INSTALLATION INSTRUCTIONS

CTS602 HMI BY NILAN

Combi S 302 Polar Top (English)

Version 3.00 - 29.04.2019

NILAN®
OUTSTANDING INDOOR CLIMATE

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Ventilation installation

Safety

Power supply

CAUTION
Always disconnect the power supply to the unit if an error occurs that cannot be rectified via the control panel.

CAUTION
If an error occurs on electrically conductive parts of the unit, always contact an authorised electrician to rectify the error.

CAUTION
Always disconnect the power supply to the unit before opening the unit doors, for instance for installation, inspection, cleaning and filter change.

Heat pump ventilation

CAUTION
Avoid touching the pipes for the heating system in the heat pump. They can get very hot.

CAUTION
To protect the heat pump from damage, the following safety equipment has been fitted:

- Electronic monitoring of the temperature

The heat pump must undergo appropriate service inspections in compliance with current laws and regulations. This ensures the unit is maintained adequately in accordance with safety and environmental requirements.

The responsibility for maintaining the heat pump lies with the owner/user.

Disposal

Ventilation unit

Nilan's units consist mainly of recyclable materials. They must, therefore, not be mixed with household waste, but must be delivered to your local recycling center for disposal.

Heatpump

Concerning disposal of units with heat pumps, it is important to contact the local authorities for information about correct handling of these. The heatpump contains the refrigerant R134a, which is harmful to the environment if not handled correctly.

General information

Introduction

General information prior to installation

The following documents are supplied with the unit:

- Installation instructions
- Software instructions
- User manual
- Wiring diagram

Instructions can be downloaded from Nilan's website: https://www.nilan.dk/en-gb/frontpage/download

If you have questions regarding installation of the unit after having read the instructions, contact your nearest dealer of Nilan products. You can find Nilan dealers on www.nilan.dk/en-gb/frontpage/download/dealers.

The purpose of these instructions is to advice the installer on correct installation and maintenance of the unit.

ATTENTION

The unit must be started up immediately after installation and connection to the duct system. When a ventilation unit is not in operation, humidity from the rooms may penetrate into the ducts and create condensation. Condensate water may leak out of the valves and damage furniture and floors. Condensation may also form inside the unit, which can damage its electronics and fans.

The unit is delivered fully tested and ready for operation.

Final inspection

Ventilation Combi unit

How to set the unit

This list is intended for the installer to get an overview of what settings to use in consultation with the user or the builder.

Function		Settings
Setting of frequency of filter change		Days:
What level constitutes basic ventilation		Level:
Do you want low flow ventilation at low outdoor temperatures	yes/no	Level: At °C:
Do you want low flow ventilation at low air humidity	yes/no	Level:
Level - low air humidity		%
Do you want high flow ventilation at high air humidity	yes/no	Level:
Set maximum time for high air humidity		Min:
What is the desired room temperature		°C:
Should ventilation cease at low room temperatures	yes/no	°C:
Is a cooker hood connected to the ventilation system	yes/no	Level:
Do you want active cooling	yes/no	
Cooling setpoint		°C:
High ventilation in connection with cooling	yes/no	Level:

Unit type

Product description

Combi S 302 Polar Top is a ventilation unit with combined passive and active heat recovery as well as a cooling function.

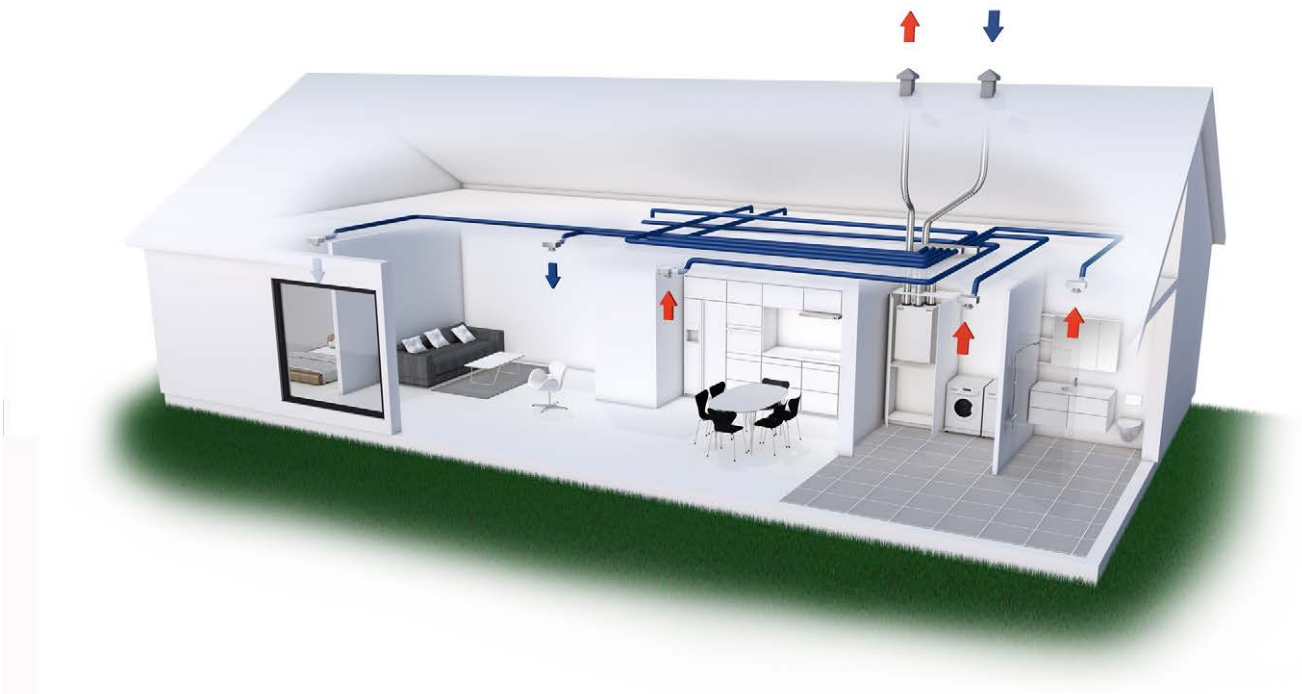
The unit is intended for air volumes up to 375 m^3/h at 100 Pa external counter-pressure.

The ventilation draws humid and vitiated air out of the dwelling via bathroom, lavatory, kitchen and utility room. It introduces fresh air into living areas such as living room, bedrooms and study. Cold outdoor air is heated up in the heat exchanger (heat recovery) by warm extract air.

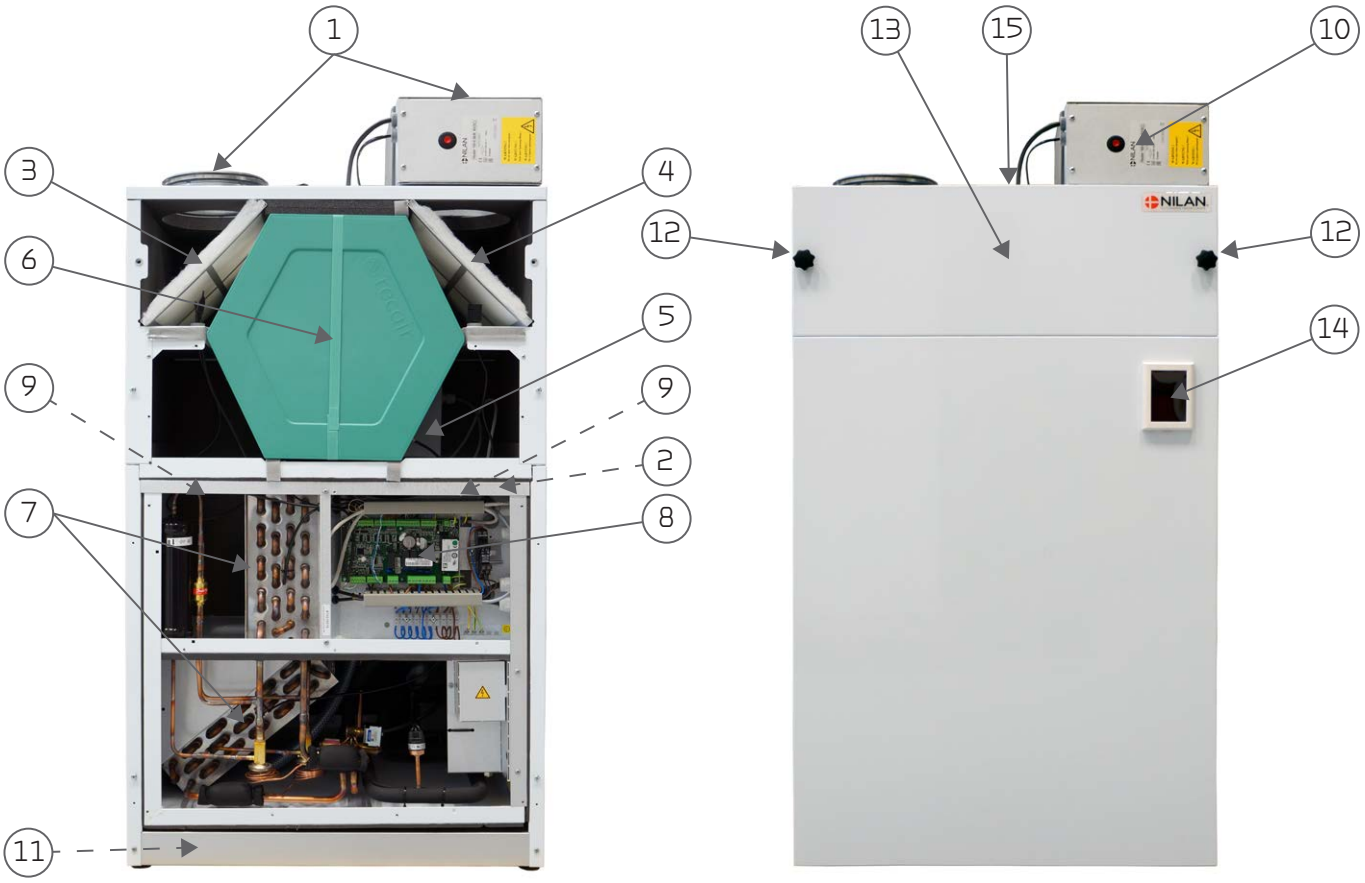
In addition to a (counterflow) heat exchanger, Combi S 302 has an integral heat pump. The heat pump utilises the heat that remains in the extracted air following heat recovery in the heat exchanger.

