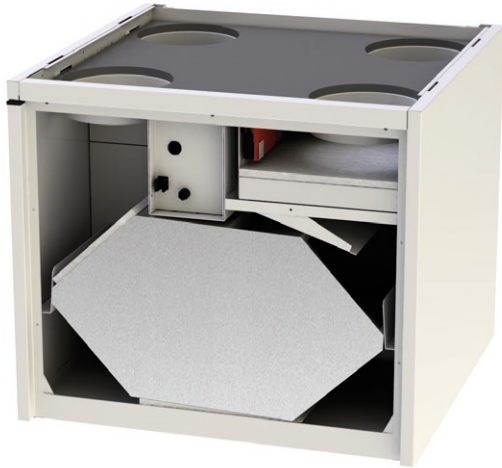


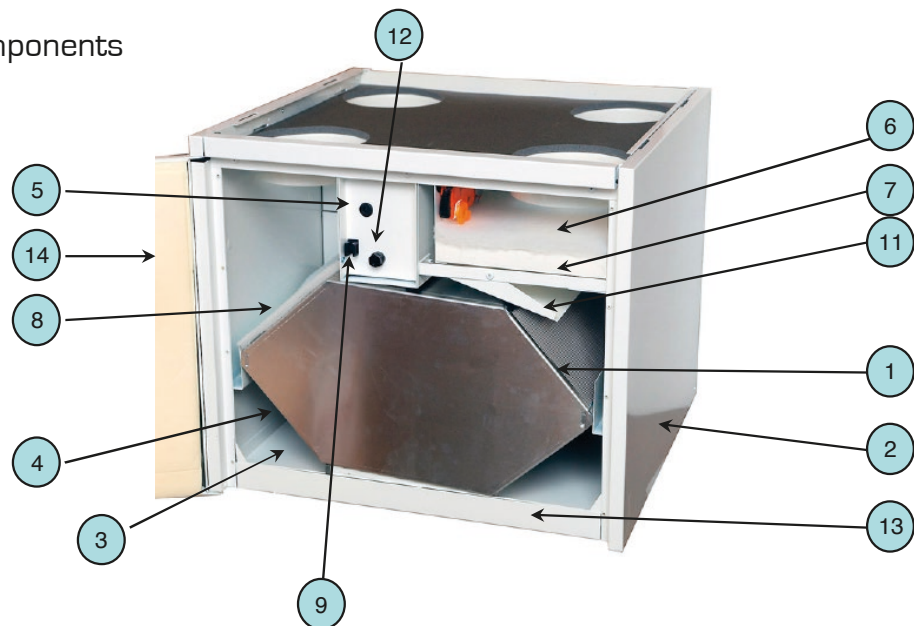
ILOX 89 Optima Energy Recovery Unit Use and maintenance



Technical data Ilox 89 Optima

Measurements (W x H x D)	598 x 512 x 569 mm
Electricity	230 V, 50 Hz
Electrical power	1260 W, 5.5 A
Reheating	1000 W, 50 Hz
Weight	50 kg
Airflow, max.	125 dm ³ /s
Duct diameter	160 mm

ILOX 89 Optima components



- | | |
|--------------------------------------|--|
| 1. Heat recovery cell | 9. Door switch |
| 2. Exhaust air fan (behind the cell) | 10. Control panel
(speed/fireplace/boost) |
| 3. Supply air fan (behind the cell) | 11. Heat recovery bypass (automatic) |
| 4. Reheating resistor | 12. Overheating protection reset button |
| 5. Electrical cabinet | 13. Condensation outlet
(bottom rear of the unit) |
| 6. Supply air pre-filter (G3) | 14. Door switch pushbutton |
| 7. Supply air fine filter (F7) | |
| 8. Exhaust air filter (G3) | |

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Use and maintenance

Ventilation needs

In a well-insulated house, a forced ventilation system is essential. The flawless operation and use of an air handling unit guarantee a pleasant level of comfort and healthy indoor air quality in your home.

Without sufficient ventilation, humidity building up on structures may damage them and cause the growth of mould and fungi.

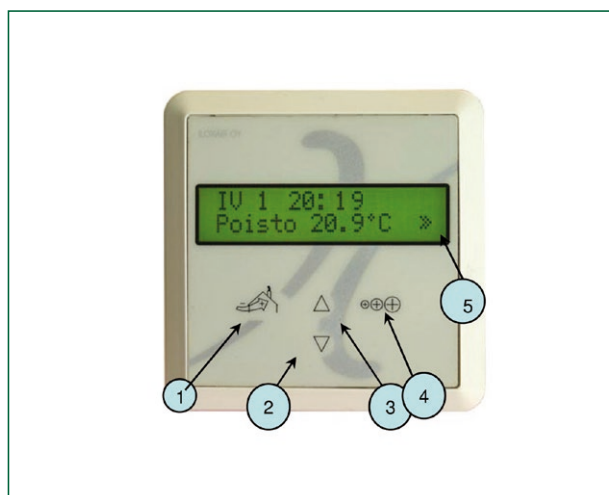
Building structures, people, and earth all generate impurities (such as radon, formaldehyde, carbon dioxide, etc.) that can easily lead to a deterioration in the quality of indoor air.

Sufficient ventilation is needed to control the amount of these substances in the air.

According to The National Building Code of Finland (Section D2, Indoor climate and ventilation of buildings), *the outdoor air flow rate should be at least $0.35 \text{ (dm}^3\text{/s)/m}^2$, which corresponds to an air change rate of 0.5 1/h in a room with a free height of 2.5 m.*

Ventilation control panel

The Ilox 89 Optima Energy Recovery Unit is controlled using a control panel.



1. Pressure regulation function such as fireplace function, time 15 min (adjustable)
2. Decrease ventilation, minimum level 1
3. Increase ventilation, maximum level 4
4. Boost ventilation, boosts for 60 min. by increasing the fan speed (time and grade of boost both adjustable)
5. A symbol on the display indicating a function being performed

Display texts in basic mode

When the power is connected, the unit starts up in stages. First the company name ILOXAIR OY, and HW x.x and SW x.x appear on display for 3 seconds. The numbers replacing x.x indicate the hardware (HW) and software (SW) versions in use.

