

# INSTALLATION INSTRUCTIONS

CTS602 HMI BY NILAN



## Compact P



Nilan England & Wales  
Old Bank Court  
Morocco Street  
London SE1 3HB

Tel: +44 (0)208 142 9373  
sales:ronan.bourke@nilan.uk.com  
technical: mark.pearce@nilan.uk.com  
[www.nilan.uk.com](http://www.nilan.uk.com)

# Table of contents

## General information

Safety .....	1
Power supply .....	1
Heat pump domestic hot water .....	
Water quality .....	4
Requirements for water quality .....	4
Introduction .....	5
Documentation .....	5
Unit type .....	6
Product description .....	6
The unit .....	7
Temperature sensor overview .....	8
Dimensional drawing .....	8

## Installation

Assembly .....	12
Transport into the dwelling .....	12
Positioning of unit .....	12

## Electrical installation

Safety .....	13
Connections overview .....	13
Electrical connections unit .....	15
Power supply .....	15
Compact P unit .....	15
Electrical connections accessories .....	16
CO2 sensor .....	19
Installation of expansion PCB on CTS602 circuit board .....	21
External heat supply .....	26

## Plumbing installation

Condensate drain .....	27
Important information .....	27
Hot water tank .....	28
Connection overview .....	28
Connection .....	28
Requirements for water quality .....	29
Hot water circulation .....	29
Solar coil .....	29
Softened water .....	29
Plumbing connections for accessories .....	30
Safety group .....	30
Safety group with anti-scald protection .....	31

## Ventilation installation

Duct system .....	32
Legislation .....	32
Ducts .....	32
Ventilation unit .....	32
Extract air .....	33
Supply air .....	33
Facade terminals .....	33
Installation example .....	33
Balancing .....	34
Important information .....	34
Balancing connectors .....	34
Pressure fall diagram .....	34

## Troubleshooting

Emergency operation domestic hot water .....	35
Domestic hot water .....	36
Errors and solutions domestic hot water .....	36

## Ventilation installation

Duct system .....	32
Legislation .....	32
Ducts .....	32
Ventilation unit .....	32
Extract air .....	33
Supply air .....	33
<b>Facade</b> terminals .....	33
Installation example .....	33
Balancing .....	34
Important information .....	34
Balancing connectors .....	34
Pressure fall diagram .....	34

## Troubleshooting

Emergency operation domestic hot water .....	35
Domestic hot water .....	36
Errors and solutions domestic hot water .....	36

# General information

## 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 to supply to the unit before opening the unit doors, for instance for installation, inspection, cleaning and filter change.

### Heat pump domestic hot water



**CAUTION**

Avoid direct contact with the heating system pipes in the heat pump as they can get very hot.



**CAUTION**

To protect the heat pump against damage, it is fitted with the following safety equipment.

The heat pump must undergo suitable service inspections under applicable legislation and regulations to keep it in good condition and in compliance with safety and environmental requirements.

Responsibility for maintenance of the heat pump rests with the owner/user.

## Water quality

### Requirements for water quality

The hot water tank in the Nilan units is made of steel, which has been given a double enamelling, to ensure an extra long service life. In addition, the tank is equipped with a sacrificial anode as extra protection. It is important that the sacrificial anode is replaced regularly.

Most units are equipped with an electronic monitoring sacrificial anode, which gives an alarm on the user panel when it is time to replace it.

In order for the sacrificial anode to function and protect the tank, it is required that the water quality complies with the following:

- Electrical conductivity (EC): Between 30 mS/m and 150 mS/m (millisiemens pr. m) @ 25 °C
- Chloride must be below 250 mg/L @ 65 °C

If the above criteria are not met, the sacrificial anode will not work as intended, after which the tank will be corroded., to

# Introduction

## Documentation

The following documents will be supplied with the unit:

- Quick guide
- Wiring diagram

In the Quick guide you will find important information regarding installation and start-up of the unit. If you require further information regarding, for instance, installation of accessories or additional settings in the software, or if you need an extended user manual, the following documents can be downloaded from the Nilan website:

- Installation instructions
- Software instructions
- User Manual
- Wiring diagram

The instructions can be downloaded from <https://www.nilan.dk/en-gb/frontpage/download>.

If you have questions regarding installation and operation of the unit after having read the instructions, please contact your nearest Nilan dealer. A list of Nilan dealers is available on [www.nilan.dk/forhandlere](http://www.nilan.dk/forhandlere).



### **ATTENTION**

The unit must be started up immediately after installation and connection to the duct system.

When the ventilation unit is not in operation, humidity from the rooms will enter the duct system and create condensate water that can run out of the valves and cause damage to floors and furniture. Condensation may also form in the ventilation unit, which can damage its electronics and fans.

From factory, the unit has been tested and is ready for operation.

# Unit type

## Product description

Compact P is a ventilation unit with heat recovery, that has a built-in heat pump, which is used for the production of domestic hot water, but which is able to heat and cool the home via the ventilation air.

