it is important to avoid using sharp tools or hard brushes and to be cautious about pressure washing as this may cause permanent damage to the heat exchanger.

Defrost damper maintenance:

It is recommended to clean regulation and shut-off dampers regularly with a vacuum cleaner or cloth.



⚠ The defrost damper has moving parts. Careless work can cause injuries.

In case of damper failure:

1. Check the damper body and lever for damage or rust.
2. Check that damper blades open and close without any restriction and there aren't foreign obstacles restricting the blades' movement.
3. Check that the blade gaskets are not damaged.
4. Check the actuator motor limit positions and adjust if necessary.
5. Check that the actuator is correctly fixed to the motor bed and the shaft.

Section defrosts commissioning

Section defrost automation is sold separately. Please contact Recair for further information.

Recair section defrost system includes:

- Actuators for every damper
- Exhaust pressure difference transmitter
- Exhaust fan air volume transmitter
- Controller

Controller connections for the building automation system:

- Modbus RTU
- 0-10 Vdc control signal
- Alarm indication
- Operation status

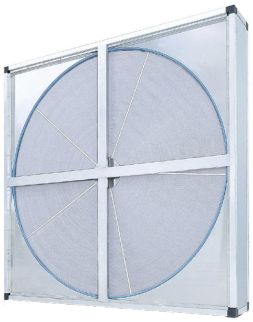
The controller's electrical connection is 230 V. The controller is tested and pre-adjusted in the Recair factory. The controller Modbus register list is delivered if needed.

Rotor heat exchanger

General

Rotar heat exchangers are regenerative heat exchangers where the wheel is made of heat-absorbing material, which rotates between two air streams: room extract air and outdoor fresh air. As the wheel rotates the heat is transferred from return air to supply air.

Generally, the casing is made from steel and aluminum frame. The rotor is made from aluminum foil. Different materials like hydroscopic, sorption rotor and epoxy-coated aluminum foil materials to be used in different environments are available on request.



Installation

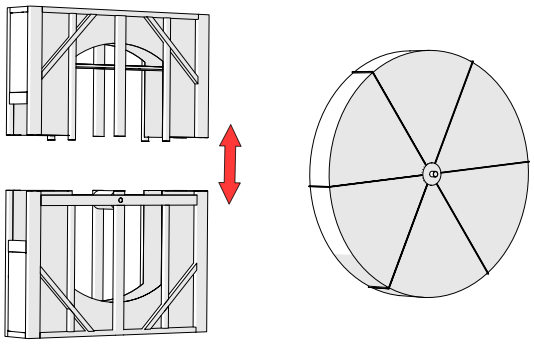
Smaller rotor units are delivered assembled with preinstalled controller.

Larger rotor units are delivered sectorized. Assembly is carried out at the site.

Small rotor units can also be supplied sectorized.

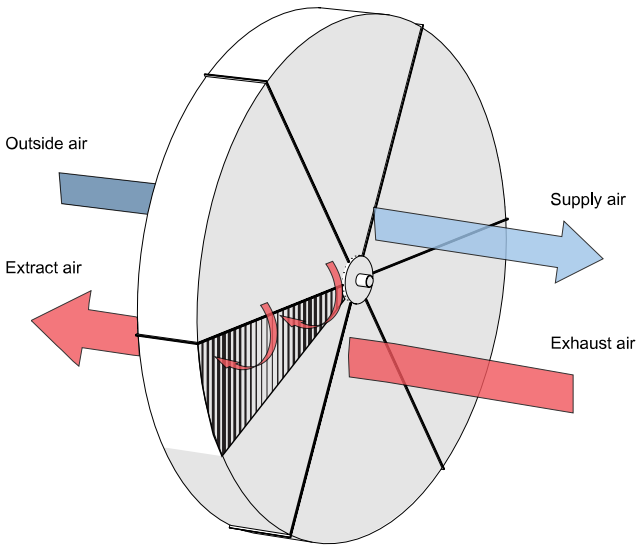
Sectorized rotors are supplied in two casing parts and multiple rotor slice parts.

Do not remove the protective cladding from the rotor before the unit is right at the place where it is to be installed.



Airflow for supply and return air through rotor sector must be opposite.

To prevent any potential harm or damage, it is crucial to ensure that the heat exchanger is securely fastened and not prone to tipping over during transportation, handling, storage, or installation. It's recommended to use appropriate transport racks if there is any uncertainty about the stability of the heat exchanger. Neglecting to secure the heat exchanger could result in severe injury and damage.



During installation, the position of the seal brushes relative to the rotor wheel, the correct rotation direction of the rotor, and the tension of the belt must be checked.

Sectored rotor installation

In the sales contract, the contractual responsibilities are:

Sectorized rotors are delivered in parts. The rotor consists of an upper and a lower casing, as well as rotor sectors. The lower casing and 50% of the rotor is supplied together.

NOTE! The air handling unit can **be completely assembled only** if on both sides of the rotor there are at least 500 mm doors with access to the rotor. If adjacent parts to the rotor do not give access from the inside to the rotor, the rotor must be assembled before installing the adjacent blocks.

The customer installs the lower part of the rotor, lifts the upper shell of the rotor without the sectors and bolts the parts together. The customer transfers the parts of the sector in their packaging next to the air handling unit before ETS NORD Recair installers arrive at the site.

The customer contacts ETS NORD Recair to agree on the assembling time and makes sure that previous steps are done before installers arrive.

NOTE! Contact should be made approximately 2 weeks before the desired assembling time. ETS NORD Recair installers assemble the rotor disc and check the final installation.

Project number: **Sight:**

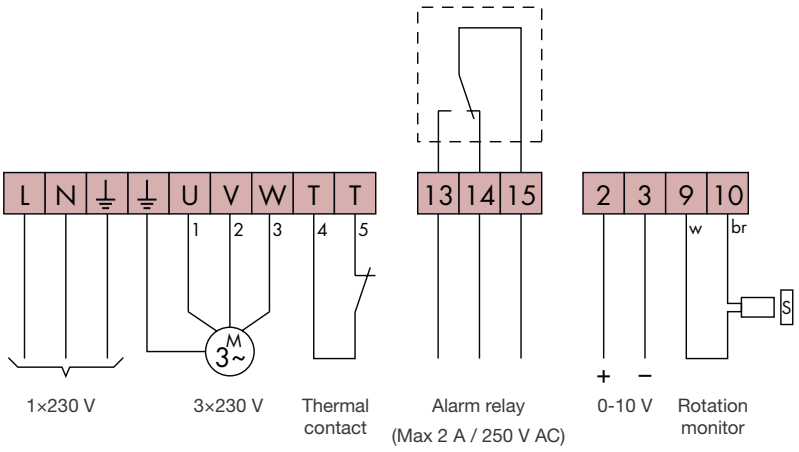
The following points apply to the installation of the sectors:

1. The customer has installed the lower parts of the air handling unit, including the lower part of the rotor, and has lifted the upper shell of the rotor in place without the sectors.	
2. The customer has transferred the sector parts in their packaging next the air handling unit.	
3. ETS NORD Recair installers assemble the rotor disc, install and connect the rotor's controller and check final installation. NOTE! The controller is an electrical installation.	
4. Comments by ETS NORD Recair for the rotor supplier.	
5. Rotor wobble margin (max allowed 0,24% of diameter).	Measured:
6. Approval and the installer's signature	Date: Name:

Electrical connections

The control panel is factory installed on the device, and the internal wiring has been completed.