The text AHU 2 (energy recovery unit) on the top line refers to ventilation. On the bottom line, information about the outdoor air temperature, supply air temperature, exhaust air temperature and discharge air temperature as well as supply air efficiency alternate at 3-second intervals. Next, the unit fans start in the mode that was selected when the unit was switched off.

Example: Display texts, explanation

- AHU 2 = selected ventilation speed, currently 2
- Fresh Air -5°C = outdoor temperature entering the unit, currently -5°C
- Supply air 20°C = supply air temperature into the house, currently 20°C
- Exhaust air 24°C = temperature of the "impure" air to be removed from the dwelling in the unit, currently 24°C
- Outlet air 5°C = temperature of the "impure" air to be removed from the dwelling after the heat recovery process, currently 5°C
- Efficiency 70 % = utilised energy percentage (heating effect of the fans excluded in the calculation. Calculated at the sensors, the value is approximate.)
- If the efficiency value is not exact, - - is displayed in place of numbers. This happens in the summer when the difference in temperature between discharge and outdoor air is minimal.

TIME In the basic mode, the time is shown on the display. Set the date and time using the control panel.

BACKLIGHT When the backlight is off, pressing any button will turn it on. Press the appropriate button again to select a function.

Getting started

Before starting to use the energy recovery unit, the ventilation system must be adjusted. When adjusting and measuring the air flows, check the speeds required for the intended air flows.

If you do not know the necessary fan speeds, you can estimate the minimum ventilation fan speeds for different sizes of dwellings using the following table (please note: room height is about 2.5 m).

Table 1 Ilox 89 Optima Energy Recovery Unit, fan speeds and air flows

Speed	1	2	3	4
Airflow (dm ³ /s)	25	42	70	100
Floor space (m ²)	30	100	180	250
Control voltage (V)	3	5	7	10

If necessary, the fan speeds can be fine-tuned between the speeds 1 to 4 using the control panel of the unit. We recommend doing this when adjusting ventilation. The supply air fan and exhaust air fan of the unit can be set at different speeds independently.

Reheating



Display symbol
when the function is on

The energy recovery unit warms the supply air in the heat recovery cell using the heat recovered from exhaust air. However, the supply air temperature should be at least +14°C to avoid draught caused by the incoming supply air.

The Ilox unit uses an electric resistor for reheating. You can adjust the electric resistor setting using the control panel (factory setting +17°C). The desired supply air temperature at the sensors is adjusted using the software. We recommend measuring the supply air temperature at the supply air valve and adjusting it if necessary.

Table 2 Annual electric energy consumption of the reheating system in kWh/a

Ventilation	Supply air temperature setting in °C Energy consumption of the reheating system in kWh/a			
	14°C	16°C	18°C	22°C
dm ³ /s				
30	130	360	740	1800
40	230	585	1100	2550
50	420	930	1600	3400
60	580	1150	1860	3670

Please note! If the supply air temperature is too high, the electric energy consumption of the unit rises significantly, and in the worst-case scenario the heating of the entire flat or house will run on the reheating resistor's reserves. See Table 2.

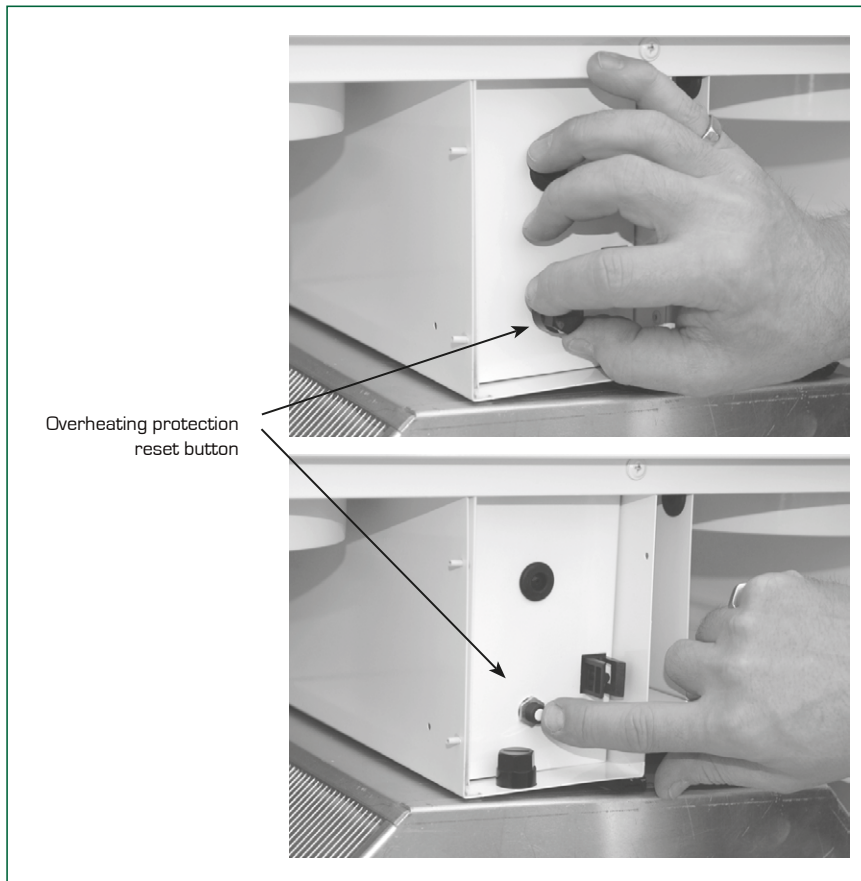
The recommended supply air temperature range is around 14°C to 18°C during the winter months when heating is required.

Please note! When the heat recovery bypass is in the "summer mode," (automatic in Optima models) the software disables the reheating function.