Compact P is designed for air flows of up to 275 m<sup>3</sup>/h at 100 Pa external counter-pressure. Compact P XL can handle air flows up to 430 m<sup>3</sup>/h at 100 Pa external counter-pressure.

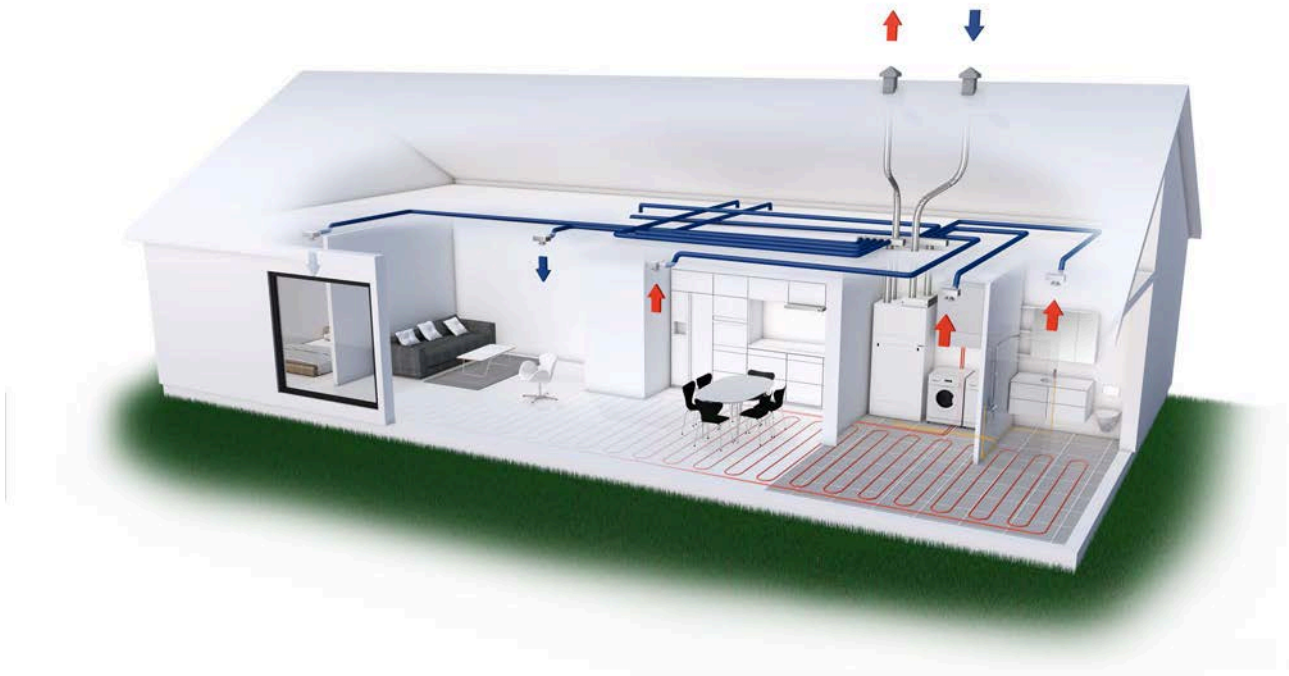
The unit is primarily used in residential construction such as single-family houses and apartments. It ventilates the home by drawing out the moist and bad air via valves in e.g. bathrooms, toilet, kitchen and utility room, and introduces fresh outdoor air in via valves in living rooms such as. living room, bedrooms and family room.

The cold outdoor air is heated via the high-efficiency counterflow heat exchanger by the hot exhaust air. The heat loss that occurs via heat recovery, the built-in heat pump use to produce domestic hot water. All the energy in the exhaust air is utilized, and you have not really seen any heat loss that you experience with an ordinary ventilation unit.