In the winter the heat pump can be used to heat up supply air. The supply air can be heated up to 34 °C.

As the heat pump is reversible, in the summer it can be used for cooling supply air. The unit can cool supply air by up to 10 °C. However, It does not function as an air condition unit as it operates with relatively low air exchange. Cooling the supply air removes humidity from the indoor climate. This provides comfort for users of the dwelling, even at high indoor temperatures.

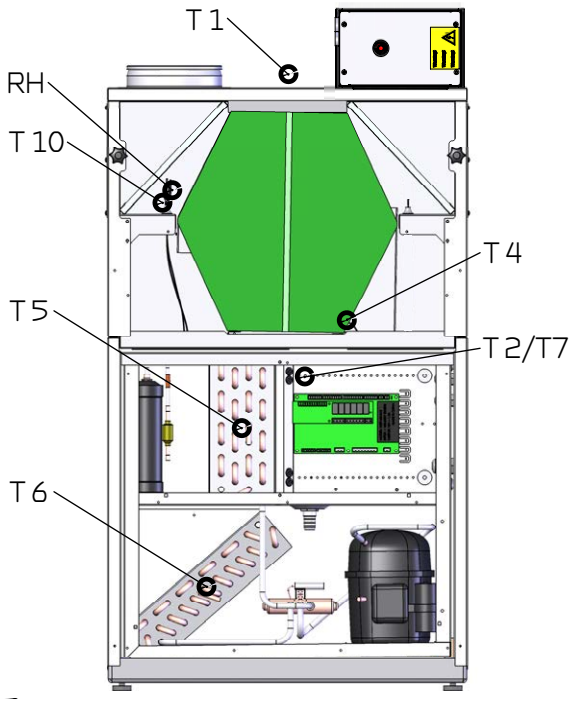


The unit



1. Duct connections
2. Electrical connections (on the rear side)
3. Extract air filter
4. Outdoor air filter (if purchased as an accessory, a pollen filter should be fitted here)
5. 100% bypass damper
6. Counterflow heat exchanger
7. Heat pump
8. Automation
9. Fans
10. Pre-heating element
11. Condensate drain
12. Additional duct connections (the spouts can be moved individually from the top to the side of the unit)
13. Door to filter change (loosen the two thumb screws to dismount the door)
14. Control panel
15. 8-pole plug

Temperature sensor overview



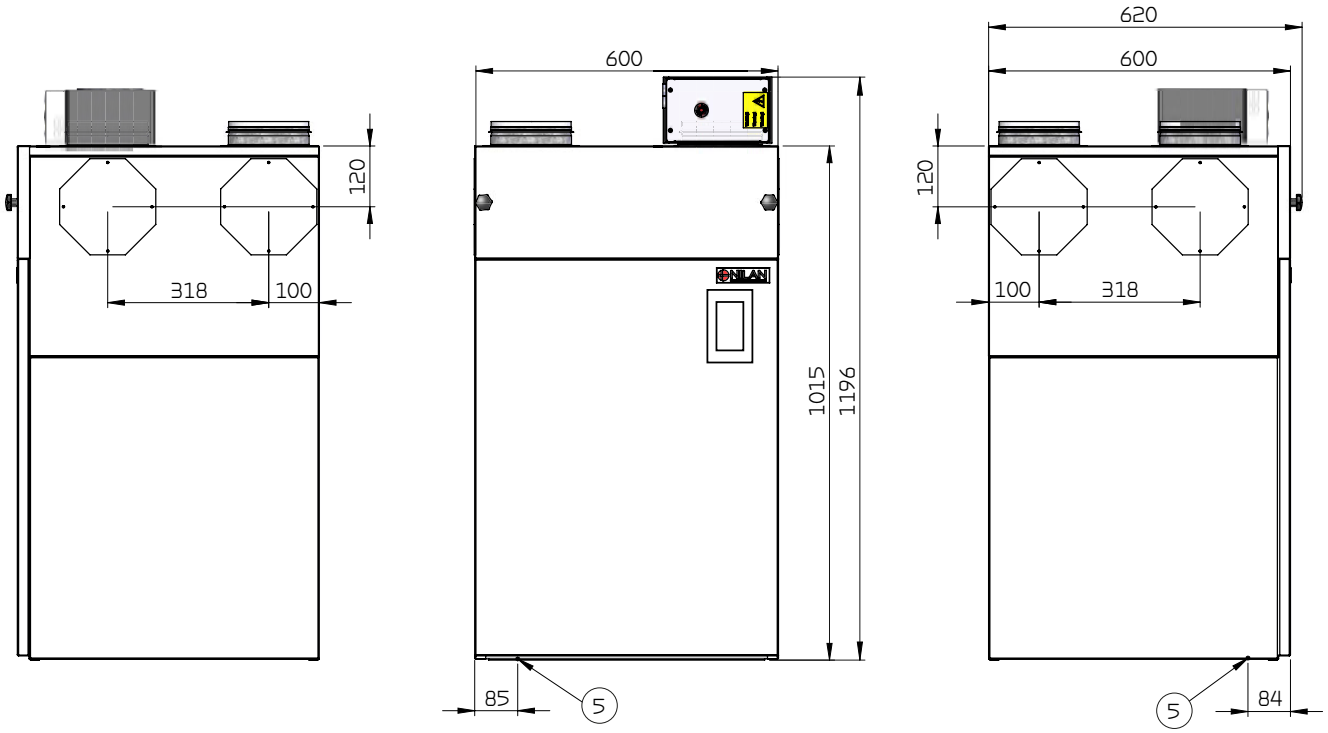
Temperature sensor inside the unit

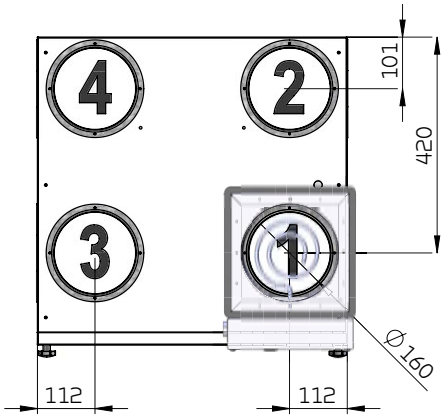
T1: Outdoor air (before pre-heating element)
T2: Supply air
T4: Extract air after counterflow heat exchanger
T5: Condenser
T6: Evaporator
T10: Extract air
RH: Humidity sensor

Temperature sensor outside the unit

T7: Supply air after electrical after-heating element (accessory) When installing a heating element, T2 changes its name to T7
T8: Outdoor air before pre-heating element (accessory)
T9: On after-heating element (accessory)