Connection diagram



Pressure-differential control for frost protection is not included in the delivery. If frost protection is desired, then this needs to be ordered and purchased separately.

Commissioning

For commissioning:

- Ensure that all electrical supply lines and their components are installed and secured properly.
- Remove any transport securing devices.
- Remove any loose items from the rotor sections.
- Check for smooth and unrestricted rotor running. If the rotor is blocked by the seals, it must be adjusted. The seal should lightly touch the rotor.
- Make sure all electrical connections are done correctly.
- Check that the rotor belt is tightened, if not adjust the belt.
- **Setup variable speed drive: See start-up instructions for the specific control unit.**

Maintenance

The cleanness of a heat exchanger can impact its performance, effectiveness, and pressure drop. It is crucial to conduct regular inspections of the critical components of the heat exchanger, particularly when there is a decline in air quality.

Regular inspections of the rotor are necessary to identify any dirt or dust buildup. Even with filters in place within the air-handling unit, there is a possibility of the accumulation of dirt.

In case there is dirt or dust buildup on the rotor, the following methods can be used for their removal:

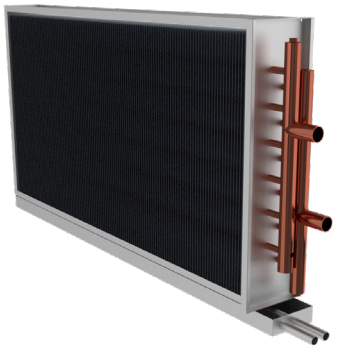
- Vacuum cleaner: suitable for light accumulation of dirt.
- Compressed air: useful for removing heavy dirt deposits.
- Hot water or solvents: effective for removing stubbornly attached dirt.

The rotor is driven by the motor via a drive belt. It is essential to check the tension of the drive belt after the first 100 operating hours. The tension of the belt can be increased by shortening the belt.

Coils

General

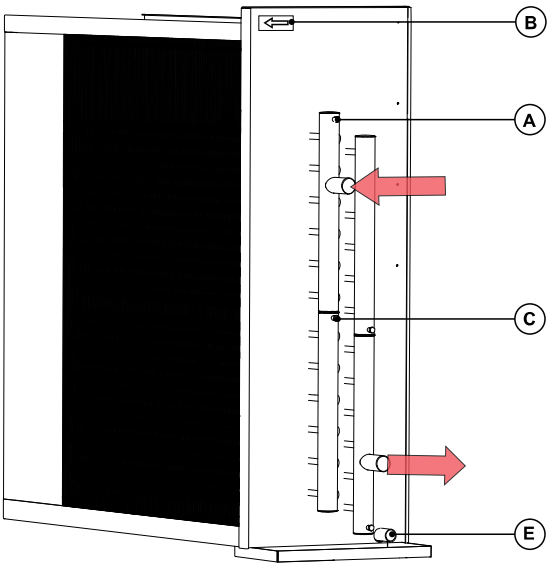
Coils in the air handling unit are used for heating and cooling the air and for energy recovery in run-around coil heat exchanger systems. Although the coils are used for different applications, the general installation and maintenance principles apply to all of them.



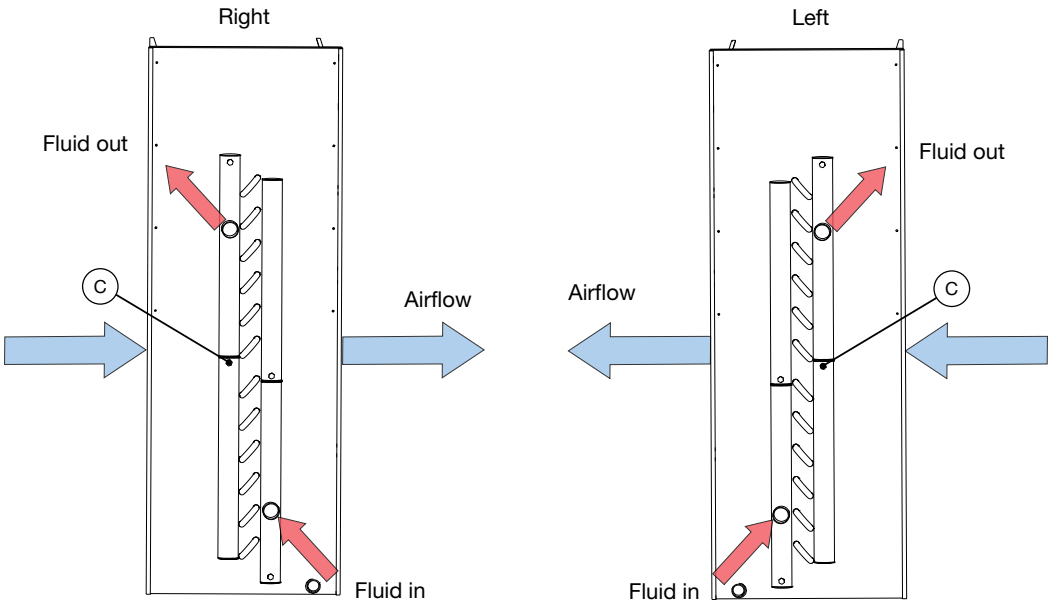
Installation

The pipework connections to the coil should be carried out by a professional. When connecting the coil to the pipework, it is important to ensure that the weight of the pipework does not put pressure on the coil's liquid connections.

Coils are always connected in a way that the liquid inlet is on the opposite side of the air inlet. Airflow direction and liquid inlet and outlet connections are indicated on the coil.



A – Airing valve
B – Airflow direction sticker
C – Anti-freezing temperature sensor (optional)
D – Drainage



RECAIR disclaims any responsibility for the connection of coils to the fluid system, or for any damage resulting from deficient planning, installation, or maintenance of such a system.

The installation of coils must be carried out according to the qualified designer for the project who is responsible for the heating or the correct selection of the equipment and accessories. It is recommended that pipes, valves, and other components be sized with consideration for pressure drop and optimal performance, rather than solely based on the dimensions of the coil connections.

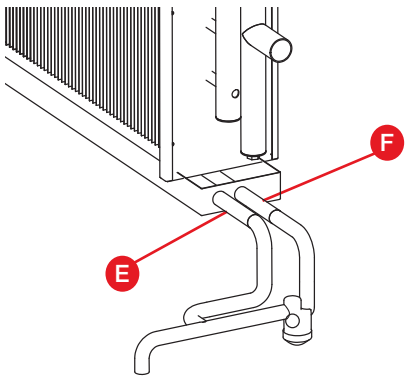
In the event of water freezing in the unit, the piping may fracture, resulting in a leakage in the system and potential water damage. To prevent this from occurring, appropriate measures must be taken. If there is a risk of the heating device freezing, a circulation pump must be installed in the secondary circuit to ensure a constant flow of water through the device. In addition, a frost protection thermostat or regulator, as well as an alarm, if possible, should be installed to deactivate the air handling unit fans and close the air side closing dampers.