Table 3 Maximum supply air temperatures at an outdoor temperature of -26°C

Airflow (dm ³ /s)	Power output (kW)	Supply air maximum temperature
40	1.0	32
55	1.0	27
70	1.0	24
85	1.0	22

The power output of the electric heater in the unit is approximately 1000 W. The electric heater heats the supply air by 30°C to 10°C at air flows of 25 to 70 dm³.



In case of a malfunction, the overheating protection of the reheating resistor switches the resistor off.

The cause of the overheating protection trip must be determined. Reset the overheating protection by pressing the reset button on the left-hand side of the electrical cabinet. First unscrew the protective plastic cap on the button.

Allow enough time (5 to 10 minutes) for the electric resistor to cool down before resetting the overheating protection.



Before switching on the Ilox 89 Optima W water coil unit, make sure that the water circulation system is on, the coil has been bled, and the heating pipe network is on.

In the water coil model, the supply air temperature is adjusted using the temperature controller at the coil inlet pipe. For the temperatures corresponding to the number scale on the temperature controller, see Table 4. We recommend a setting of 3 to 4.

In the summer, it is recommended that you set the valve to * position to prevent the heating system from heating the supply air.

*= 8°C
4=20°C
1=11°C
5=23°C
2=14°C
6=26°C
3=17°C

Table 4
Temperature range of the water
coil temperature controller

The power output of the Ilox 89 Optima W unit water coil depends on the airflow, inlet water temperature, and water flow.

Use the water coil power output table to estimate the maximum power output under different conditions with an outside temperature of -26°C. The supply air temperature controller, however, controls the power output to limit the available temperatures to a maximum of +26°C.

Ilox 89 water coil design

Supply air temperature of +10 °C before the coil corresponds to outdoor temperatures of -20°C to -30°C.

Inlet water temperature °C	Airflow L/s	Water flow L/h	Power output [W]	Supply air °C
70	40	20	240	17
	60	30	360	17
	80	40	480	17
	100	50	600	17
50	40	30	240	17
	60	45	360	17
	80	62	480	17
	100	81	600	17
40	40	57	240	17
	60	95	360	17
	80	126	480	17
	100	126	600	17

Table 5 Maximum power output of the water coil

Water coil freeze protection



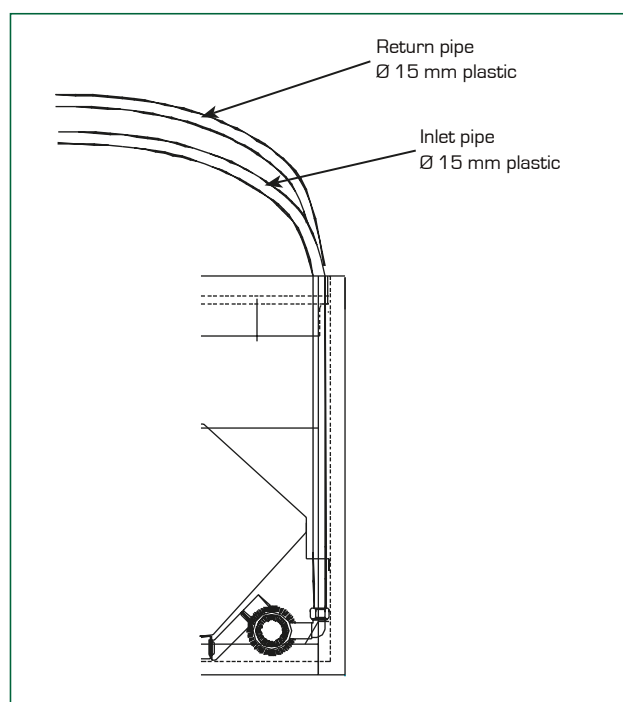
Display symbol when the function is on

The water coil freeze protection automatically switches the unit off if the supply air temperature in the coil falls below +10°C. The fans are automatically restarted when there is no longer a risk of freezing.

There is no risk of freezing in units where the supply air is heated electrically.

When the freeze-risk alarm is active, the panel and external boost functions cannot be switched on. The unit automatically disables its being switched on if the coil temperature is too low.

Please note! The cause of the freeze protection trip must be determined.




Summer mode

Heat recovery bypass (summer)



Display symbol when the function is on

In water coil units, the temperature controller can be set to  or the heating system can be switched off to prevent it from heating the supply air in the summer.

The heat recovery system is automatically bypassed when the exhaust air temperature exceeds +23°C and the outdoor temperature exceeds +12°C. If the outdoor temperature is lower, the bypass is not activated. If necessary, you can adjust the temperature to your desired values.

In the summer, the temperature at night is lower than during the day, and the bypass cools the indoor air. During the day, indoor air can be cooler than outdoor air. Under such conditions, the bypass is set to direct the cool indoor air through the heat recovery cell to utilise the energy for cooling the supply air, thus taking advantage of free cooling energy. The advantages of this system are even more prominent in houses with cooling systems.

Summer cooling (activated from the menu)