Dimensional drawing Combi S 302 Polar Top





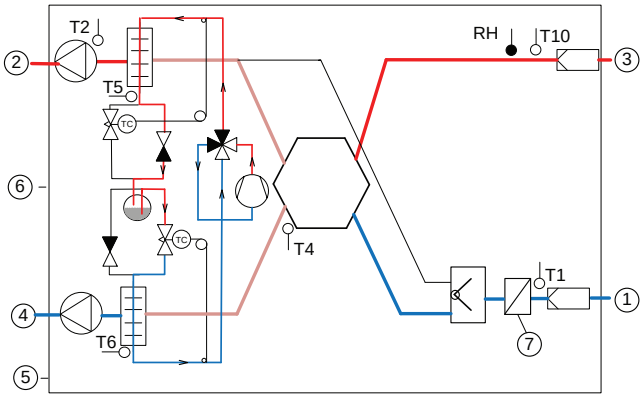
Connections:

1. Outdoor air
2. Supply air
3. Extract air
4. Discharge air
5. Condensate drain

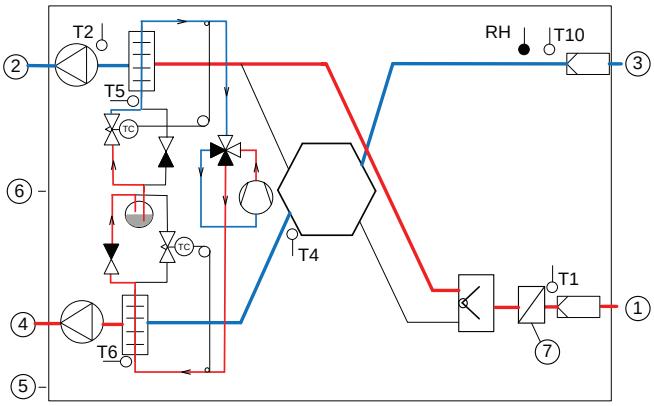
Weight: 87 kg.

Functional diagram

Heating function



Cooling function



Connections

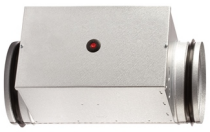
1. Outdoor air
2. Supply air
3. Extract air
4. Discharge air
5. Condensate drain
6. Electrical connection
7. Pre-heating element (frost protection)

Automation

T1: Outdoor air sensor
T2: Supply air sensor
T4: Discharge sensor
T5: Condenser sensor
T6: Evaporator sensor
T10: Extract air sensor (room temperature)
RH: Humidity sensor

Accessories

Electrical after-heating element



With an electrical after-heating element you can increase the supply air temperature to the desired level. Electrical after-heating elements are supplied for mounting in the supply air duct. Included are the necessary sensors.

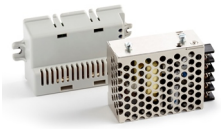
Pollen filter

As a standard, the unit is supplied with a plate filter.

If anyone in the household suffers from a pollen allergy, you can install a pollen filter in the outdoor air intake to minimize the proportion of pollen in the indoor air.

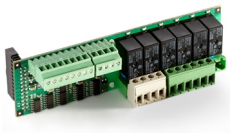
A pollen filter also removes approx. 50 % of harmful particles in outdoor air, so a pollen filter is recommended if you live in a large city or close to a motorway.

CO_2 sensor



Fitting a CO_2 sensor means the ventilation speed can be pre-programmed to run higher ventilation levels in the event of high CO_2 level in the extracted air. CO_2 levels can be programmed.

Expansion PCB



With an expansion PCB, the features of the CTS 602 control expand option to use user select 2.

EM-box

With an EM box it is possible to divide the extract air between the kitchen and the bathroom.

If a cooker hood is connected to the unit and is switched on, extract air from the bathroom will be reduced slightly to allow sufficient air for the cooker hood to extract kitchen fumes.

The EM-box has a fitted metal filter that clears the air in the cooker hood of grease particles effectively, and thereby protects the unit.

Flexible sound damper

To make it easy to service the unit in the future, we recommend that you fit a flexible connection between the unit and the duct system.

Nilan's flexible sound damper absorbs sounds effectively from both the duct system and from roof stacks.

Trolley

A trolley makes it possible to lift the unit of the pallet without physical strain.
The same trolley can be moved to wheel the unit around.

Set up

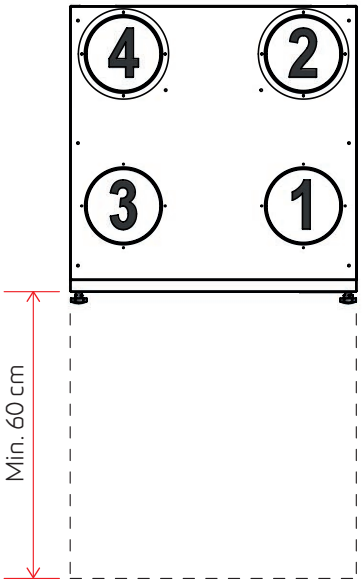
Installation

Positioning the unit

ATTENTION
When positioning the unit, you should always consider future services and maintenance.

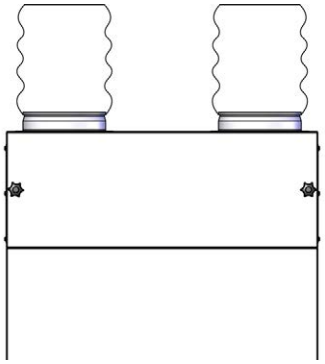
Filters must be easily accessible so they can be changed when necessary.

You must also be able to remove the heat exchanger for servicing and to replace fans and other components. It is therefore recommended that you leave a minimum of 60 cm of clear space in front of the unit.



When replacing or servicing certain components, such as fans, you will need to remove the top of the unit.
In order to make the top of the unit easily removable, flexible connectors should be fitted between the unit and the ducts.

If flashings are fitted above the unit, these must be easily removable.



ATTENTION
It is important that the unit is level to ensure proper drainage from the condensate tray.

ATTENTION
The unit produces little noise and only weak vibrations, but you should still take into account potential vibrations that can spread from the unit to individual building components. In order to separate the unit from its foundation, it is therefore recommended that you install vibration absorbers under the unit. There should be approx. 10 mm distance to other building components and to permanent fixtures.

ATTENTION
To minimise noise, it is recommended that the unit is positioned with its rear side against an outer wall.

Electrical installation

Electrical connections

Safety

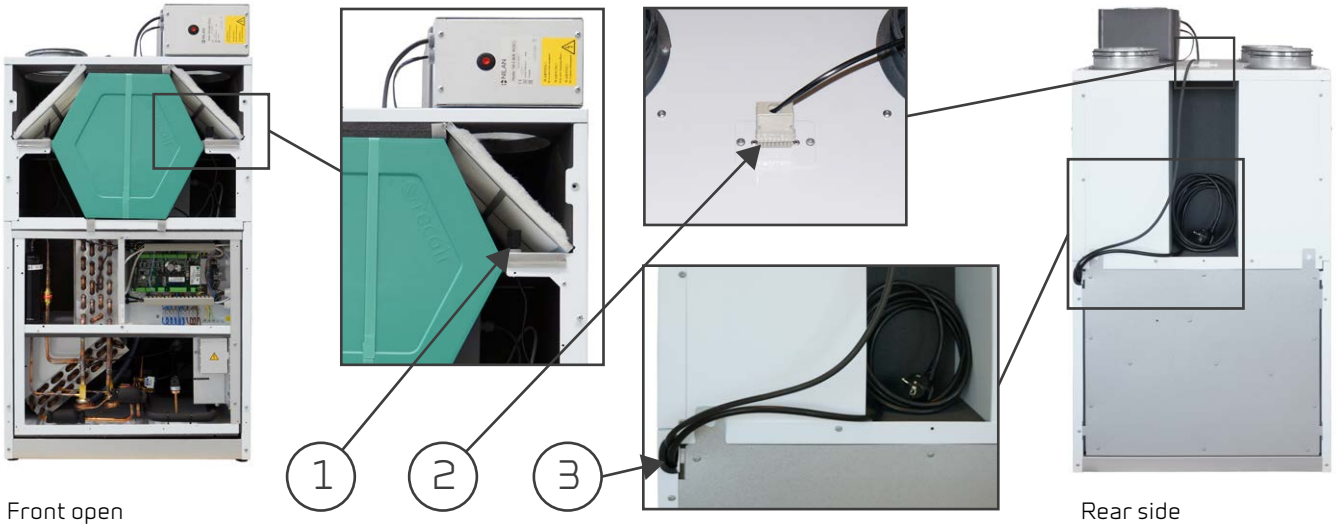
ATTENTION
All work must be carried out by qualified persons and in compliance with existing legislation and regulations.

ATTENTION
It is important that the power is off, if you do work to the electrical components of the unit.

It is important to check that wires are not damaged or squeezed during connection and use.

Connections overview

Connections for 230V and for the pre-heating element are situated on the rear side of the unit. The connection to the control system via USB cable is situated behind the filter door at the front of the unit. An 8-pole plug is found on top of the unit.