Drainage connection

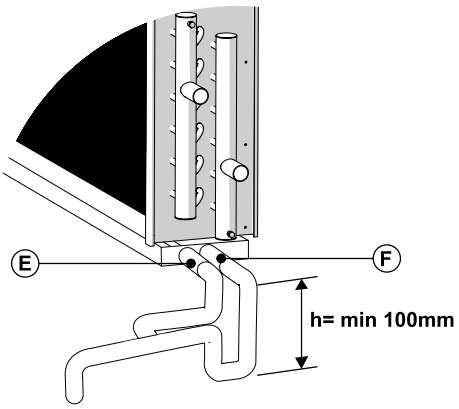
The connection “F” of the condensate bath of the cooling coil is connected to the drainage system with a siphon or U-trap. Connection “E” of the condensate pan can be connected to the drainage system after the siphon or U-trap.

In installations with negative pressure, the minimum height of the U-trap should be 100 mm. For systems where the negative pressure exceeds 1000 Pa, add 10 mm to the U-trap height for every additional 100 Pa.

Positive pressure installation
(after the fan)



Negative pressure installation
(before the fan)



Commissioning

1. Make a pressure test for the whole piping system.
2. Fill the system with fluid and bleed air from the system.
3. Verify that there are no fluid leakages.
4. Balance the system to the desired fluid flow.
5. Verify that condensation drainage is functioning correctly and that there are no leaks.
6. If there is a freezing protection function, test if it works properly.
7. Test the adjustment valves to ensure they are functioning correctly.

When dealing with water heating systems, it is important to exercise caution when opening venting taps, drainage, and isolating valves as the temperatures can be dangerously high. Failure to take necessary precautions could result in severe damage caused by the elevated temperatures.

Maintenance

Shut down the unit before opening the service door and doing any maintenance on the unit.

Regular cleaning of the coil fins is essential for optimal performance. The frequency of cleaning depends on the level of air cleanliness and the maintenance of the air filter and other system components. First, the air inlet side of the device must be cleaned with a brush, and then the entire coil must be cleaned with compressed air, water or steam (note that pressure washing is not allowed). Dirt must be blown out or washed out from the air outlet side towards the air inlet side. A mild detergent may be used to facilitate cleaning (make sure the detergent does not damage copper or aluminum). When cleaning, be careful not to damage the thin ribs of the device.

During the maintenance make sure that:

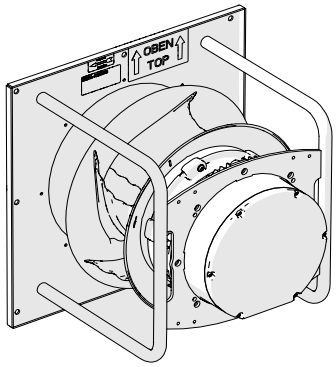
- There are no leakages in the system.
- Bleed air from the system and test that freezing protection works properly.
- Condensation tray, water lock and pipes are clean.
- There is no damage to lamellas, if necessary, use a fin comb.

Fans

General

The fan's primary function is to facilitate the movement of air throughout the system. This requires the fan to overcome the resistance posed by various components, such as air diffusers, grilles, ducting, and the air handling unit.

Adjusting the fan speed is essential to achieve the desired airflow. Insufficient airflow generated by the fan can disrupt the performance of the ventilation system.



Installation

Shut down the power of the unit before doing any installation or maintenance work.

Recair Modular ventilation units are supplied with EC, PM or AC motors.

The EC motor consists of a permanent magnet motor and an integrated speed controller known as the commutation unit. Speed control can be achieved using either a 0-10V DC signal or a Modbus RTU.

AC fan needs a frequency controller to control the frequency of the AC power supplied to the fan motor.

Depending on the motor type, with options of either 1-phase 230 VAC or 3-phase 400 VAC. Please look at the connection diagram from the specific delivered fan data sheet.

Measuring pressure and determining air volume

Almost all Recair fan sections contain two tubes for reference pressure measurement. Measuring reference pressure allows for the calculation of airflow with the manufacturer's equation and a k-value for the fan. The measurement measures the pressure difference between pressure before the fan and at the inlet nozzle.

The unit can contain pressure difference or airflow measurement devices (optional) or reference pressure measurement tubes can be connected to measurement equipment on site.

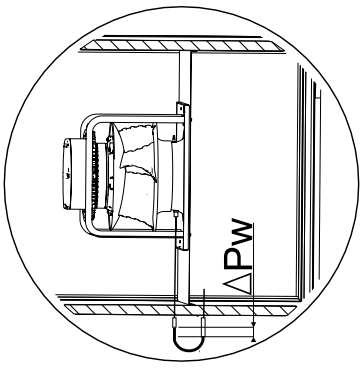
K-values, airflow units and equations to calculate the airflow are fan manufacturer-specific.

Each fan contains a sticker on its door telling what K-value, a unit of airflow and equation to use to calculate reference pressure airflow.

RECAIR
Made in Finland

Project:	12345
Type:	R3B
Unit ID:	301 TK
Airflow (m3/s):	1.4
Pressure (Pa):	826
k-value (m3/h=k*√Δp):	188

Reference pressure measurement



Before commissioning

Before starting fan, make sure:

- Ensure that the fan impeller rotates without any obstruction and that there are no objects present that could be drawn in and potentially harm the fan within the installation.
- Make sure that all mounting screws used to secure both the fan installation wall and the fan are properly tightened.
- Check the motor bearings. If the motor is moved and pounding or scraping sound, then this may mean that the bearings need service.
- Check that the measurement tubes are firmly and correctly connected.
- Do not start the fan with the damper on the suction or discharge side closed.

⚠ Do not make any modifications, additions, or conversions to the device without manufacturers approval.

Cleaning

Regular inspection and cleaning of both the supply air and extract air fans should be conducted as necessary.

- Wipe the fan impeller with cloth or vacuum cleaner with a soft nozzle. Dust accumulation primarily occurs on the inner side of the fan blades.
- Clean the fan's external surface from dust, dirt, and oil. If necessary, use soft cleaning detergent.
- Clean the fan section with cloth or vacuum cleaner with a soft nozzle.
- Take care to eliminate all impurities from the fan blades to avoid any imbalance.

Following any adjustments or cleaning, ensure that the fan operates smoothly without any vibrations.

Bag filters

General

Particulate air filters are used to remove solid particles like dust from airflow throughout the air handling unit. Filters are used to clean the air and protect the air-handling unit. As particles are gradually collected in filter the flow resistance increases. This results the decrease in airflow through the filter. Therefore, filters must be changed regularly.