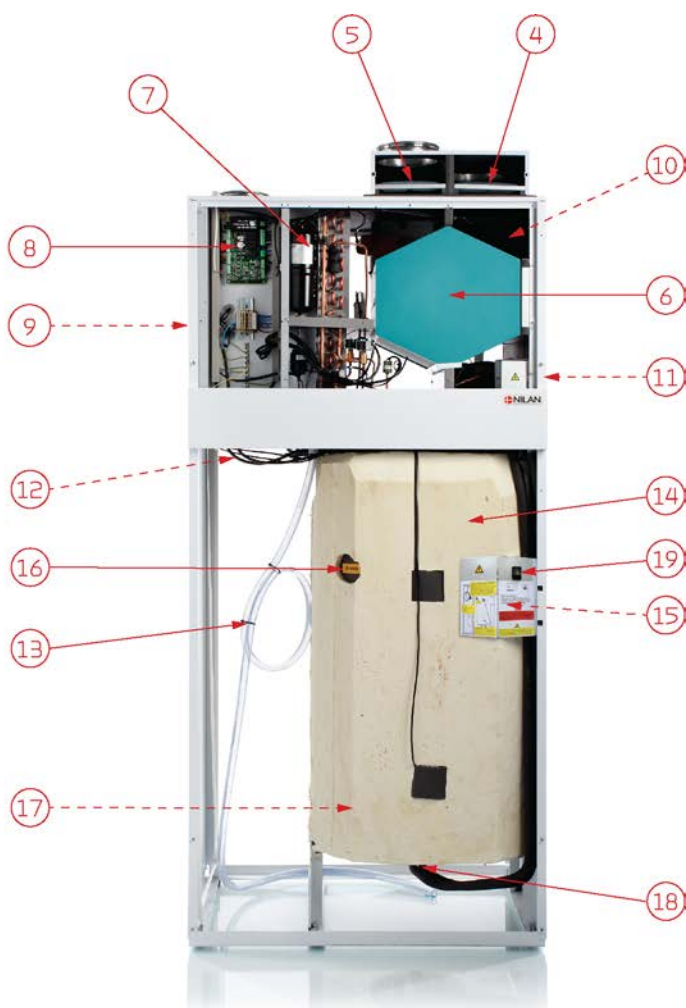
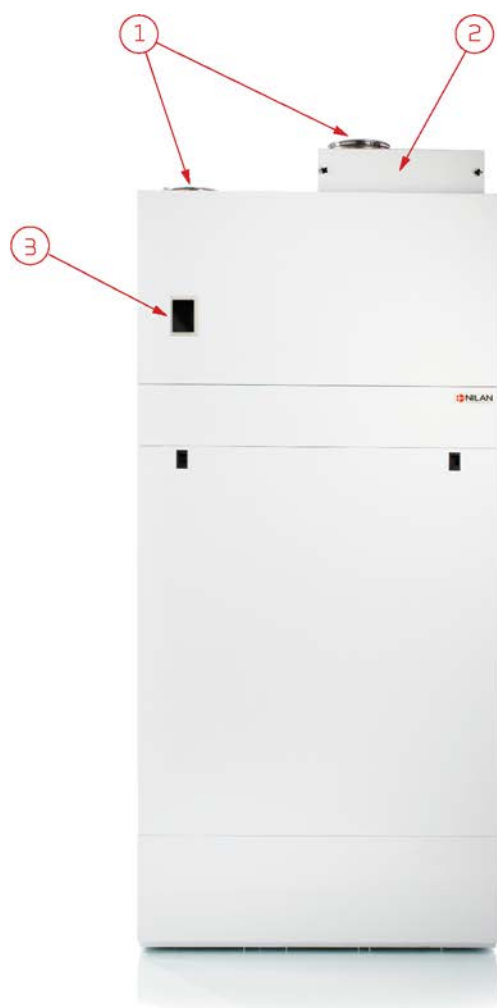
In the winter, the built-in heat pump can heat the supply air up to 34 ° C, and thus contribute to heating the home. When the supply air is heated, at the same time a little heat is deposited in the hot water tank and ensures a constant high hot water temperature.

The heat pump has a reversible cooling circuit, which means that the cooling circuit can be turned and it can cool the supply air in the summer. Compact P can cool the supply air by up to 10 ° C in relation to the outdoor air. Due to the low air exchange, usually 1/2 time per hour, it will not act as an air conditioning system. However, when cooling, moisture in the supply air is removed, which results in a lower humidity in the home. The lower humidity means that it is easier to withstand a slightly higher temperature, which therefore provides good comfort in the home.

When Compact P cools the supply air, the energy is deposited in the hot water tank, and it can thus be said that “free” domestic hot water is produced during those periods.