Front open

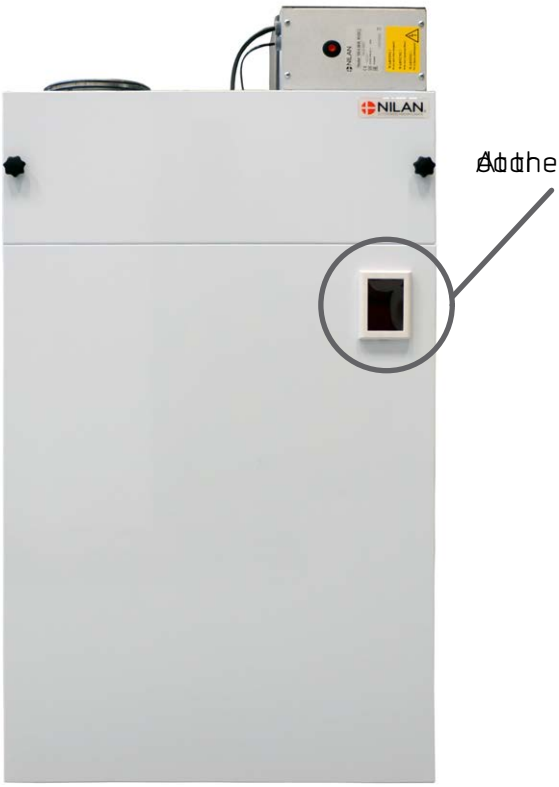
Rear side

1. Connection of PC via a USB cable.
2. 8-pole plug with a T1 sensor in addition to options for user selection 1 and modbus/ control panel.
3. Connection of 230V plug (remember electrical grounding), and connection of pre-heating element.

Control panel

Connection of CTS602 HMI control panel

The control panel is connected to the CTS602 circuit board and is installed to the front of the unit.



At the factory the control panel has been mounted on the large

Electrical connection of the unit

Power supply

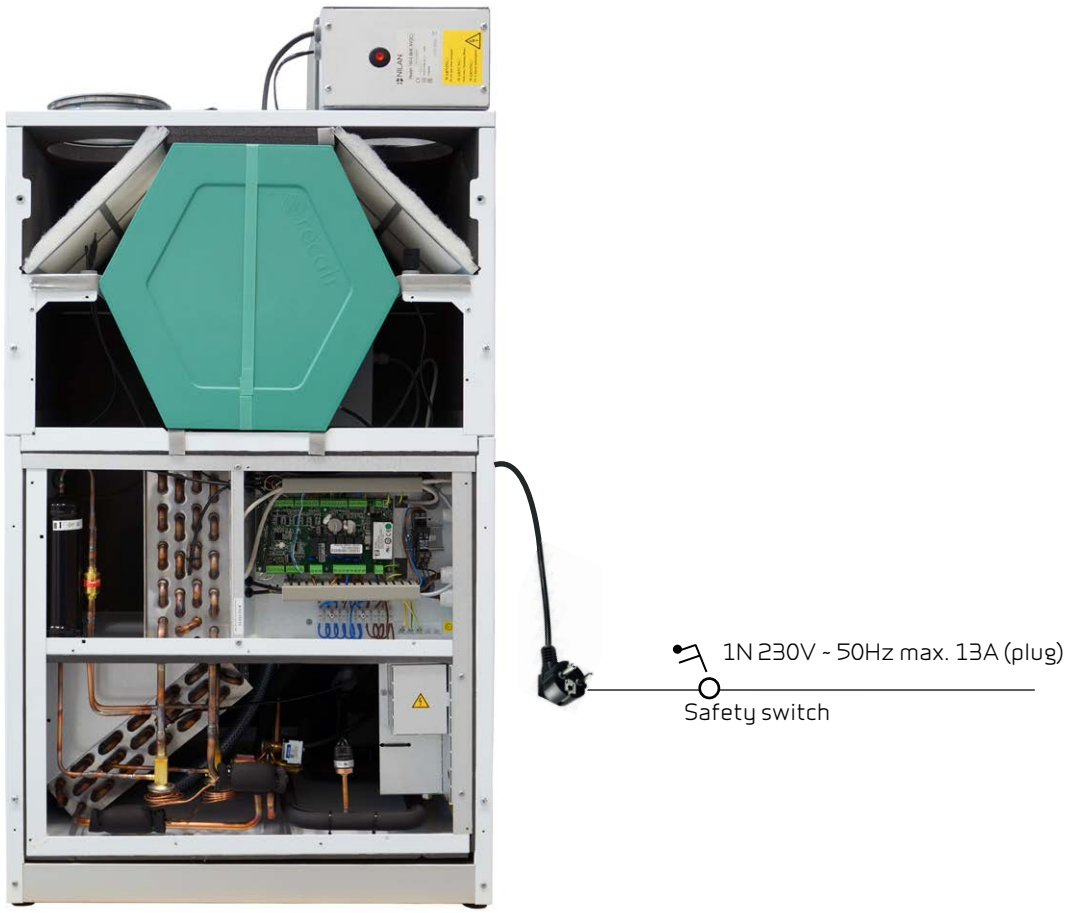
CAUTION
The power supply, including a safety switch, must be installed by an authorized electrician.

A power cable for connection to a power socket is included. It is important that the unit is earthed.

The unit is supplied with an EU plug for a 230V power supply. This means that, in principle, you have no protection of electrical grounding. You can secure electrical grounding by connecting the plug to a socket with a ground pin.

You can also connect an adapter for a plug with a ground pin. You can fit this plug adapter on the unit, so that the unit is secured electrical grounding to the earthing system.

Combi S 302 Polar Top



Electrical connection accessories

Connection to user selection and modbus

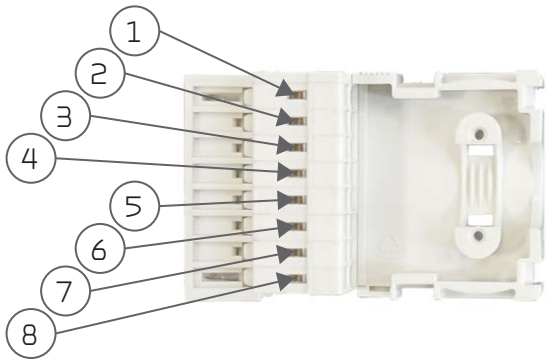
User selection: Connection to the user selection can be used, for instance, to control operation of a cooker hood. This happens via a potential free contact in the cooker hood that sends a signal to the unit. The unit then increases ventilation when the cooker hood is on. Connection happens in pin 4 and 5 of the 8-pole plug.

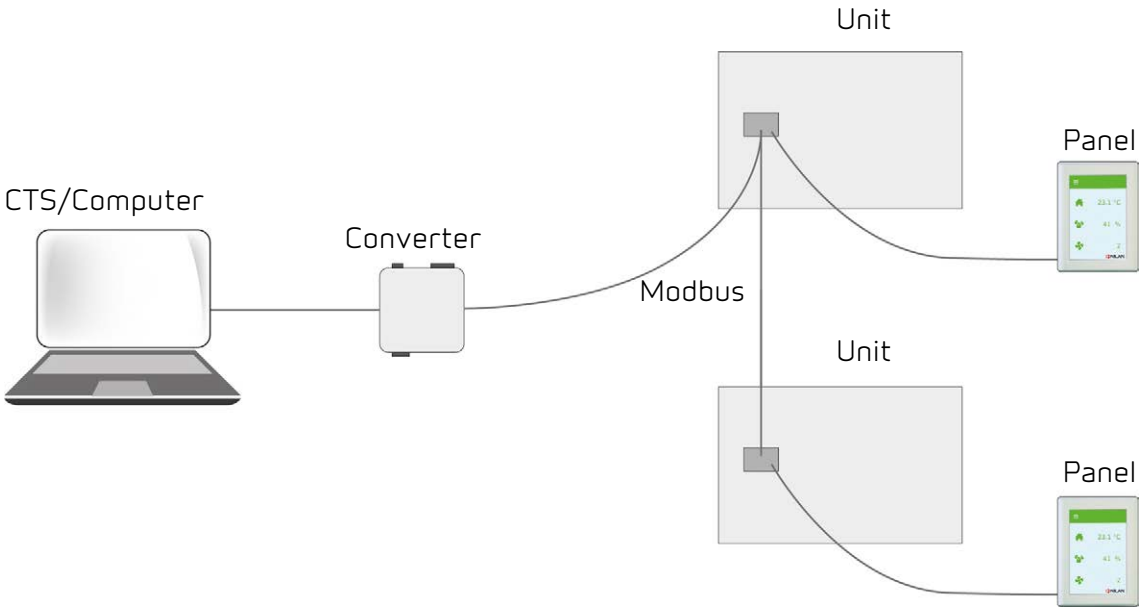
User selection can also be used for other functions such as for creating imbalance in supply air and extract air ventilation.