Changing the supply and extract air filters

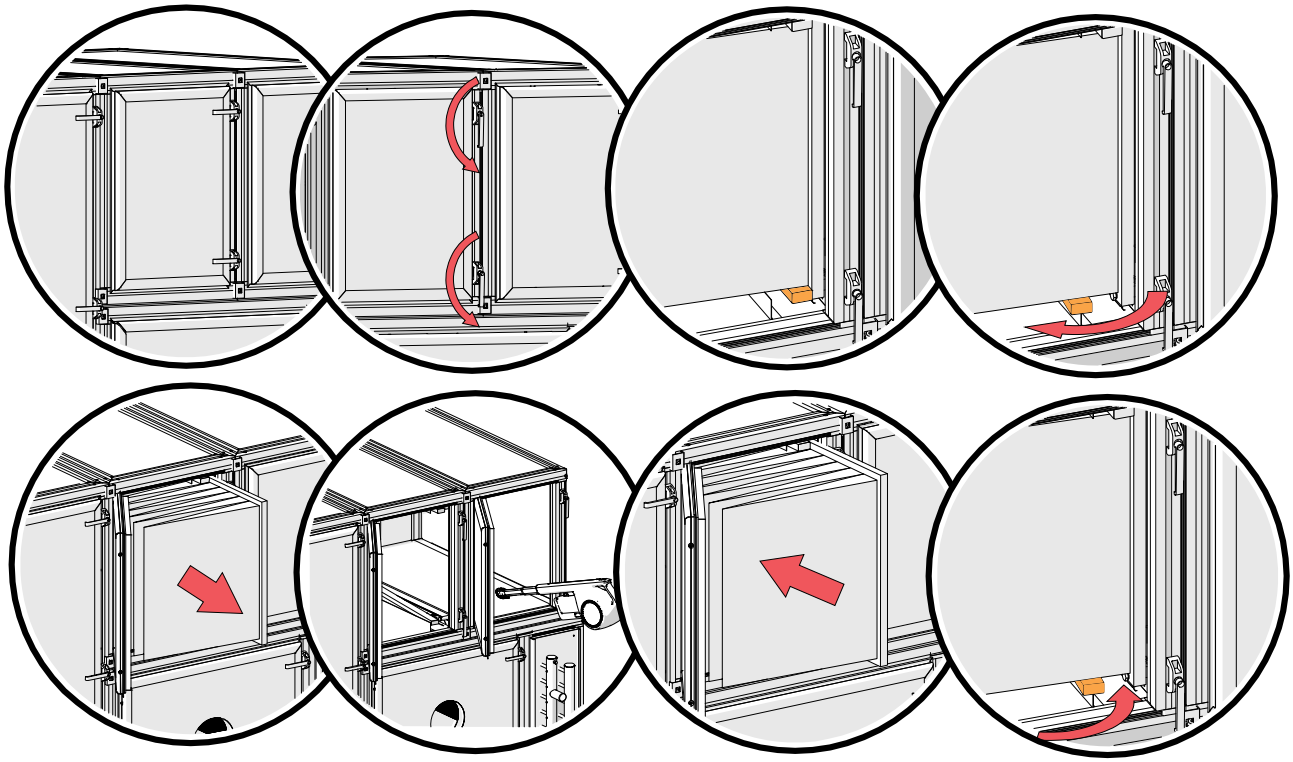
Shut down the unit before opening the service door and doing any maintenance on the unit.

Particles from the filter can be hazardous. Make sure you take the necessary precautions.

Air handling unit operation time between filter changes depends on the air quality. The filter guard (filter differential pressure sensor) indicates the time for a filter change. When the pressure sensor shows a 1.75-fold pressure drop compared to the initial pressure drop, it is advisable to replace the filters.

If the unit is not equipped with a filter guard, we recommend changing the filter at least twice a year.

To change the filter:



1. Open service hatch.
2. Open filter locking mechanism.
3. Pull out old filters one by one.
4. Clean the unit with vacuum cleaner and/or damp cloth.
5. Check that the filter part sealings are intact.
6. Insert new clean filters.
7. Lock the filter locking mechanism.
8. Close the service door.

Used filters must be disposed of in an environmentally responsible manner in accordance with local regulations

Replacement filters

A short filter section (filter section length 250mm) is suitable for filters with a length of 165 mm. Filter efficiency coarse 60% (G4).

The long filter section (section length 600 mm) is suitable for filters with a max length of 525 mm. Filter efficiency ePM10 60% (M5), ePM1 60% (F7) or ePM1 85% (F9) fine filter.

The filter pack contains one or more filters of the same or different size, see the numbers in the table.

Note! The filter gasket is pre-installed to the unit filter frame in the factory and no additional gaskets are needed for the filter. When changing filters make sure the gasket is correctly in place.

Replacement filter sizes

For **R-series** units

R2A	1 × (592×287) ▭
R2B	1 × (592×442) + 1 × (287×442) + ▭▭
R3B	1 × (592×442) + 1 × (287×442) + ▭▭

Filter sizes:

Filter class		Frame size (mm)	Length (mm)	Bags (nr.)
EN 779	ISO 16890			
F7/F9	ePM1 60% / ePM1 85%	287×287	520	5
F7/F9	ePM1 60% / ePM1 85%	287×440	520	5
F7/F9	ePM1 60% / ePM1 85%	287×592	520	5
F7/F9	ePM1 60% / ePM1 85%	592×287	520	10
F7/F9	ePM1 60% / ePM1 85%	592×440	520	10
F7/F9	ePM1 60% / ePM1 85%	592×592	520	10
M5	ePM10 60%	287×287	500	4
M5	ePM10 60%	287×440	500	4
M5	ePM10 60%	287×592	500	4
M5	ePM10 60%	592×287	500	6
M5	ePM10 60%	592×440	500	6
M5	ePM10 60%	592×592	500	6
G4	Coarse 60%	287×287	165	2
G4	Coarse 60%	287×440	165	2
G4	Coarse 60%	287×592	165	2
G4	Coarse 60%	592×287	165	4
G4	Coarse 60%	592×440	165	5
G4	Coarse 60%	592×592	165	4

For **Modular and A-seria** units

1 × (592×442) **2A** 	1 × (592×442) + 1 × (287×442) + **2B** 	2 × (592×442) **2C** 				
1 × (592×592) **3A** 	1 × (592×592) + 1 × (287×592) + **3B** 	2 × (592×592) **3C** 	2 × (592×592) + 1 × (287×592) + **3D** 			
	1 × (592×592) + 1 × (287×592) + 1 × (592×287) + 1 × (287×287) **4B** 	2 × (592×592) + 2 × (592×287) **4C** 	2 × (592×592) + 1 × (287×592) + 2 × (592×287) + 1 × (287×287) **4D** 	3 × (592×592) + 3 × (592×287) **4E** 	4 × (592×592) + 4 × (592×287) **4F** 	
		4 × (592×592) **5C** 	4 × (592×592) + 2 × (287×592) **5D** 	6 × (592×592) **5E** 	8 × (592×592) **5F** 	
				4 × (592×592) + 2 × (287×592) **6E** 	8 × (592×592) + 4 × (287×592) **6F** 	
					12 × (592×592) **7F** 	15 × (592×592) **7G** 