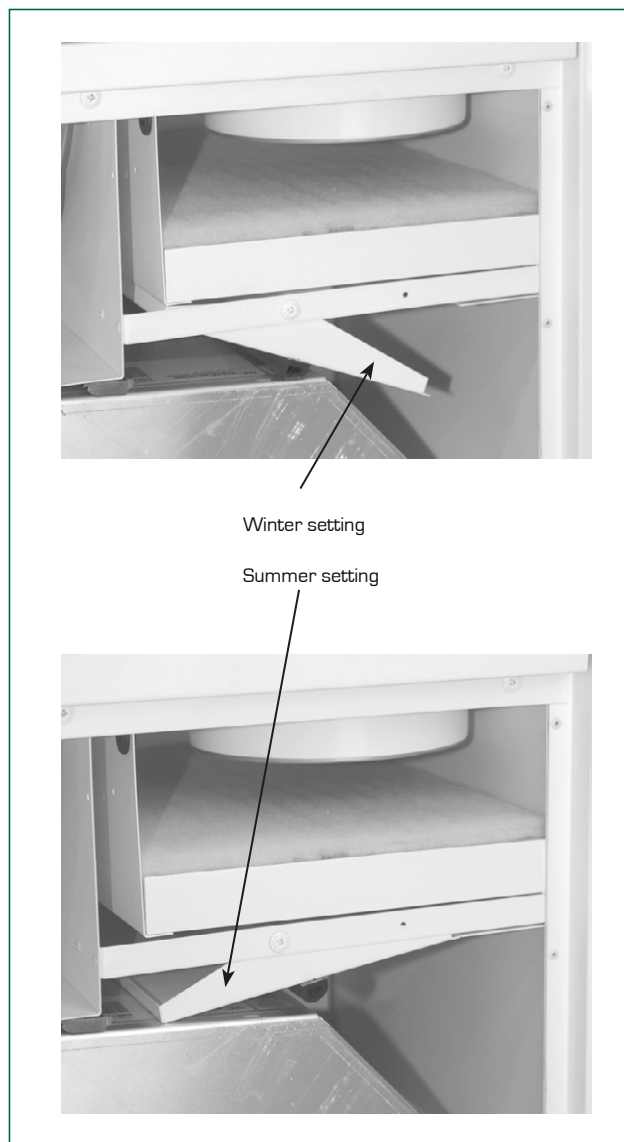
Display symbol when the function is on

In addition to the traditional bypass function based on threshold values, the software allows the activation of the summer cooling function to provide additional cooling. Activate the function in the menu. When the function has been activated, the unit control automatically allows lower than normal temperature values.

With the bypass plate in the "summer" position, the software disables supply air heating.

Heating pipe networks are usually switched off automatically outside the heating season. Therefore, adjusting the setting is not required in water coil models. If, however, the heating pipe network is not switched off completely, it is advisable to set the temperature controller to the minimum setting.

In the beginning of the heating season or when the supply air temperature is too low, the supply air temperature can be adjusted in the water coil model.



Heat recovery cell frost protection system



Display symbol when
the function is on

The advanced frost protection function guarantees the best possible annual efficiency and greater indoor comfort as it reduces the need for the supply air fan to stop. For this purpose, the unit is equipped with the advanced automatic Thermo Ice system.

The temperature sensor measures the outdoor temperature and only enables the defrost function when the temperature falls below a certain level. Using the measurement data from other sensors, the unit automatically determines whether there is enough frost on the cell to enable the defrosting function. The length of the defrosting cycle is 15 minutes. Factory setting 65.

Using the cold mode in exceptional conditions



Display symbol when
the function is on

This function was designed with the cold winter conditions of the Nordic regions, in particular, in mind. If the difference between the supply air temperature and the set point value is too high, the fan speed is reduced by one step. Previous values are restored as soon as the temperature is restored.

Condensate

With the unit running, water from the exhaust air is condensed at the bottom of the unit. This happens particularly in the autumn and in the winter. In new buildings, a large amount of condensate forms during the first winter, before the structures have dried. Later, condensation decreases, with the generation of moisture inside the dwelling determining the level of condensation.

Fill the water trap in the condensate outlet pipe with water and check the function of the outlet pipe by pouring a fair amount of water down to the bottom of the unit, below the exhaust air fan. Then check that the water flows out of the basin freely.

After the summer, the water trap in the outlet pipe may be dry, and falling outdoor temperatures may prevent the condensate from flowing out of the unit freely, causing a gurgling sound. To avoid this, fill the water trap by pouring some water down to the bottom of the unit until the water trap is full.

Controls

Control panels

You can connect additional control panels to your Ilox 89 Optima on different floors, for example. The panels can be connected parallel to the unit or from panel to panel.

External pressure regulation switch (potential free contact) such as the fireplace switch



Display symbol when the function is on

For automatic ventilation control, a potential free contact for pressure regulation can be introduced to the circuit board. Automatic reduction of negative pressure comes in handy when using the cooker hood or central vacuum system, for example.

A separate fireplace switch (accessory) can also be fitted to facilitate lighting a fire in the fireplace. Please note that the external fireplace switch is fitted separately from the hood and central vacuum function.

When the circuit board receives the signal that the function has been activated, the speed of the supply air fan is increased and the speed of the exhaust air fan is decreased. You can set the function time on the control panel, factory setting 15 min. When the function is deactivated, the fan speeds used before activating the function are resumed.

External boost switch (potential free contact)



Display symbol when the function is on

For automatic and on-demand ventilation boosts, an external potential free contact can be introduced to the circuit board. The added functions can be separate switches for boost function, carbon dioxide, and humidity (accessories).

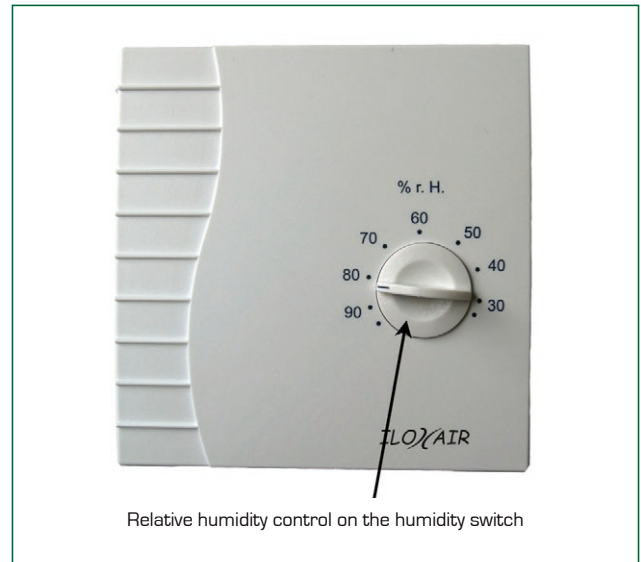
When the circuit board receives a signal, the level of ventilation is increased by 1 to 2 steps. When the function is deactivated, the fan speeds used before activating the function are resumed. You can set the level of boost to 1 or 2 steps (factory setting 2 steps). In addition, you can set the function time on the control panel, the factory setting for the after-running of the function is 5 min. The external boost function cannot be activated when the frost protection is on.