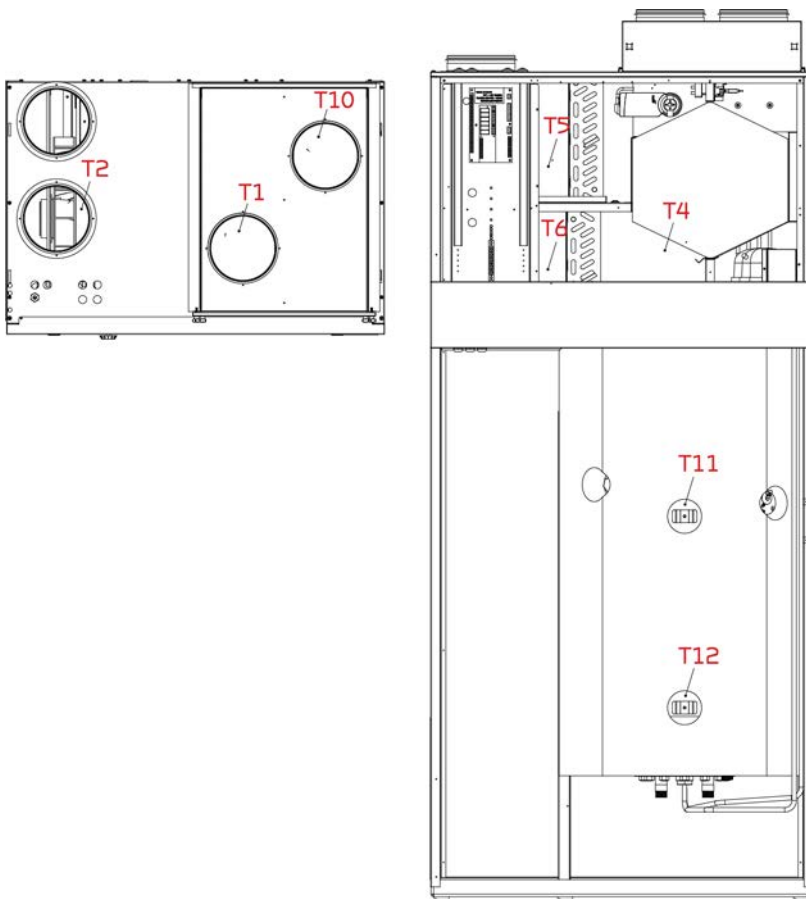
## The unit



1. Duct connections
2. Filter change cover
3. Control panel (HMI touch-panel)
4. Extract air filter
5. Outdoor air filter (pollen filter is placed here if required)
6. Counterflow heat exchanger
7. Heat pump
8. Automatic CTS602
9. Fans
10. 100% bypass damper

11. Pre-heating element (Polar version only)
12. USB-cable (for connecting to PC)
13. Condensation drain with water lock
14. 180 l hot water tank
15. 1,5 kW electrical supplement heater
16. Electronically monitored sacrificial anode
17. Supplementary coil (only SOL version)
18. Plumbing connections
19. Emergency mode (domestic hot water)

## Temperature sensor overview



Temperature sensors outside the unit

- T1: Outdoor air
- T2: Supply air
- T4: Extract air after heat exchanger T5: Condenser
- T6: Evaporator
- T10: Extract air

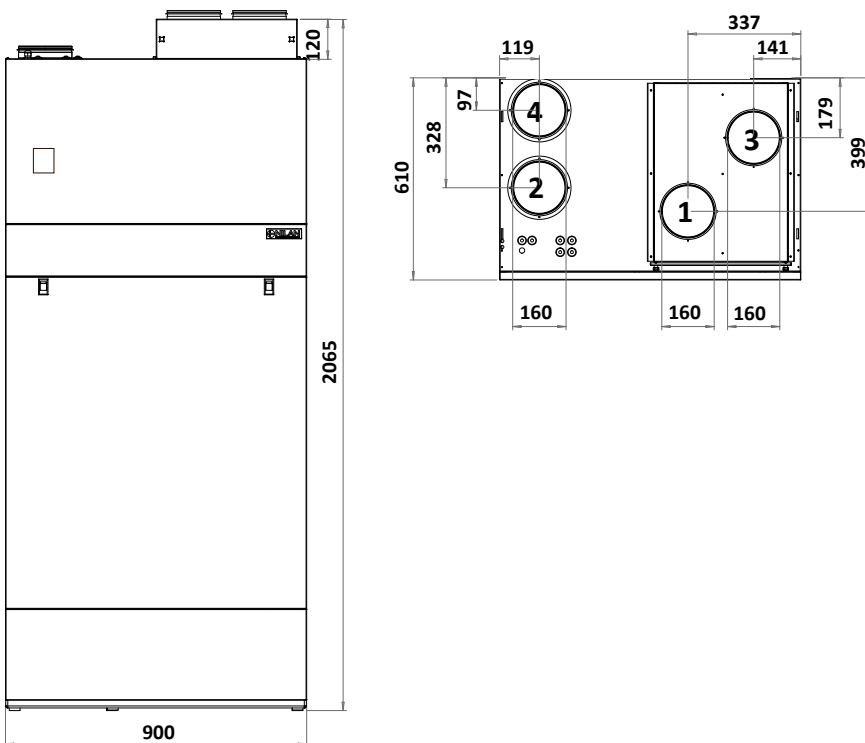
Temperature sensors outside the unit

- T7: Supply air after heating element (accessory)

Temperature sensors int the hot water tank

- T11: Top of tank
- T12: Bottom of tank

## Dimensional drawing



Connections:

1. Outdoor air
2. Supply air
3. Extract air
4. Discharge air

Weight: 202 kg.

All listed measurements are in mm.



# Installation

## Assembly

### Transport into the dwelling

Compact P is supplied in one piece on a pallet, packed in cardboard.

You can use Nilan lifting trolley, with which the unit can be lifted directly off the pallet and into the building. If the filter box is removed, the unit can be manoeuvred through an ordinary door.



The unit is fitted at the factory with 4 lifting straps, one for each top corner.

This makes it possible to lift in the unit with a crane, which is a great advantage if the terrain does not allow you to drive with a lift truck.

When lifting the units with the supplied straps, these must be at an angle of max. 45° from the vertical.

### Positioning of unit

The unit should be positioned on a level and vibration-free substrate, with good access for servicing and filter change.



#### ATTENTION

When setting up the unit, consideration must always be given to future servicing and maintenance, therefore a free space in front of the unit of at least 60 cm is recommended.



#### ATTENTION

To achieve a proper run-off from the condensate tray, it is important that the unit is installed in level.



#### ATTENTION

If a screen is mounted over the Compact P, it must be easy to dismantle this.