Closing dampers

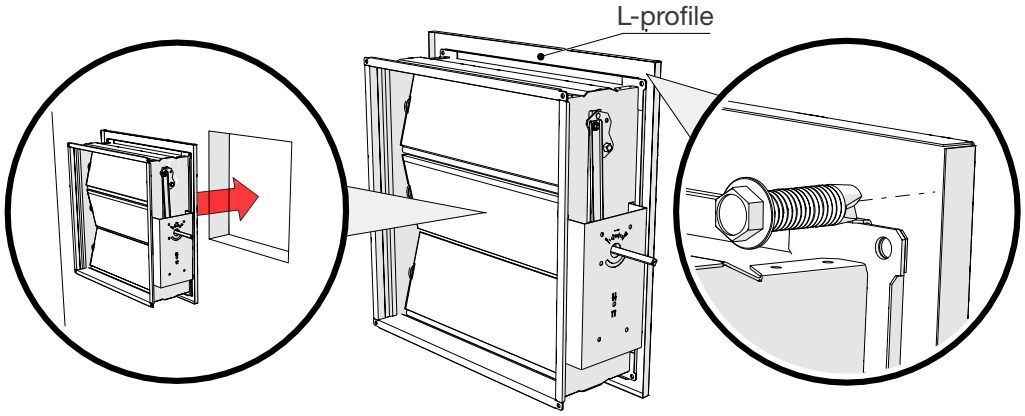
Rectangular shut-off dampers are used for closing units from ventilation systems. Recair air handling unit dampers are sealed shut-off dampers with thermally insulated blades and thermally insulated external casing, the measured thermal transmittance U_d=2,3 W/(m²K).

The blades rotate in the case on polyamide bearings. The damper has profiled blades with polyamide covers at the ends and silicone-sealed edges. The blades are filled with mineral wool.

Standard closing dampers are manufactured of galvanized steel. Special materials can be made on request.

Mounting

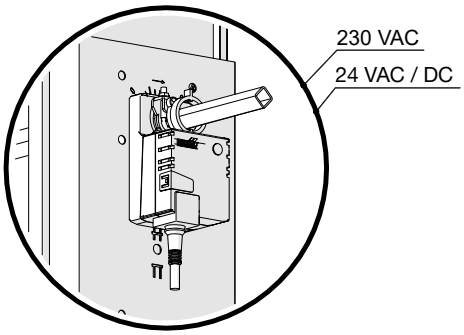
The damper is installed to the unit with screws.



The blades are regulated with an actuator. The actuator is installed on the side of the damper. The shaft size is 12×12 mm.

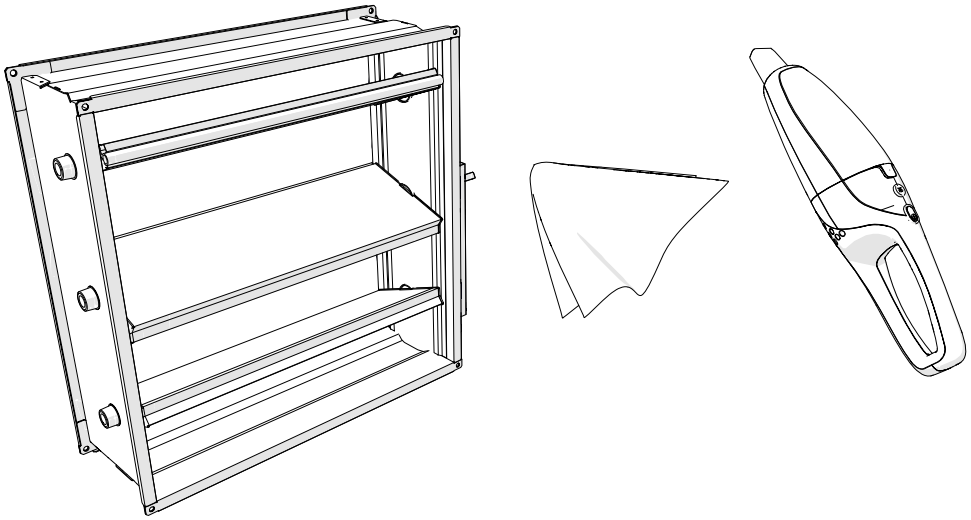
Unit size	Damper size (mm)	Actuator location	Actuator torque (Nm)
R2A	ø 315	1. Blade	7
R2B	ø 400	1. Blade	9
R3B	ø 400	1. Blade	10
2A	500×400	1. Blade	9
2B	800×400	1. Blade	12
2C	1100×400	1. Blade	15
3A	500×600	1. Blade	11
3B	800×600	1. Blade	13
3C	1100×600	1. Blade	16
3D	1400×600	1. Blade	18
4B	800×800	3. Blade	18
4C	1100×800	3. Blade	20
4D	1400×800	3. Blade	22
4E	1700×800	3. Blade	23
4F	2300×800	3. Blade	26
5C	1100×1200	3. Blade	21
5D	1400×1200	3. Blade	24
5E	1700×1200	3. Blade	26
5F	2300×1200	3. Blade	29
6E	1700×1600	5. Blade	29
6F	2300×1600	5. Blade	32
7F	2500×1800	5. Blade	43
7G*	2800×1800		3×32

*Size 7G has three actuators for closing damper.



Shut-off damper maintenance

We recommend cleaning regulation and shut-off dampers regularly with a vacuum cleaner or cloth.



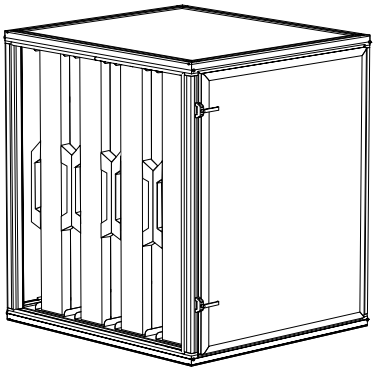
NB! Regulation and shut-off damper have moving parts. Careless work can cause injuries.

In case of damper failure:

1. Check the damper body and lever for damage or rust.
2. Check that damper blades open and close without any restriction and there aren't foreign obstacles restricting the blades' movement.
3. Check that the blade gaskets are not damaged.
4. Check the actuator motor limit positions and adjust if necessary.
5. Check that the actuator is correctly fixed to the motor bed and the shaft.

Silencers

General



Recair AHU's can be delivered with integrated silencers.

The silencer reduces the noise levels generated by the air handling unit to the ventilation ductwork.