The humidity switch

The humidity switch can be installed in a bathroom, for example, to enhance ventilation when the relative humidity in the room exceeds the value set at the switch.

During the heating season, the set value for the humidity switch to turn on the ventilation boost function is a 50% rise in relative humidity. At other times of the year, the value is increased to 70%. With a correctly set humidity switch, the ventilation boost is activated when you are showering or bathing, and normal operation resumes after 1 to 2 hours.

During the warmest and most humid season in the summer, it may be necessary to increase the value to prevent the boost function from running constantly.



External home/away switch (potential free contact)

- Display symbol when the function is on

In accordance with "green values," a potential free contact can be introduced to the circuit board for an energy-saving home/away function. When the circuit board receives a signal, the level of ventilation is set to the minimum level (1). When the function is deactivated, the fan speeds used before activating the function are resumed.

Carbon dioxide transmitter

- + Display symbol when the function is on

The level of ventilation in a room can be controlled with a carbon dioxide transmitter. The level of carbon dioxide in the room will be kept below a set level. The desired carbon dioxide level can be set using the control panel. Factory setting 800 ppm. The fan speed is increased by 1 to 4 steps according to the level of carbon dioxide set.

Program function

Service reminder

The unit features a built-in service reminder function that informs you of service and maintenance needs.

The factory setting for service is twice a year. You can set the frequency of the reminder as well as disable it from the menu.

Reset to factory settings

You can reset all the settings back to factory settings using the reset menu. Upon entering the menu, the program asks you for confirmation.

After you confirm the reset, the unit starts at level 2 and the program exits the menu mode.

If you do not wish to reset the values, press "Cancel". After resetting the unit to factory settings, the previous settings cannot be retrieved.

Sensor alarms

A sensor alarm is displayed if the temperatures are not within the range -50°C to +80°C, the sensor contact is loose, or the sensor is loose.

The number identifies the malfunction according to the following list.

- ! 1 = Outdoor air sensor is faulty
- ! 2 = Supply air sensor after the cell is faulty
- ! 3 = Exhaust air sensor is faulty
- ! 4 = Discharge air sensor is faulty
- ! 5 = Supply air sensor to flat is faulty
- ! 6 = Freeze protection sensor is faulty (water units only)

ACTION: Contact service. Before calling the service, write down the unit's serial number and type. Also, write down the number of the sensor alarm.

Entering the menu mode

Press the "Fireplace" and "Boost" buttons simultaneously. The unit is set to set value mode, the fans are stopped, and the resistors are switched off.

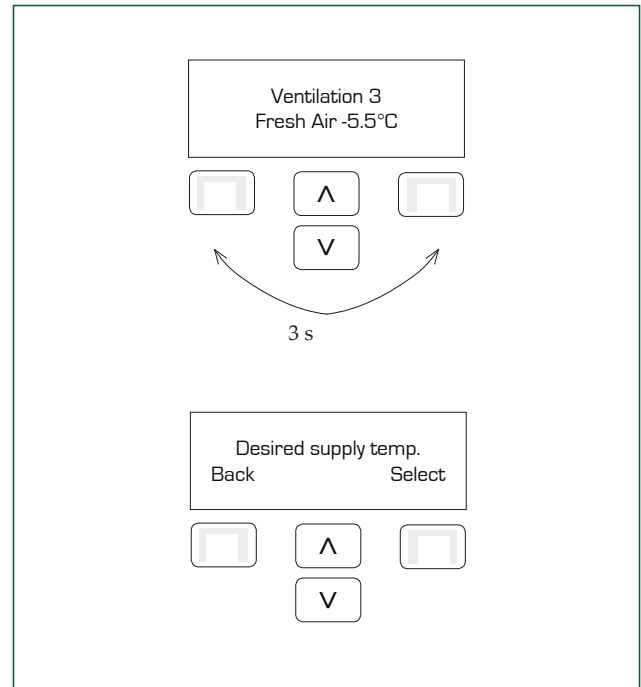
Panel button functions in the menu

Use the cursor keys to select the desired setting. Use the cursor keys to select the value you wish to change.