At the lower rear and sides of the unit, there are punched areas which can be clipped out, so you do not cut the holes yourself.

The rear angle iron on the base frame can be removed, allowing the unit to be pushed closer to the wall, thereby concealing the water connections.

# Electrical installation

## Safety



### ATTENTION

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



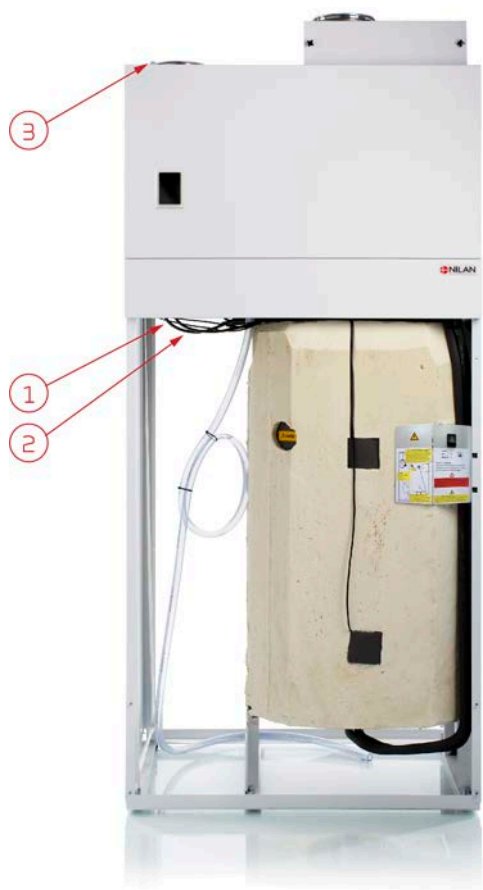
### ATTENTION

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

Connection of 230V and connection to the control via USB cable can be found behind the unit's large front door. An 8-pole plug is found on top of the unit.



1. Connection of 230V power supply via Schuko socket (remember earth connection)
2. Connection of PC via a USB cable.
3. 8-pole plug with options for connecting user program 1, Modbus and control panel.

# Electrical connections unit

## Power supply



### CAUTION

The power supply is plugged into a 230V socket with a safety switch. It is important that the unit has ground connection.

The ventilation unit is supplied with an EU Schuko plug for 230V power supply.

This means that if you have not installed a shoko socket with side earth or pin earth, an Adapter schuko plug with pin earth must be used.

This Schuko adapter can be plugged into the ventilation unit's Shuko plug and then into a socket with earth.