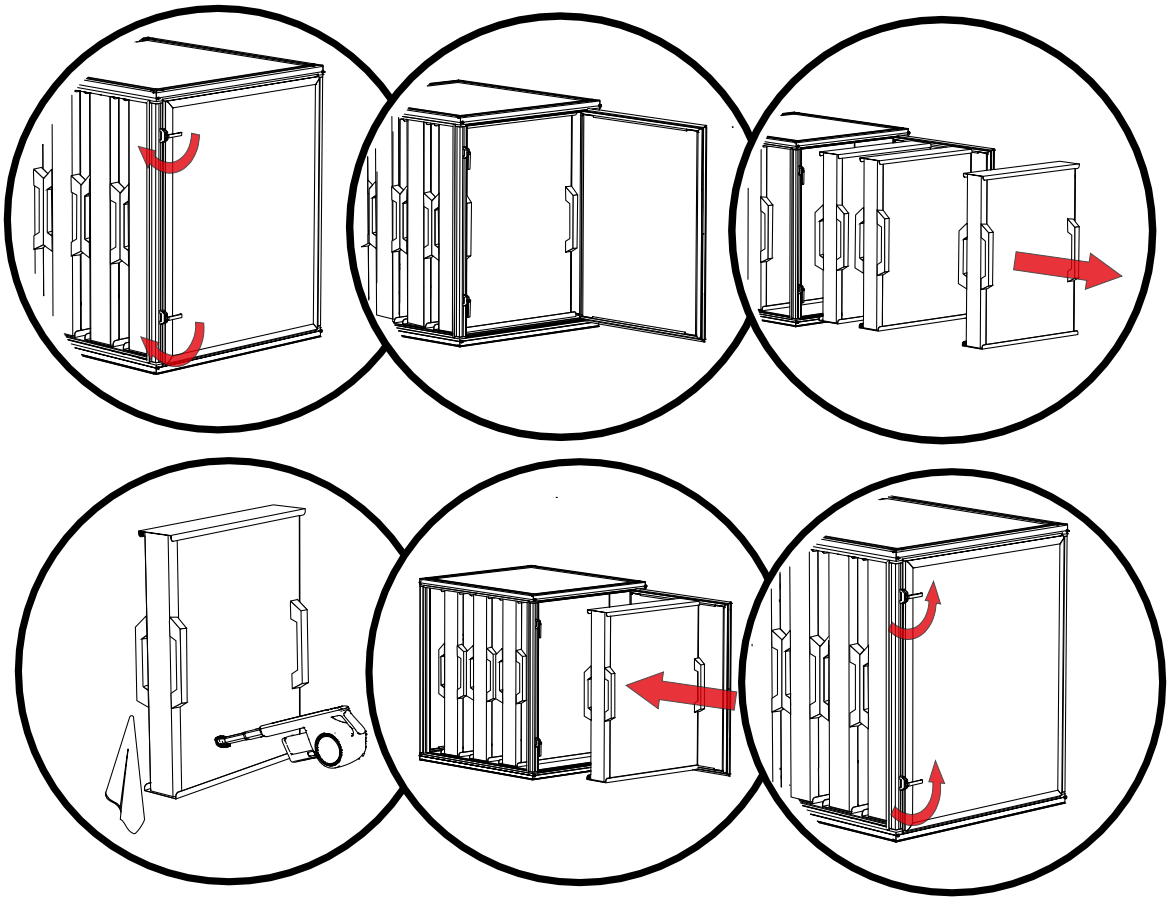
Recair offers three silencer absorption material options:

- Mineral wool
- Synthetic polyester sound insulation
- Cleantec® mineral wool with a washable surface layer

Cleaning

Silencer can be delivered with fixed or removable silencer baffles. If the silencer has a door, silencer baffles can be pulled out of the unit for maintenance and cleaning. This type of silencer can be used as a service section.

If the unit is delivered with a fixed silencer section, then the service section right next to the silencer section should be used for cleaning.



Cleaning methods depend on the silencer absorption material used.

For Mineral wool and Synthetic polyester:

- Cleaning with a vacuum or cleaning cloth

For Cleantec® mineral wool with a washable surface layer:

- Cleaning with a vacuum or cleaning cloth
- Flush or rinse them with water and, if needed, incorporate an appropriate detergent to clean surfaces coated with a fatty deposit.

Electrical heater

General

Electric heaters can be used as pre-heaters or post-heaters in Recair AHU's.

Electrical heaters are delivered with integrated electronics (if not stated otherwise on order).

Installation

Heaters can be deliver as integrated inside the ventilation unit section or as separate part for duct installation.

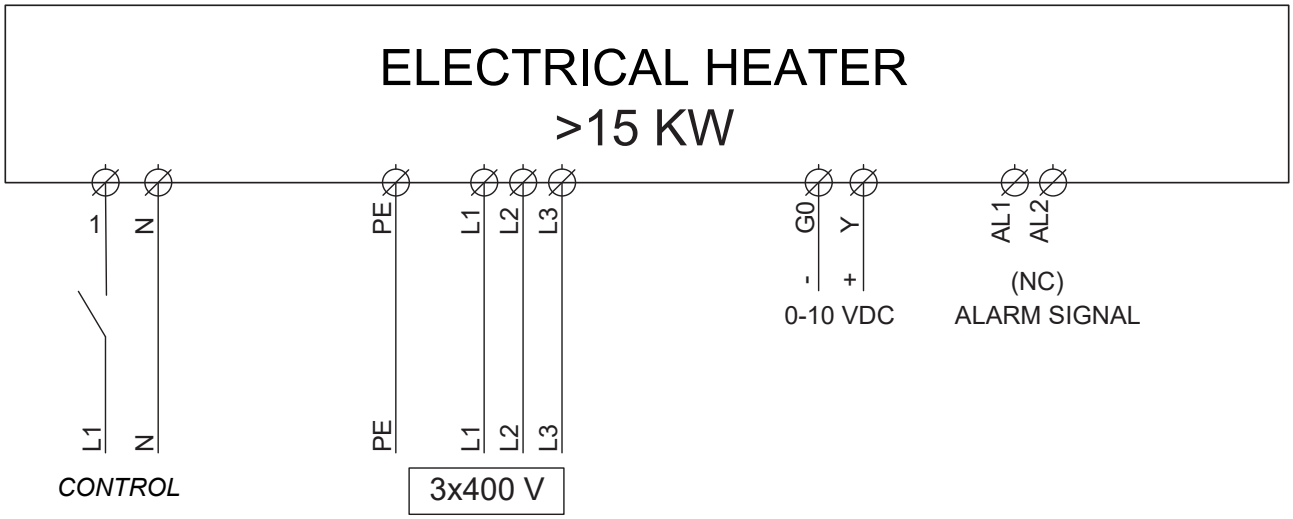
Shut down the power of the unit before doing any installation or maintenance work.

Note! In some cases, the unit has a separate power supply for the electrical heater. Make sure such separate power supply is disconnected before performing any installation or maintenance work.

The heater can be installed either horizontally or vertically. When installing, ensure that the terminal box is mounted correctly. For round connection heaters the terminal block must be installed facing upwards or allowing for a maximum lateral rotation of 90°. The terminal box should not be installed facing downwards. The rectangular heating element should not be positioned with the terminal box facing upwards or downwards.

- The installation of the main power supply may only be carried out by a certified electrician.
- Make sure the appropriate power supply cable is selected based on the heater's power rating.
- The airflow direction within the air heater should align with the indicated arrow, which can be found on the side of the heater near the base of the junction box.
- The automatic circuit breaker must be selected regarding power and nominal current (see the electrical rating plate on the heater casing top) of the heater.
- When connecting the heater to the mains power supply, check that the voltage, frequency, power, and current are the same as those indicated on the electrical rating plate.
- It is important to ensure that the current to the associated fan cannot be switched off unless the current to the elements is either switched off first or simultaneously. It is advisable to keep the fans running for some time before shutdown. This allows sufficient time for cooling of remaining heat and prevents the activation of overheating protections.
- The air heater is equipped with two over-heating protections, one of which requires manual reset. These protections are specifically designed to prevent overheating in two scenarios: when the airflow is insufficient and in the event of a malfunction in the system.