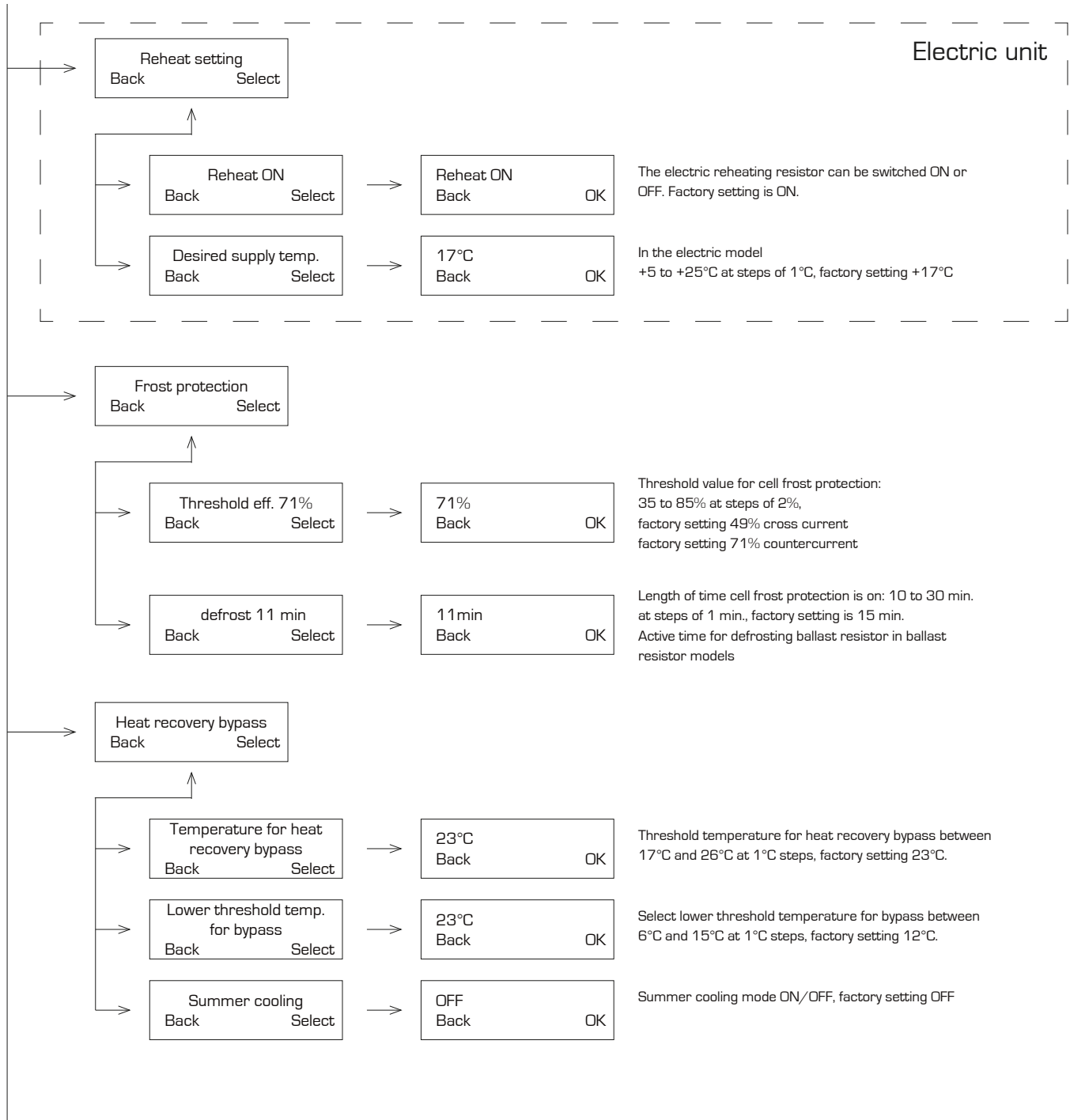
Use the cursor key (Boost) as a "Select" button to move forward in the menu and finally as the "OK" button to select a value.

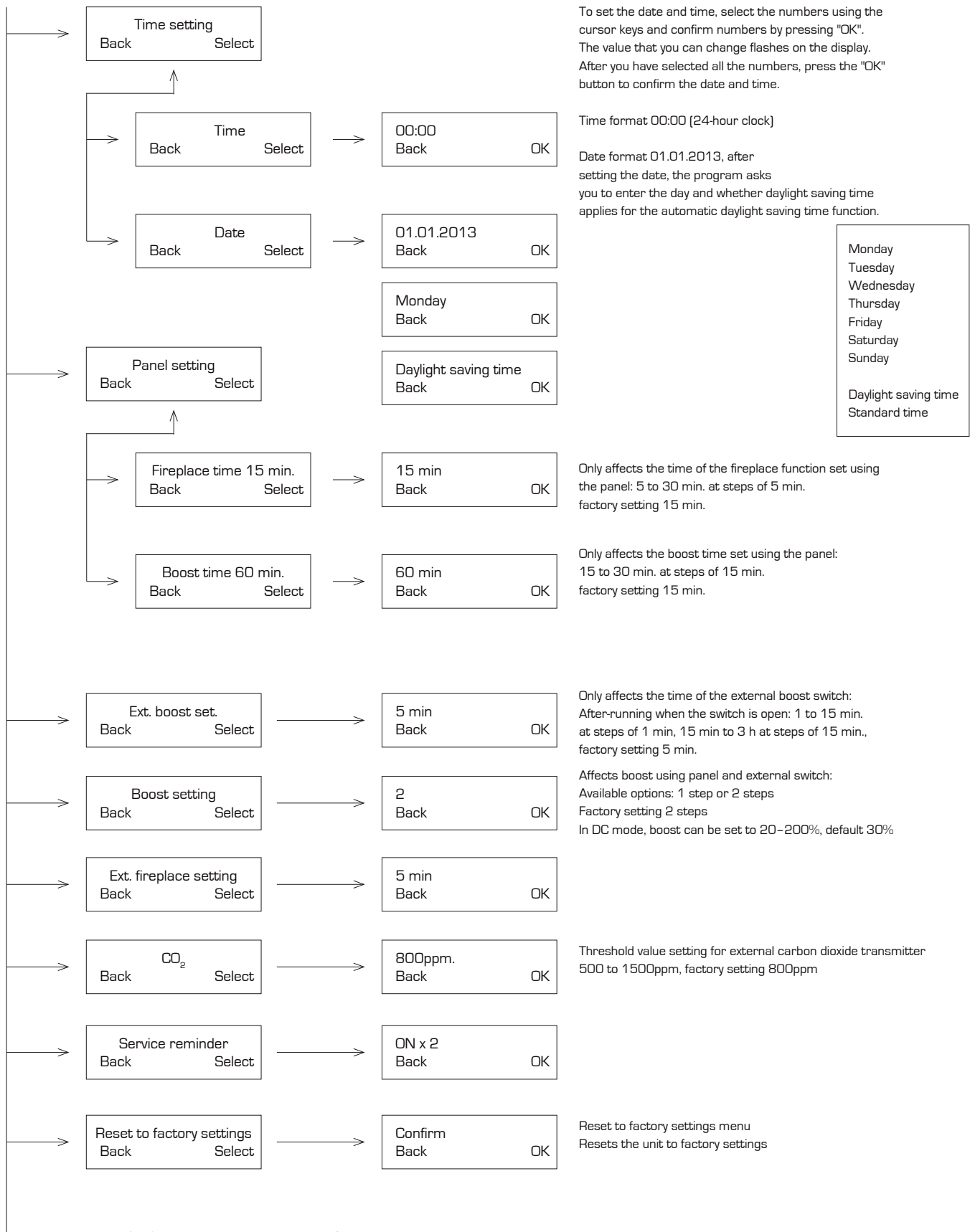
Use the left cursor key (Fireplace) to move back in the menu. The button functions as a "Back" button. Set a value using the cursor keys and confirm the selected value using the "OK" button. The value is saved by pressing the "Select"/"OK" button.