Modbus: You can communicate with the unit via modbus, which can be connected in pin 1 (GND), pin 6 (A1) and pin 7 (B1) of the 8-pole plug.

Please consult the user manual for software settings etc.

Connect the plug to the unit in point 3: Connections overview.





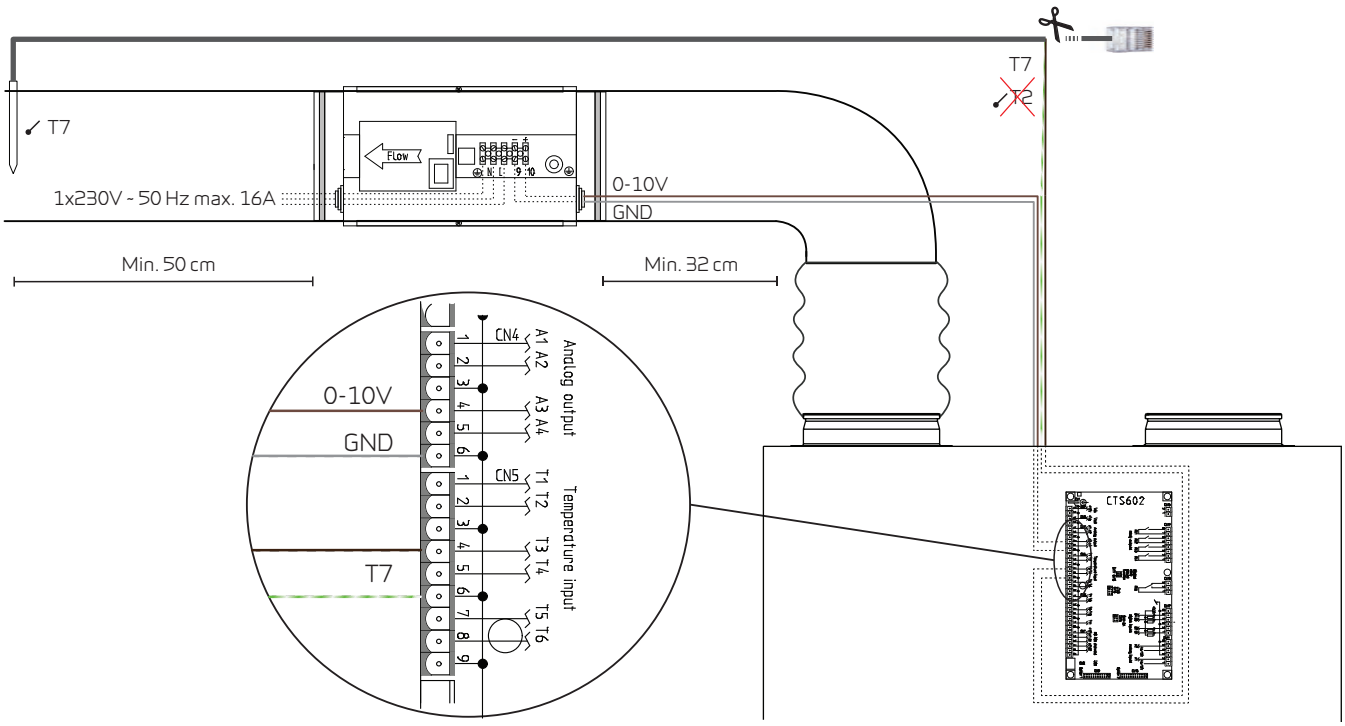
Electrical after-heating element

An after-heating element is necessary if you want to control the supply air temperature.

The electrical after-heating element can be purchased for installation in the supply air duct. The required sensor and connectors for the unit are included.

Cut off the RJ 45 plug at the heat-shrink sleeve connection and fit the wire on the circuit board.

ATTENTION
The T7 temperature sensor has been installed near the heating element. The T2 sensor **MUST**be disconnected from the circuit board. The T7 sensor should then be connected to where the T2 sensor was previously connected up.

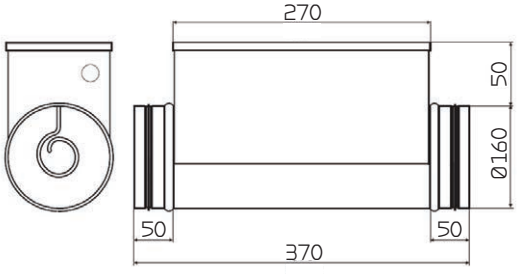


Wiring diagrams are supplied with the products.

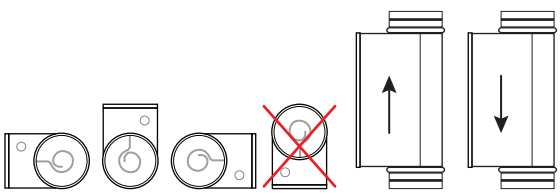
Run the wires along the duct and through the grommet on the unit down to the circuit board. Connect the wires in accordance with the wiring diagram.

ATTENTION
The heating element must be insulated with a fire retardant insulation material. The cover of the connection box, however, must not be insulated.

Dimensional drawing:



Positioning options:

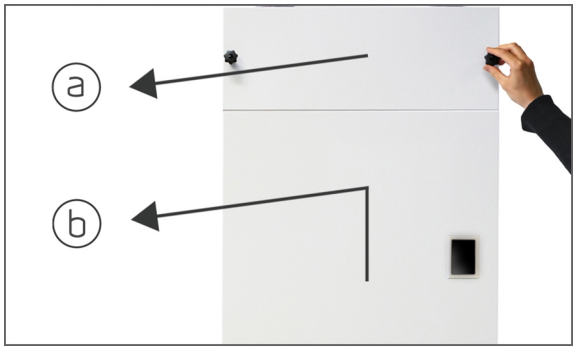


CO_2 sensor

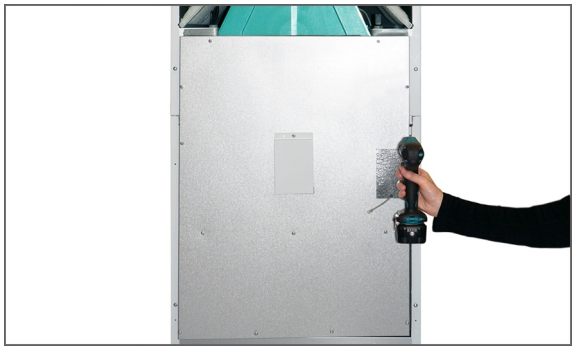
You can purchase a CO_2 sensor as an accessory if you want to control the fan speed level in accordance with the CO_2 level in the dwelling.

CAUTION
Always disconnect the power supply to the unit before opening its doors or working on its electrical installations.

Install the CO_2 sensor in the unit as follows:



1. Demount the front panels.
1. loosen the thumb screws and remove the filter door.
2. lift up the large door and remove it. Detach the RJ plug from the control panel on the rear side of the large door.

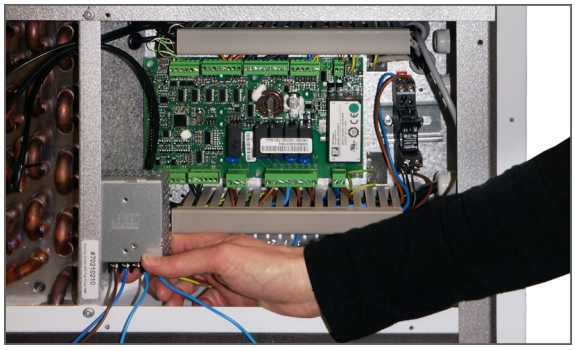


2. Remove the screws and demount the cover plate.

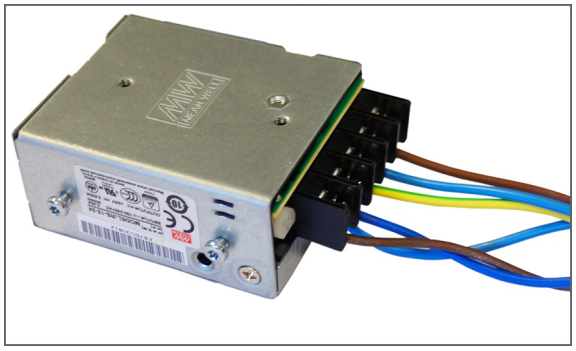
3. Pull out the T4 sensor from the counterflow heat exchanger.