Schuko socket with side earth



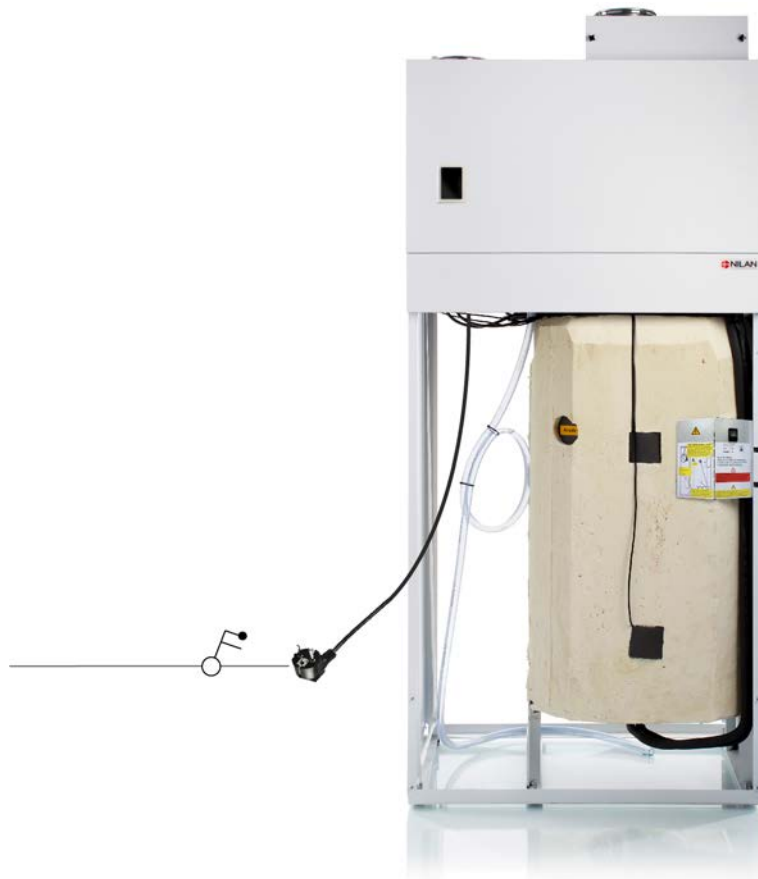
Schuko socket with pin earth



Adapter Schuko plug with pin ground

## Compact P unit

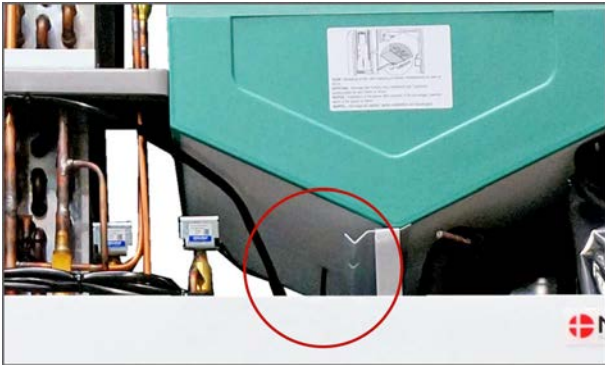
Ventilation and domestic hot water  
1N 230V - 50 Hz max 13 A (Schuko plug)(Polar version 16A)  
Remember safety switch.



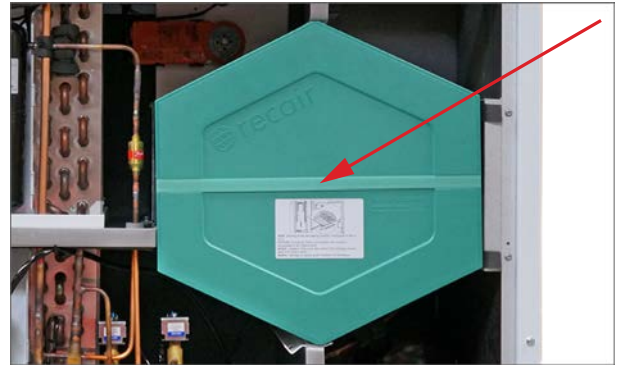
## CO<sub>2</sub> sensor

If there is a large load change in the home / building, it is advantageous to install a CO<sub>2</sub> sensor to control the air exchange. The CO<sub>2</sub> sensor measures the CO<sub>2</sub> level in the exhaust air, and regulates the ventilation level accordingly.

The CO<sub>2</sub> sensor is mounted in the unit as illustrated below:



1. Remove the T4 sensor in the heat exchanger.



2. Remove the heat exchange by pulling the strap (do not cut).



3. Pierce a hole into the foam over the crossbar, (where the heat exchanger is positioned) to gain access to the recess in the top cover.



4. Run the wire from the CO<sub>2</sub> sensor through this recess.



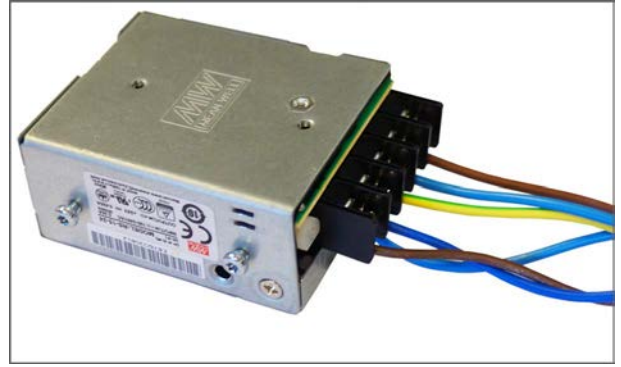
5. Mount the CO<sub>2</sub> sensor in the top cover, using self-threading screws (included in the CO<sub>2</sub> sensor kit).



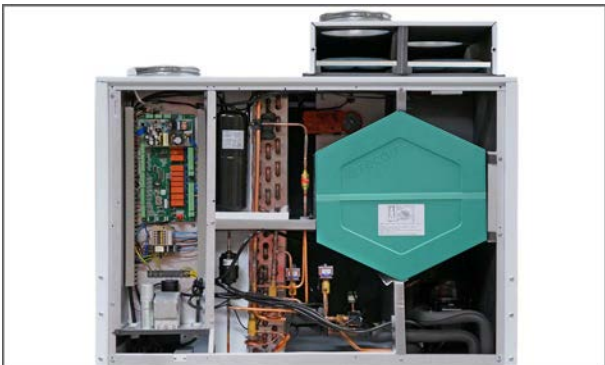
6. Run the wire from the CO<sub>2</sub> sensor through the cable grommet to the automation. Wire is subsequently tied up with cable strips.



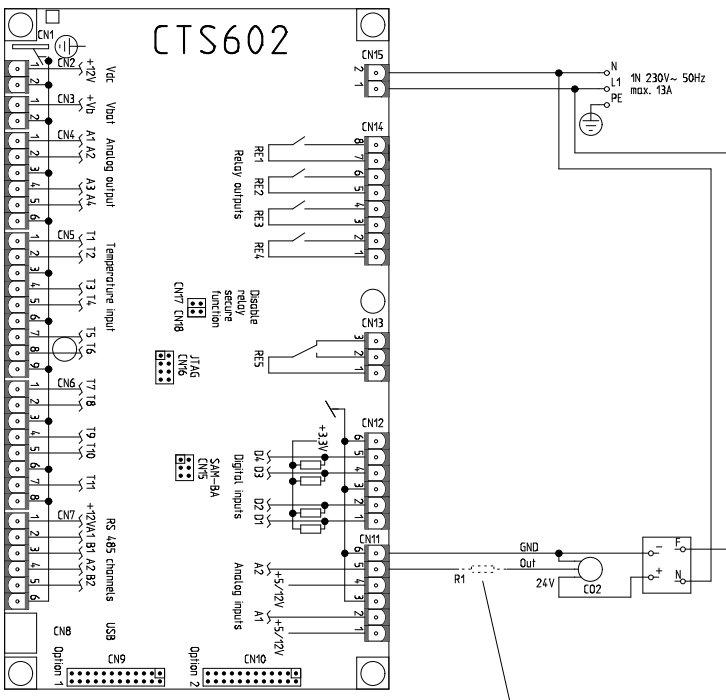
7. Mount the power supply box in the box for automatic. (pre-drill 2 holes for the screws).