To exit the menu mode, press the "Back" button repeatedly or go to the "Reset factory settings" menu and press the "Back" button.



Menu list and factory settings





To exit the menu, go to Reset to factory settings menu and press the "Back" button.

Information list (symbols on the control panel)

FUNCTION	SYMBOL	INFO	ACTION
Frost protection on		Automatic internal function when there is frost on the cell	-
Reheating resistor on (electric unit)		Automatic internal function during the heating season. Notifies you when the electric resistor is on.	-
Heat recovery bypass on		Automatic internal function in the summer.	-
Summer cooling on		Automatic internal function in the summer.	Can be switched on or off
Cold mode on		Automatic internal function during exceptionally cold periods.	-
External boost on		1. Humidity switch contact closed, enhances ventilation by two steps in relation to the selected level of ventilation. 2. If a carbon dioxide transmitter has been installed, boosts according to the set value of the carbon dioxide transmitter.	-
External pressure regulation function (e.g. fireplace) on		Increases the speed of the supply air fan and decreases the speed of the exhaust air fan.	-
Home/away mode on		Sets the fans to position 1 when the switch is closed.	-
Freeze protection (water coil model)		Automatic internal function, protects the water coil. Stops the unit when the temperature falls below the set level. When the temperature rises, the unit starts up again.	Check the water coil of the unit for leaks. Determine the reason for the drop in temperature in the water coil.
Sensor 1 (outdoor air) broken or loose		Notifies you if the sensor is broken or loose.	Contact service.
Sensor 2 (supply air after cell) broken or loose		Notifies you if the sensor is broken or loose.	Contact service.
Sensor 3 (exhaust air) broken or loose		Notifies you if the sensor is broken or loose.	Contact service.
Sensor 4 (discharge air) broken or loose		Notifies you if the sensor is broken or loose.	Contact service.
Sensor 5 (supply air to flat) broken or loose		Notifies you if the sensor is broken or loose.	Contact service.
Sensor 6 (freeze protection) broken or loose (water unit)		Notifies you if the sensor is broken or loose (only in units with a water coil).	Contact service.
Service reminder	Replace filter	Check the function of the condensate connection and clean/replace the filters.	Replace filters.

Maintenance instructions

Filters

If you live in a block of flats, terraced house, or a semi-detached house, check if the housing company has signed a service agreement with a maintenance company or if you, as a resident, are responsible for the maintenance of the energy recovery unit.

Before opening the door, disconnect the unit from the mains to stop the fans and to switch off the electric resistor.

Please note! If the electric resistors were on, it may take a few minutes for them to cool down after disconnecting the unit.

The unit is equipped with a G3 class exhaust air filter and outdoor air filter before the heat recovery cell. The coarse-grain filter removes dust from the exhaust air, thus keeping the heat recovery cell clean and avoiding the contamination of the exhaust air fan propeller.

The outdoor air filter filters any debris and insects from the intake air. The supply air fine filter (F7 filter class) removes visible dust, fine particles, and pollen from the supply air.

The service life of the filters depends on the air quality of the area and the selected ventilation speed.

The filters should be replaced every 6 to 12 months, as required.

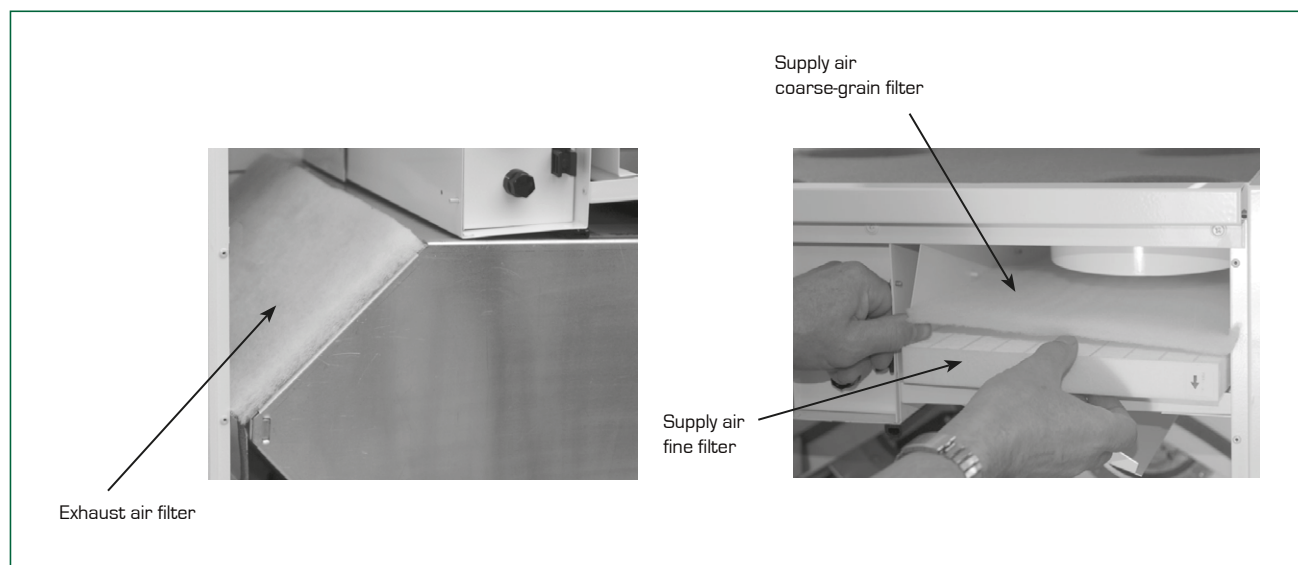
The coarse-grain filters can be vacuumed clean in the time between their being replaced unless they are heavily contaminated. Washing the filters is not recommended, as it will significantly compromise the efficiency of filtration.