Electrical connections



Maintenance

Electric heaters do not require maintenance. Do periodic performance checks and if necessary clean the electrical heater section.

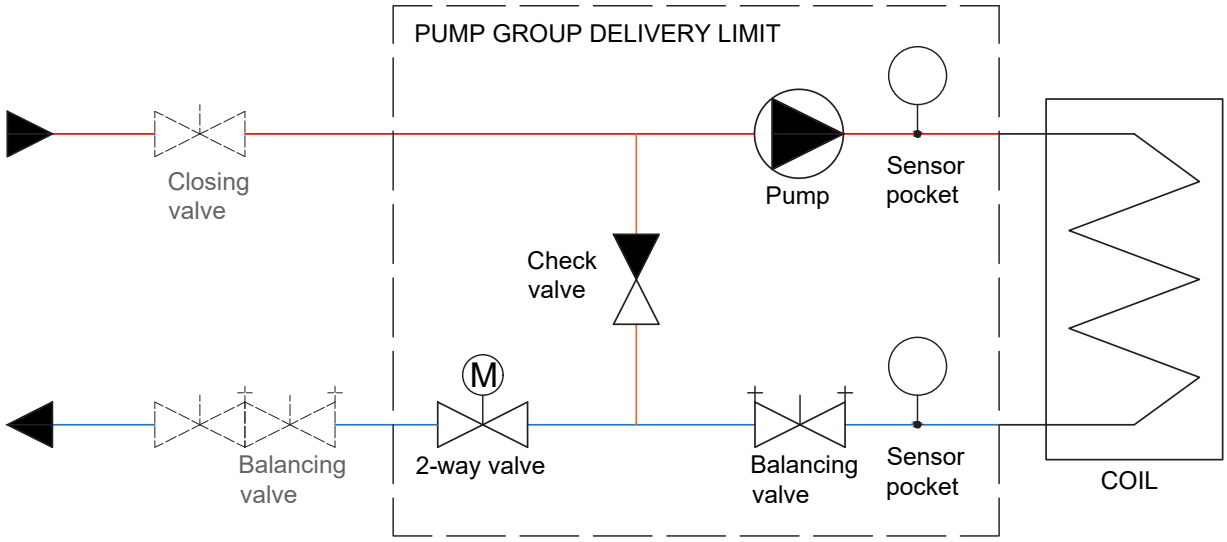
When accessing the heater make sure to shut down the air handling unit and possibly separate the power supply first and wait for the heater to cool down.

In case of overheating:

1. Shut down the air handling unit. Electrical work must be carried out by a certified electrician.
2. Check if the manual overheating protection has been triggered.
3. Investigate and fix the fault.
4. Reset the overheating protection.

Heating pump group

The Recair Pump group for the heating coil is a complete system with integrated pumps, valves, and sensors. The system can be controlled with Recair or other suppliers' controller.



Delivery limits

Pump group delivery includes:

- Pump
- 2-way valve / 3-way valve
- Check valve
- Adjustment valve
- 2 x meter pockets

Installation

- Connect the pump group to the pipe system.
- The pump is always in the fluid coil inlet side.
- Connect 230 V electric connection for the pump.
- Connect 2-way / 3-way valve actuator to the building automation system.
- Connect the pump to the building automation system (Operation inform / alarm).

Commissioning

Make sure that pump circuits are installed correctly. Make sure that the 2-way / 3-way actuator operates in the right direction. Adjust the fluid volume for the operation point:

1. Close the 2-way / 3-way valve.
2. Adjust the pre-adjustment value for the adjustment valve (3-5 kPa).
3. Increase the pump speed so it achieves the operation point.

Operation points can be found in the air handling unit technical data sheet.

Check that the next operations work:

- Supply air temperature adjustment.
- Frost protection function.
- Pump alarm/operation inform.

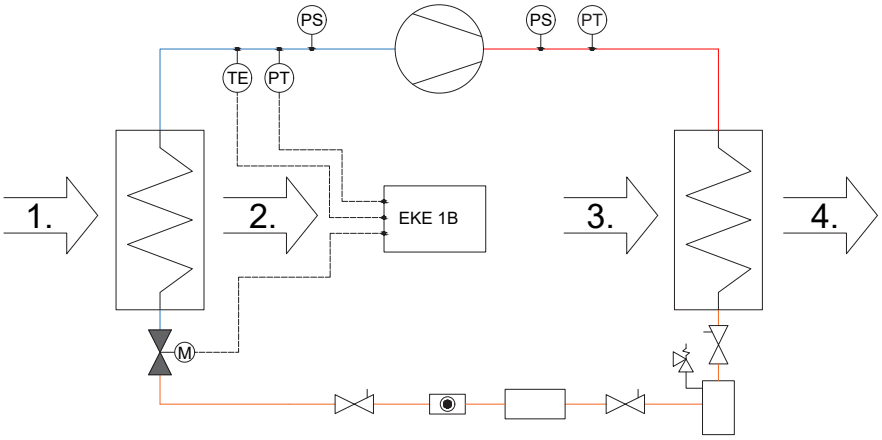
Maintenance

- Check that the actuator is not stuck.
- The frost protection function works.
- The pump is running.

Cooler

General

A Recair Cooler is a separate module with an integrated cooling circuit, evaporator, condenser, and compressor, that can cool the supply air.



The cooler is equipped with an inverter compressor and frequency converter. The compressor speed is regulated based on the supply air, setpoint and status of cooling circuit.

In the compressor refrigerant is compressed to hot gas and moves to the condenser, where it releases heat and condenses from a gas into a liquid due to cooling from the surrounding air.

Next, the refrigerant flows through the pressure-reducing expansion valve, entering the evaporator. In the evaporator, it undergoes a phase transformation from liquid to gas (evaporates). During this process, the refrigerant absorbs the necessary heat, which is extracted from the supply air, resulting in the cooling of the supply air.

The gaseous and cold refrigerant then returns to the compressor, where it is compressed and heated up again. Additionally, the gas is utilized to cool the compressor's electric motor.

Installation

The Cooler is delivered as a complete one-piece module that is factory-tested and filled with refrigerant. On rare occasions the cooler is delivered unassembled. Assembly, soldering, pressure tests, and adding the refrigerant can only be carried out by qualified and certified personnel.

For the installation of the unit block refer to the section INSTALLING UNIT BLOCKS.

The unit must be installed indoors with an ambient temperature between +5…+30 °C.