8. Connects as shown in the electrical diagram below.



9. Reinstall the counterflow heat exchanger. Remember to reinstall the T4 sensor.

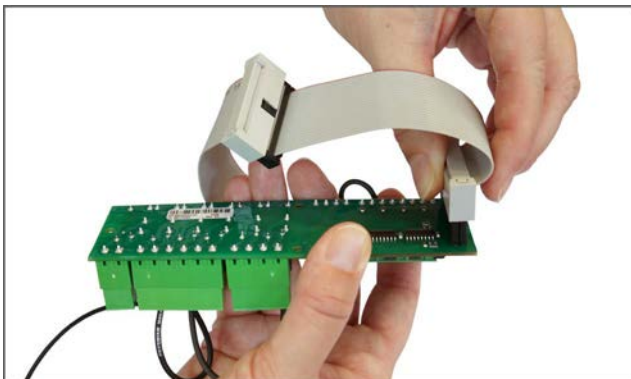


For SW version 2.00x or less, the resistor must be mounted in series with a black signal cable For SW version 2.01x and above, do not mount a resistor.

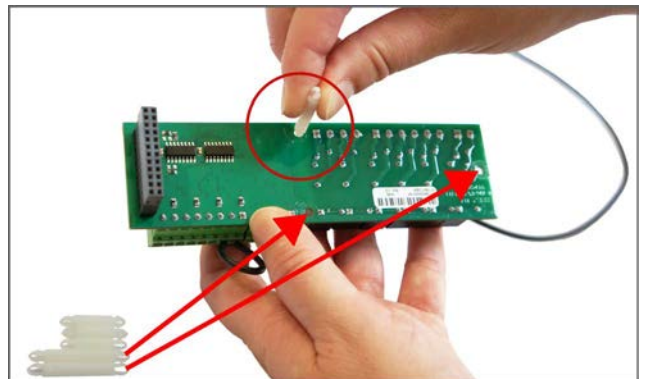
## Installation of expansion PCB on CTS602 circuit board

With an expansion PCB, it is possible to expand the functions within the control system.

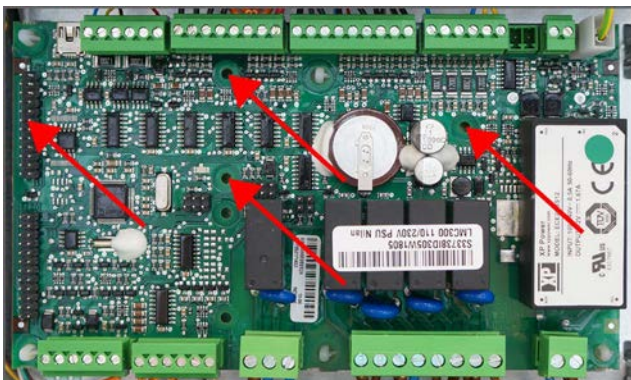
You can connect a CO<sub>2</sub>-sensor, a joint alarm and User programme 2 (expansion PCB is included with the after-heating element)



1. Demount the shown bus cable from the expansion PCB..



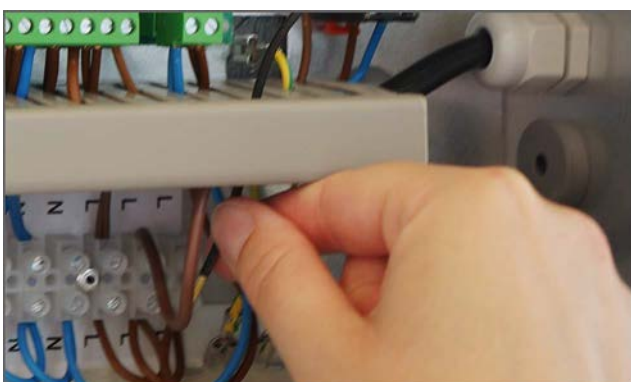
2. Mount the large circuit board supports in the 3 holes on the expansion PCB.



3. Connect the expansion PCB to CN9. Mount the circuit board supports in the holes provided for this on the CTS602 Light circuit board.