The fine filter can be carefully vacuumed using the brush nozzle between its being replaced.

The filters must be cleaned or replaced at least twice a year, preferably in the autumn and spring.

Depending on circumstances, the filter may have to be replaced more frequently.

To remove the supply air filter, twist the guide rail to one side and pull both filters out simultaneously. Install the filters in reverse order.





Heat recovery cell

Fans

Dust and dirt on the fan propellers cause imbalance, wear and tear on the fan bearings, and unnecessary noise when the unit is running. The exhaust air fan propellers are particularly prone to contamination caused by grease and dust in the air. We recommend checking the propeller blades for contamination every few years, and cleaning them if necessary.

Removing the fans:

1. Unscrew the retention screws of the plates above the fans and remove the protective plates from in front of the fans.
3. Pull out the fans from between the brackets.
4. Disconnect the electrical connections of the fan.
4. Carefully clean the fan propeller using a toothbrush and pressurised air, for example.
5. When installing the fans, make sure that the wires are not placed too close to the heating resistor.

Please note! Be careful not to remove the balancing elements on the propeller blades.

Heat recovery cell

When replacing the filters, check the heat recovery cell for contamination. Remove the contaminated cell from the unit and wash it with a mild washing-up liquid solution. Rinse the cell by spraying warm water through the sheets of the cell. After washing the cell, allow it to dry before installing it again. Be sure to install the cell in the correct position in the unit. The condensate drip mould at the lower edge of the cell is placed down on the side of the electrical cabinet in the unit.

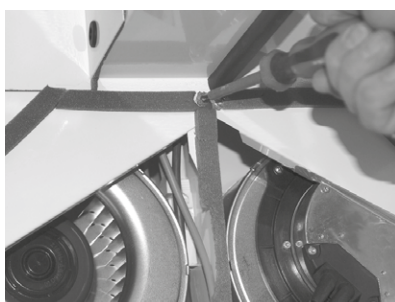
Ventilation duct components

To ensure the flawless operation of the ventilation system, it is important to keep all the valves and grilles clean and to make sure the actual air flows correspond to the flows intended. If the outdoor air grille is equipped with a mosquito screen, it should be cleaned several times a year. Otherwise it may block the air flow completely, causing a dramatic drop in the efficiency of heat recovery. In most cases, the mosquito screen has been removed and the grille will not be blocked.

The exhaust air valves in the flat or house slowly get blocked over the years, and the valves in and near the kitchen, in particular, may get completely blocked. It is recommended that you clean the exhaust valves every year. Be sure to check that the back of the valve disc is also clean where the gap is at its narrowest.

Warning: Do not change the valve setting while cleaning. It may cause an imbalance in the airflows.

Dust and dirt on the fan propellers cause imbalance, wear and tear on the fan bearings, and unnecessary noise when the unit is running. We recommend checking the propeller blades for contamination every few years, and cleaning them if necessary.



Troubleshooting

The unit emits irregular noises after bathing and showering.

In the summer, when the outdoor air is warm, there is no condensation from the exhaust air and the water trap in the condensate outlet pipe of the unit is dry. In the autumn, when the temperature drops, more condensation occurs in the unit. If the water trap is dry, the negative pressure in the unit prevents the condensate from flowing out of the unit, and the air in the outlet pipe causes a gurgling sound.

Open the unit door, pour some water down to the bottom of the unit and check that it flows out freely.

Possible cause:

Exhaust air filter is blocked.



Clean filters or replace them.

Exhaust air valves are blocked.



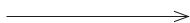
Carefully clean the exhaust air valves in the flat.
Check that the whole valve disc is clean but be careful not to change the set position of the disc.

The exhaust air ducts in the attic are not properly insulated.



Measure the exhaust air temperature inside the unit. Even the coldest temperatures should not cause the exhaust air temperature to drop by more than 3°C in the ducts in the attic when the unit is running at level 2 or 3. Be sure that the exhaust air ducts are properly insulated.

Water circulation malfunction in the Ilox 89 Optima W model.



- Check the condition of the heat pump, and check if water circulates in the heat pipes.
- Check if the network of pipes has been bled and if water circulates in the coil.
- Check the control panel for the symbol indicating a fault in the freeze protection sensor.
- Check that all the valves in the water pipes of the coil are open.

The supply air fan stalls

When the outdoor temperature drops below a certain level, the frost protection of the heat recovery cell stops the supply air fan at certain intervals to prevent excessive frost from building up on the cell. If the conditions promote frosting, the fan may already stall at temperatures of around -10°C.

The built-in Termo Ice system in the Optima model helps avoid unnecessary stops.

If the fan stalls at temperatures above -8 C, check the unit for the following faults:

- Exhaust air filter is blocked.
- Exhaust air valves are blocked.
- Exhaust air ducts in the attic are not properly insulated.
- The air ducts are unadjusted or incorrectly adjusted (exhaust air flow is too low in comparison to supply airflow or there is excess pressure in the flat, possibly causing moisture to build up on the building structures).
- In the Ilox Optima 99, the water coil freeze protection is active.

Measure:

Supply air is cool.

Possible cause:

Measure:

For some reason, the heat recovery cell bypass is in the wrong position (summer setting).



The plate may be blocked. Correct the faulty bypass.

The overheating protection of the electric resistor has tripped.



Reset the tripped overheating protection and determine the cause of the trip.

Exhaust air fan does not move.



Replace the faulty fan.

Exhaust air filter is blocked.



Clean filters or replace them.

The level of the temperature controller is set too low.



Adjust the temperature controller's set level to a suitable degree.

Supply air ducts improperly heat insulated



Check the heat insulation of the supply air ducts and properly insulate the ducts. In cold rooms, the required insulation thickness is approximately 100mm.

In the water coil model Ilox W, the set level of the temperature controller valve is too low (see Table 3, page 5).



Adjust the temperature controller and make sure water circulates in the coil. When water circulates properly in the water coil, the surface temperature of the inlet and outlet pipes is not very high and the inlet pipe is warmer.