4. Pull out the counterflow heat exchanger from the unit. Do not cut the strap.

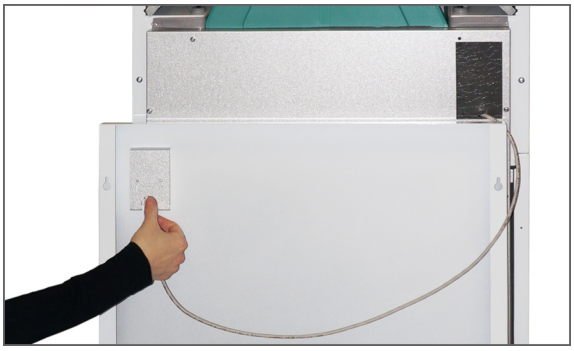
5. Install the CO_2 sensor in the metal shelf under the extract air filter using the self-drilling screws (supplied with the CO_2 sensor kit).



6. Run the wire from the CO_2 sensor through the cable grommet to the automation.
Install the power supply box in the automation compartment in the unit (predrill holes for the two screws supplied).

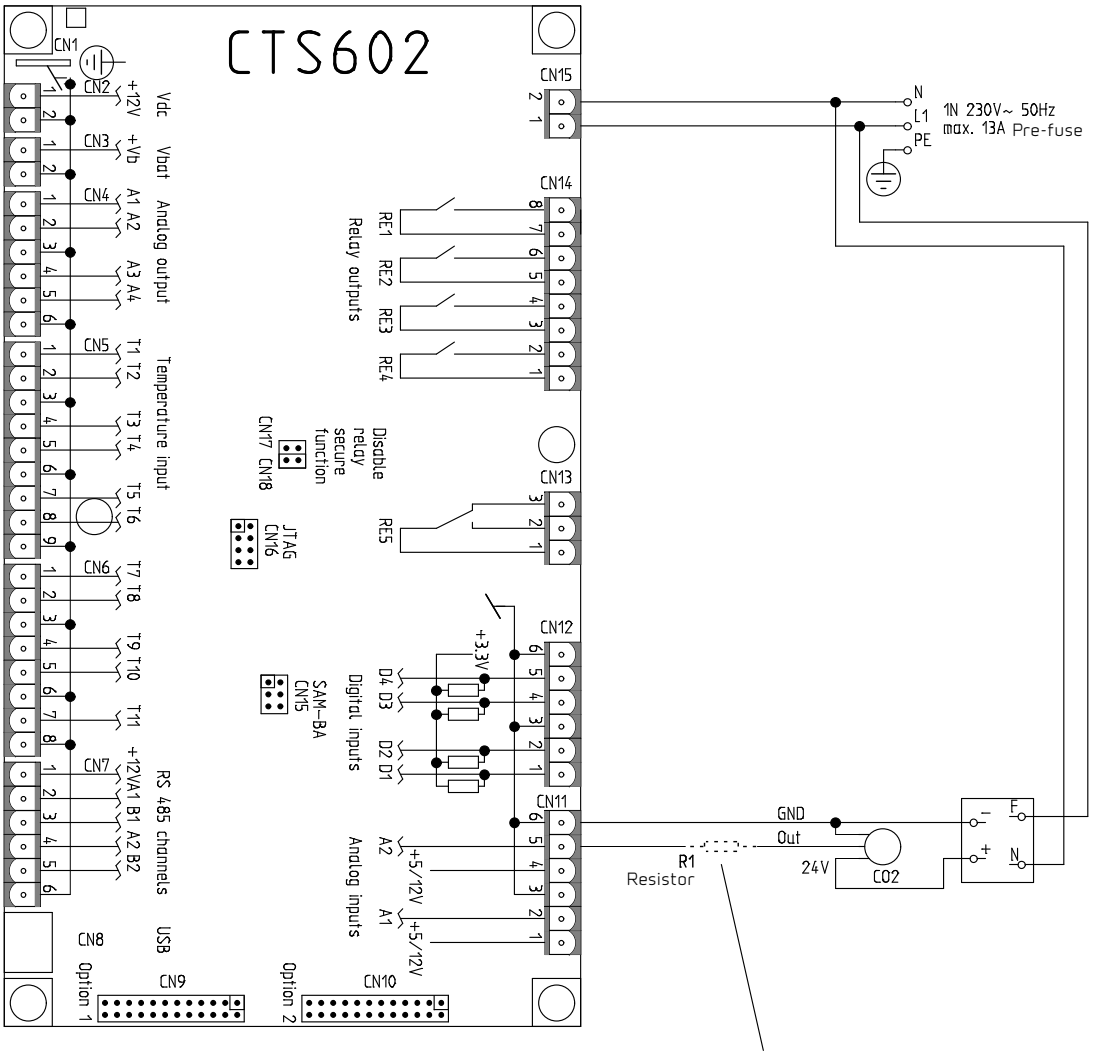


7. Connect it up in accordance with the wiring diagram. See below.



8. Reinstall the counterflow heat exchanger. Remember to reinstall the T4 sensor.
Remount the cover plate and then the front panels.
Remember to reconnect the RJ plug to the control panel.

Run the wire from the CO_2 sensor to the circuit board and connect it as shown below:



For Software version 2.00x and below, the resistor must be connected in series with a
For Software version 2.01 and above, NO resistor should be installed.

Connecting expansion PCB

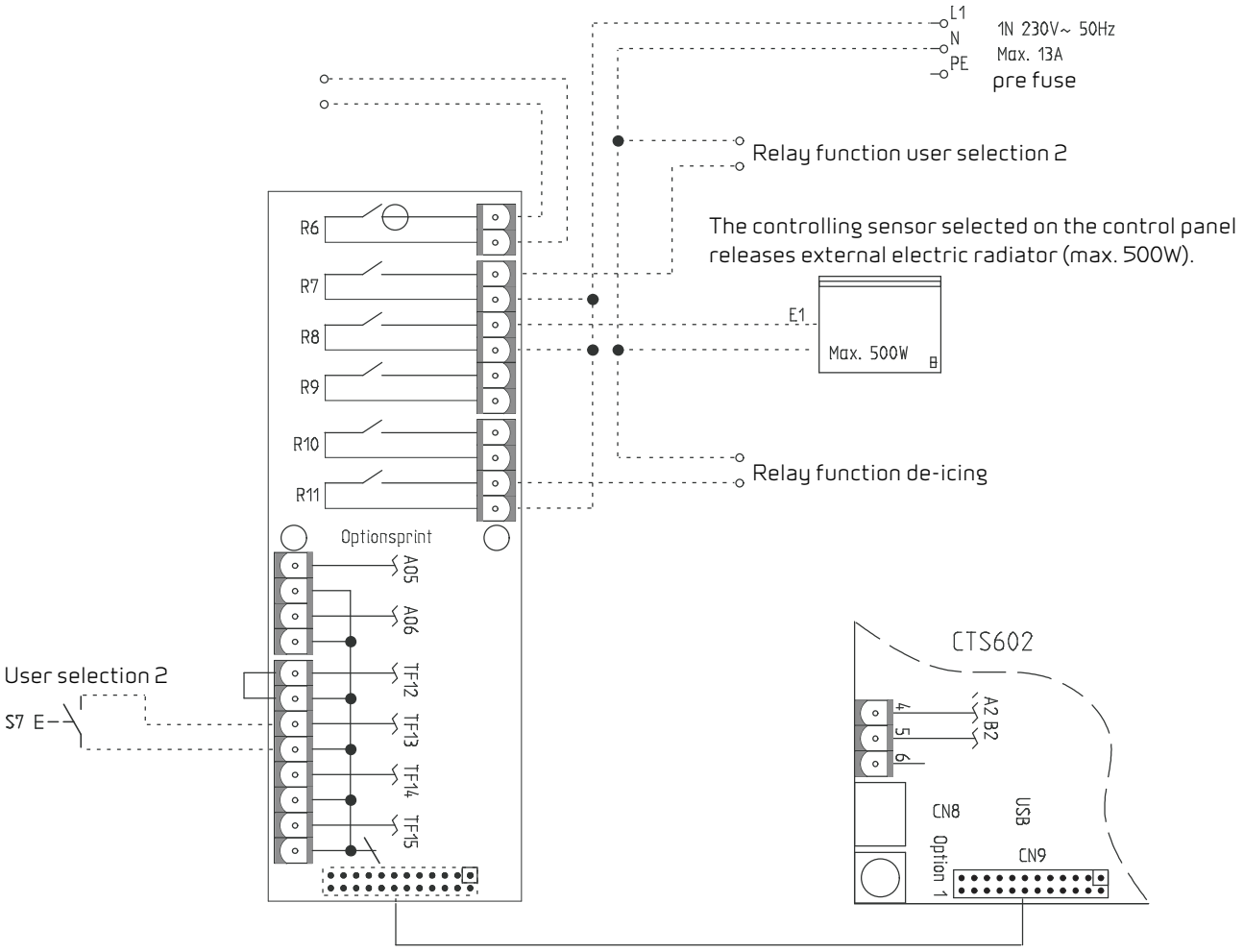
If you connect an expansion PCB to the CTS602 circuit board, you will be able to use user selection 2.