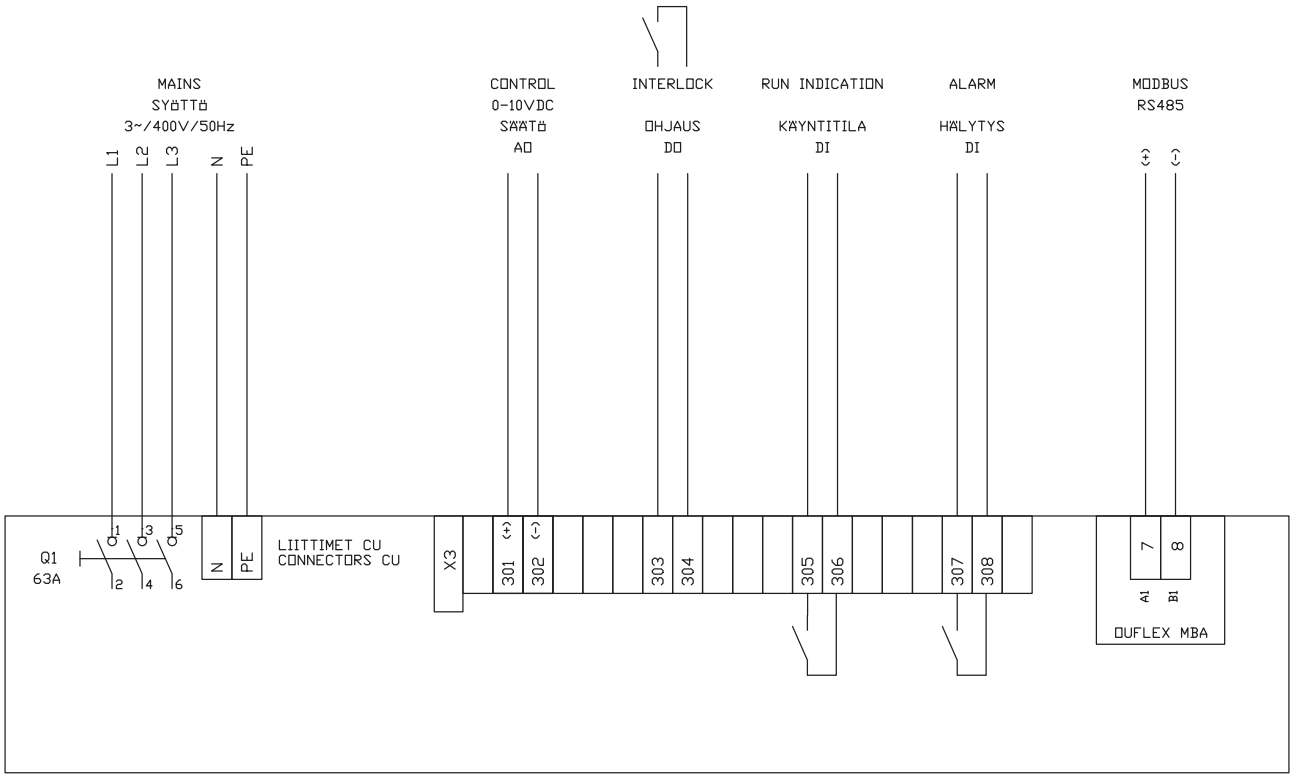
Work on the refrigerant circuit must be done by a certified refrigeration technician.

Drainage connection

The counterflow system includes a drain tray on both the supply and exhaust air sides to gather condensate. These drain trays have separate drain connections and should be connected to the water trap on site. The drain connection size is 32 mm.

Electrical connection

The Cooler is equipped with a separate controller and is powered separately:



Commissioning

Cooler commissioning needs to be done by a person familiar with integrated cooling systems.

Heat recovery cannot run when integrated cooling is running. If the system is controlled by separate a BMS, this needs to be programmed into the heat recovery control.

Service

Shut down the unit before opening the service door and doing any maintenance on the unit.

All service or repair tasks must be performed by an authorized individual who possesses the required training and certification.

Refrigerant unit service regular maintenance and leakage tests must be carried out in accordance with local and national regulations.

Adhere to local regulations on refrigerant system inspection cycles.

Refrigerant Leak Detection

The installation, maintenance, and leak checks for refrigeration systems must be carried out by an authorized individual who possesses the required training and certification.

1. Carry out statutory leak checks.

Newly installed refrigeration equipment and heat pumps must be checked for leaks immediately after their commissioning. After this, the length of the equipment inspection interval depends on the so-called refrigerant charges calculated in CO_2 equivalent tons as follows:

Refrigerant CO_2 equivalent tons	Leak inspection interval**
5*… < 50	12 months
50… < 500	6 months
≥ 500	3 months

* Those meeting the requirements of Article 2, Section 11 of the F-Gas Regulation and marked as airtight by the manufacturer at their factory < 10 tn CO_2-eq. containing devices do not need to be leak-checked.

** The inspection interval can be doubled if a leak detection system is in use that gives an alarm about a detected leak.

2. Ensure that the facility is up to date regarding the leak detection system.

Refrigeration equipment and plants, where the filling amount of a single refrigerant circuit is at least 500 CO_2 equivalent tons, must be equipped with a leak detection system, regardless of when the equipment was installed. The operation of leak detection systems must be checked once a year.

Until the leak detection system is installed, a 3-month inspection interval must be followed in the above-mentioned facilities.

3. Any leaks must be repaired without delay.

After repairing the leaks, the equipment and systems must be rechecked for leaks within one month of the repair.

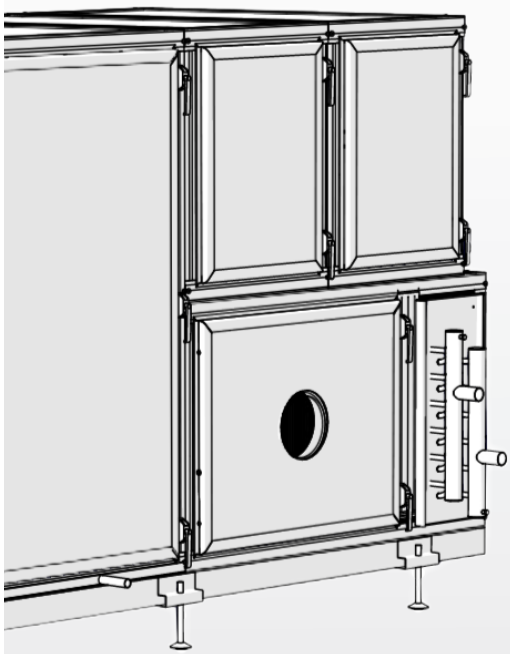
4. A maintenance and inspection log must be maintained for all refrigeration equipment subject to leak inspections, which should include the following information:

- The type and quantity of refrigerant in the equipment (in kg and t CO_2 eq.).
- The dates and results of inspections.
- The amount of refrigerant added and removed.
- The name and identifying information of the company that conducted the inspection.
- If the equipment has been taken out of service, the measures taken for refrigerant recovery and final disposal.

The owner of the device must keep the above records for at least 5 years. The maintenance company that performed the maintenance and checks must also keep the corresponding information for 5 years.

The maintenance and inspection log must be presented to the supervisory authority upon request.

There should also be a notice (maintenance label) on the equipment indicating when the equipment was last inspected.



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