Similar to user selection 1, user selection 2 allows you to override the functions of the unit via an external signal from a potential free contact.

In addition, when activating user selection 2, the control system gives an output signal.

User selection 2 has a higher priority than user selection 1. It can be used in the same manner as user selection 1.

The expansion PCB also enables activation of external heating. It further includes an alarm output and a de-icing signal.



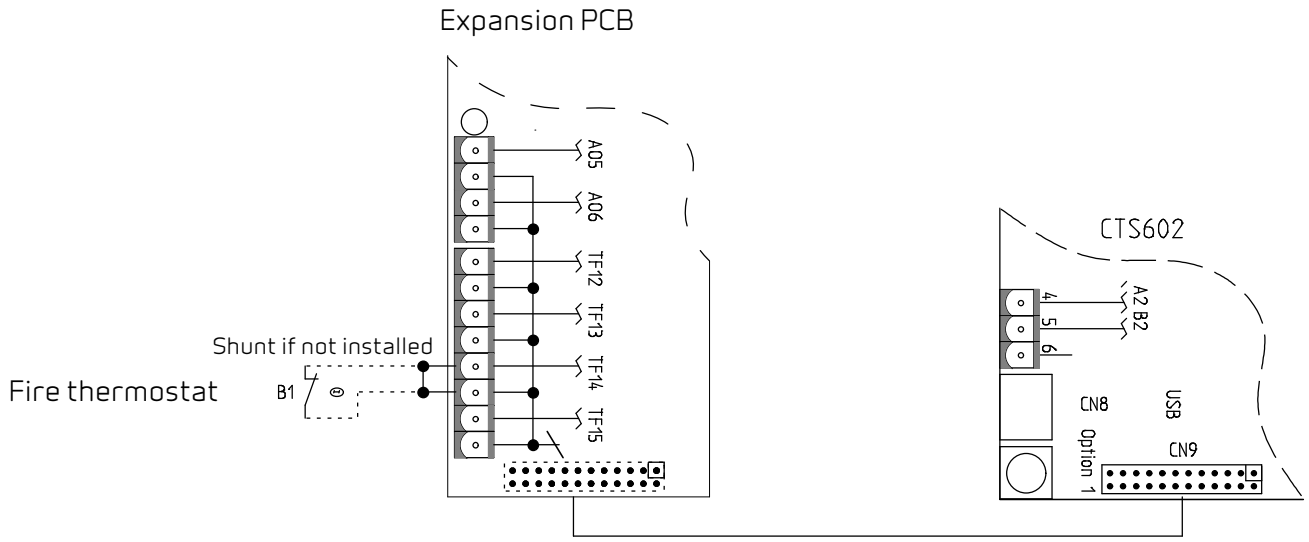
Plug the expansion PCB in the CN9 socket on the CTS602 circuit board.

ATTENTION
The expansion PCB and the connections must be installed by an authorised electrician.

The expansion PCB is an accessory to the CTS602 circuit board. Nilan does not supply external components.

Fire connection

You can connect a fire thermostat or an external fire automation system. It must be a closed signal, so that Compact S will register that there is a fire if the signal is interrupted.

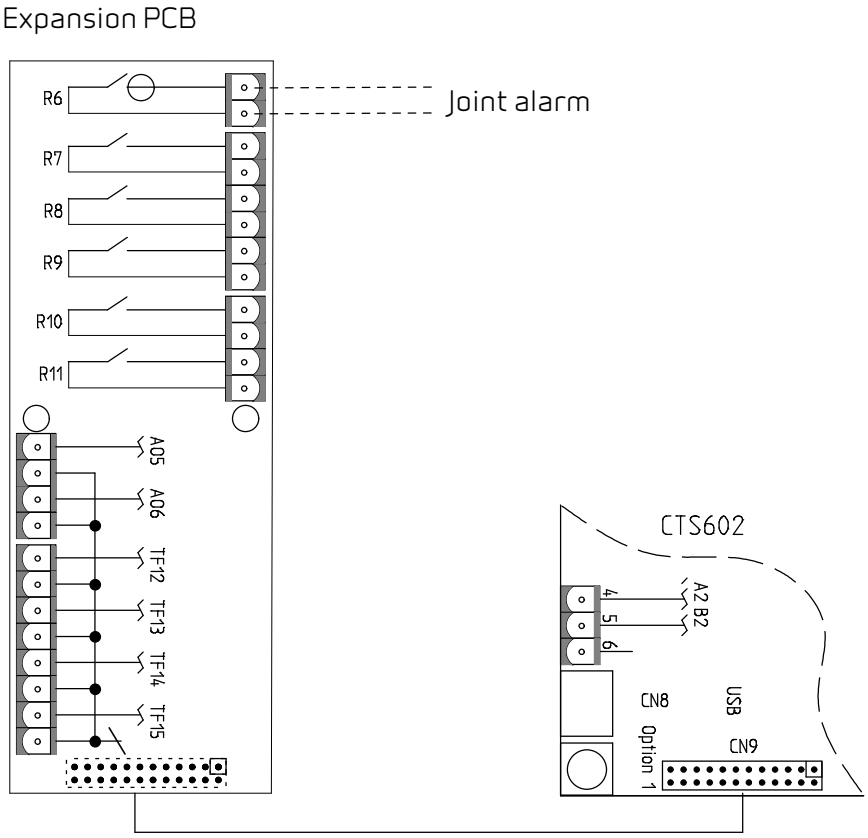


NB! If you connect the unit to an external fire automation system, set the software: General settings/ Service/Auto reset for external fire automation system to On.

Joint alarm

It may be difficult to notice alarms if the unit is located in a place where access is poor or infrequent, and if the control panel is located in the same place.

An external alarm in the form of, for instance, a light or an audible signal can be connected to the unit.

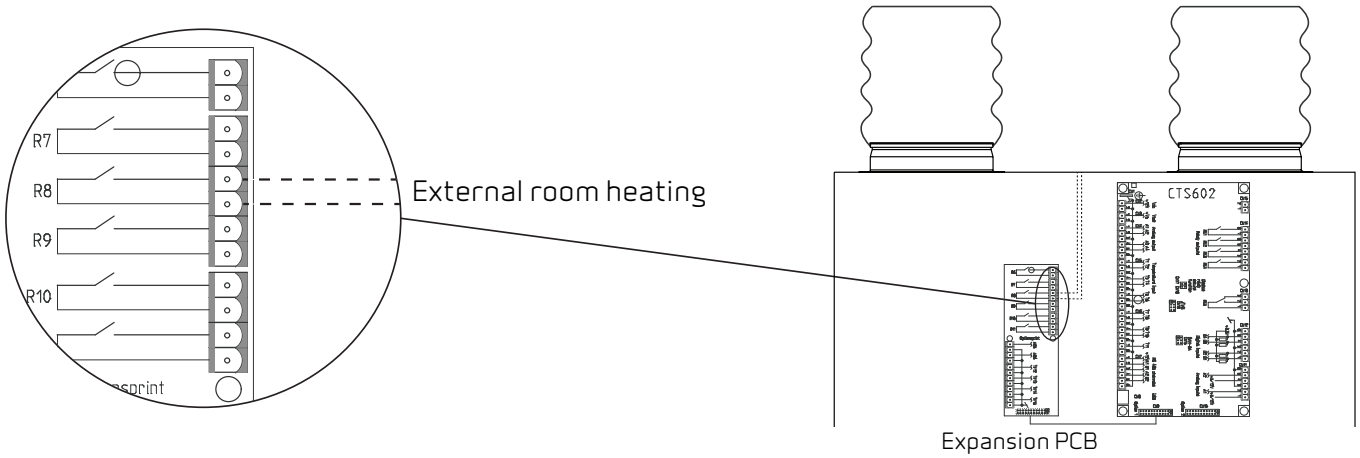


External heat supply

The unit can control an external heat supply, such as electric radiators or an underfloor heating system.

The unit monitors the room temperature and blocks the external heat supply when heating is not required. If, through ventilation alone, the unit is unable to heat the room to the desired temperature, the external heat supply will be released until the room temperature has reached the desired level.

Connect the external heat supply via relay 8 and set it in the display under menu option: Ventilation/ Temperature settings



A maximum effect of 500W can be connected (A Polar needs to have a transfer relay mounted).

Plumbing installation

Condensate drain

Important information

The unit is supplied with an Ø20 mm condensate drain (PVC, GF-fittings).

ATTENTION
You **MUST** install a water trap in connection with the condensate drain to ensure that condensate water can drain away.

ATTENTION
If you set up the unit outside the climate screen, it is important to use a heating cable to prevent the condensate drain from icing up. Frost protection of the unit is the installer's responsibility.

During operation negative pressure of up to 500 Pa may occur in the drain, corresponding to a 50 mm water column. The water trap must therefore be fitted as illustrated to prevent it from drying out and to avoid return flow.

The connection of the water trap must be air-tight; otherwise air will be drawn into the unit and condensate water will remain in the unit. It could cause water damage if the condensate tray overflows and condensate water runs out of the unit.

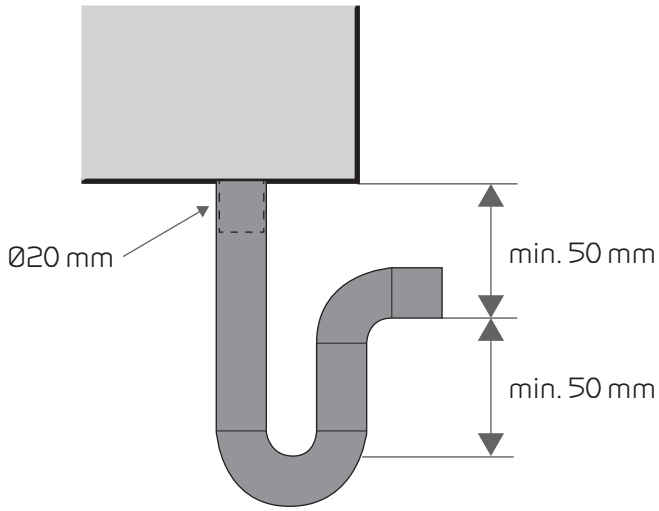
After installing the water trap, you should test it as follows (the unit must be connected to the duct system and the door must be closed):

Fill the condensate tray with water and start the unit at the highest fan speed level. Allow it to run for several minutes. Then check that there is no water in the condensate tray.

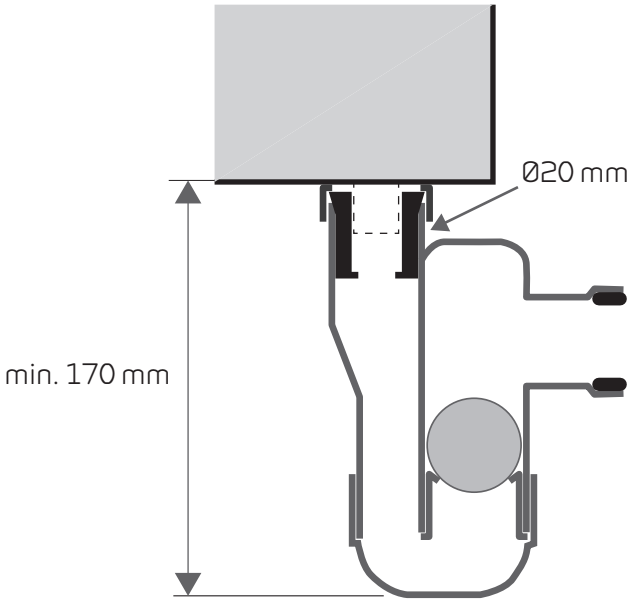
The water trap may dry out and prevent water from draining off the condensate tray, as air will then blow into the unit. The water trap should therefore be checked regularly, especially at the end of the summer, and it should be filled with water if necessary. Increasing the height of the water trap beyond the minimum requirements will minimise the need for refilling.

INFO
Nilan can supply a water trap with a ball. The ball ensures that no air blows into the unit through the condensate drain if the water trap dries out. This ensures that water in the condensate tray can drain off, which makes it unnecessary to check the condensate drain quite so often.

Connection bottom



Connection of water trap generally



Connecting Nilan's water trap with ball

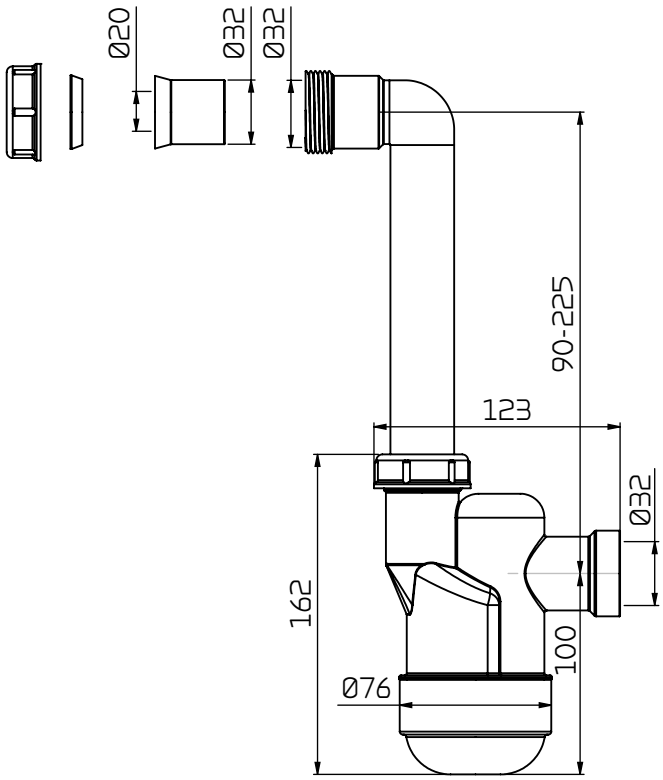
Plumbing connections for accessories

Water trap with ball (option)

Connection options with Nilan's water trap:

1. Water trap with Ø32 mm reducing fitting
2. Reducing fitting for Ø20 mm
3. Reducing fitting for ¾" RG
4. Reducing fitting for ½" tube

Dimensional drawing:
All measurements are in mm.



Ventilation installation

Duct system

Legislation

ATTENTION
All work must be carried out by qualified persons and in compliance with existing legislation and regulations.

Ducts

There are two systems by which to lead air through the house.

Spiral ducts

The spiral ducts are made from metal and are cut to size using an angle grinder. They are then connected using bends and manifolds and are fitted in accordance with the blueprint. The ducts are typically laid on the tie beams and are fixed with perforated band or they are suspended using suspension band. Avoid unnecessary bending of the ducts.

To prevent sound from being transmitted from room to room, you should install silencers for each room.

The ducts must be insulated to prevent heat loss and condensation. In some cases this can be avoided if the ducts are run through the general insulation or inside the climate screen.

NilAIR tubes

NilAIR tubes constitute a flexible system that is easy to install. You can easily cut the tubes to size with a Stanley knife and then situate them in accordance with the blueprint without having to use bends and manifolds. You install a manifold box after the unit and let the tubes run from the box out to the individual rooms.

With NilAIR tubes you do not need to install silencers for every room, as there is no risk of sound transmission.

If you lead the tubes outside the climate screen, they must be insulated to avoid heat loss and condensation. This is simpler than using spiral ducts, as NilAIR tubes are easily led through ordinary insulation.

NilAIR tubes are more flexible than spiral ducts and you can therefore run the tubes in places that are unsuitable for ordinary spiral ducts.

Unit

Nilan recommends that you install a flexible connection between the unit and the duct system.

This is to avoid vibrations from the unit being transmitted to the duct system, but also to lighten future services of the unit that will make it necessary to move the unit.

Nilan offers flexible Sound Flex tubes that provide a flexible connection between the unit and the duct system, but also reduce the sound transmission from the unit to the duct system.

The Sound Flex tubes are insulated against condensation. It may, however, be necessary with further insulation in order to comply with local requirements to insulation of duct systems.

Extract air

Install exhaust air valves in rooms that generate humidity. Place them strategically where they can extract humidity most effectively.

Rooms that generate humidity:

- Bathroom
- Lavatory
- Kitchen
- Utility room

Supply air

Install supply air valves in living areas. Place them strategically so they cause minimum discomfort. It is, for instance, not recommended that you install supply air valves in areas where people are inactive, as the supply air may be experienced as draughty.

Living areas:

- Sitting room
- Living room
- Bedroom
- Home-office

Roof stacks

The position and design of air intake and air discharge should limit pressure oscillations in the ventilation unit caused by wind. Their position should also prevent birds and other animals from getting in. Finally, the position and design should ensure that air intake and the connected duct system are kept free of plants and foreign objects.

You must place the air intake so that the risk of a short-circuit from the discharge air is minimized, with attention to the prevailing wind direction.

The air intake should be placed at least 0.5 m from the roof surface. On black, flat roofs the distance from the roof to the underside of the intake should be at least 1 m to ensure that warm air is not drawn into the building in the summer. Air intakes should be located on the northern or eastern sides of pitched roofs.

You should also install a silencer between the unit and the roof stacks to prevent noise from disturbing your surroundings.

Balancing

Important information

ATTENTION
To ensure the ventilation system operates optimally, it is important that it is balanced correctly. We recommend that experts do this.

It is important to measure the total supply air and the total extract air. The system must have a minimum vacuum, which means it must draw out more air than it blows in. This will prevent dampness from being forced into the construction of the building.

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