4. Mount the expansion PCB on the CTS602 Light circuit board.



5. Connect the wires up in accordance with the wiring diagram.



### ATTENTION

The expansion PCB and the connections must be installed by a certified electrician.  
The expansion PCB is an accessory for the CTS602 circuit board. Nilan does not supply external components.

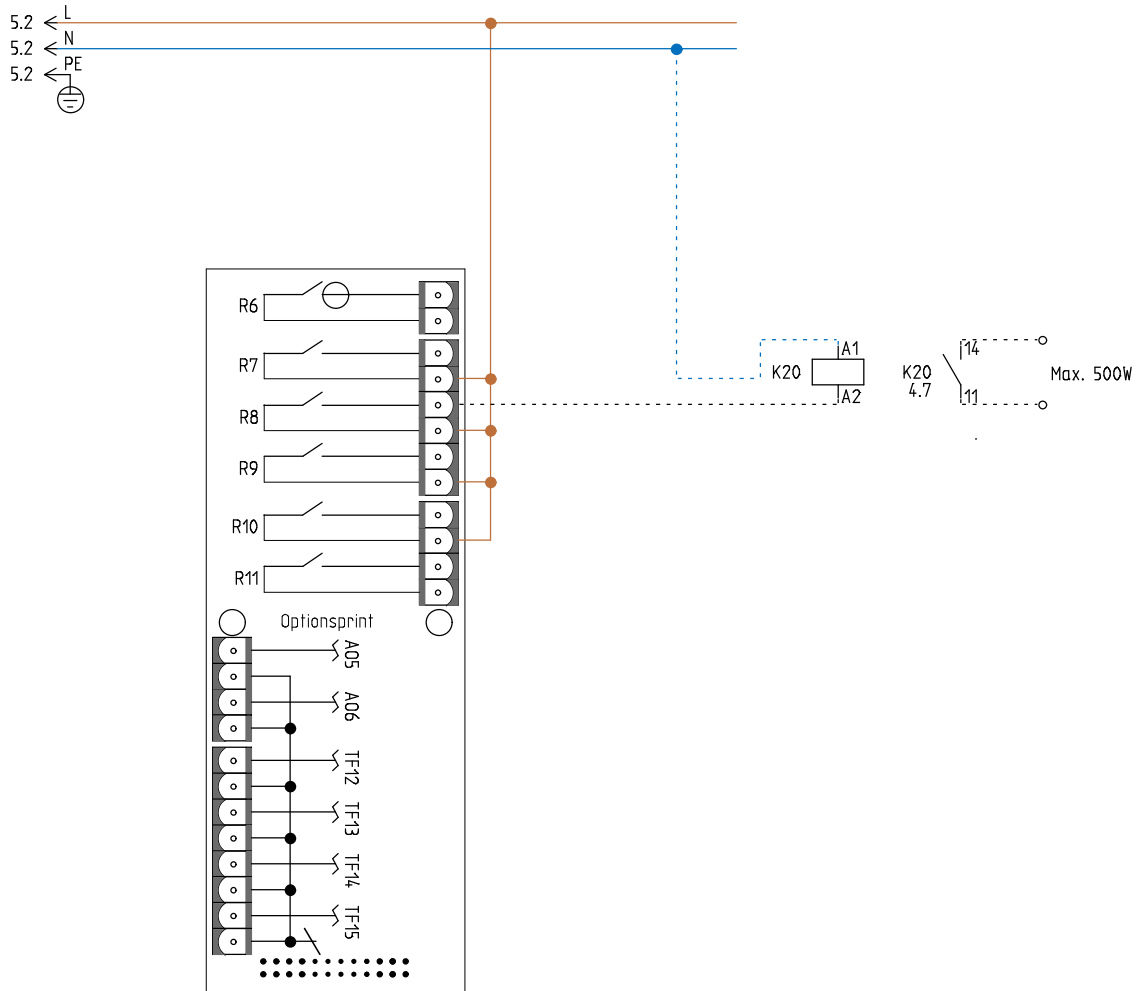
## External heat supply

The unit can control an external heat supply, such as electric radiators or an underfloor heating system. This feature is used in the cases where the unit contributes to the heating of the house via a heat pump and / or a after heating element.

The room temperature is monitored by the unit's control, which only releases the external heat supply if it cannot heat the home / house to the desired room temperature.

External heating supply is connected to the option board via relay R8, and the settings are set in the control panel.

Read the software manual to see which settings to set.



# Plumbing installation

## Condensate drain

### Important information

Compact P is supplied with a reinforced 20 mm condensation drain pipe with built-in water lock.



#### ATTENTION

Run the condensate drain to the nearest drain, allowing an even fall of at least 1 cm per m.

The overflow from the safety valve for domestic cold water must likewise be led to a visible drain.



#### ATTENTION

If the unit is positioned outside the climate screen, it is important to secure the condensate drain against icing.

Frost protection of the unit is the installer's responsibility.

The connection of the water trap must be air-tight, otherwise air will be sucked into the unit and condensate water will not be able to run out. It could cause water damage if the condensate tray overflows and condensate water runs out of the unit.

After installing the water trap, its function is tested as follows (the unit must be connected to the duct system):

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



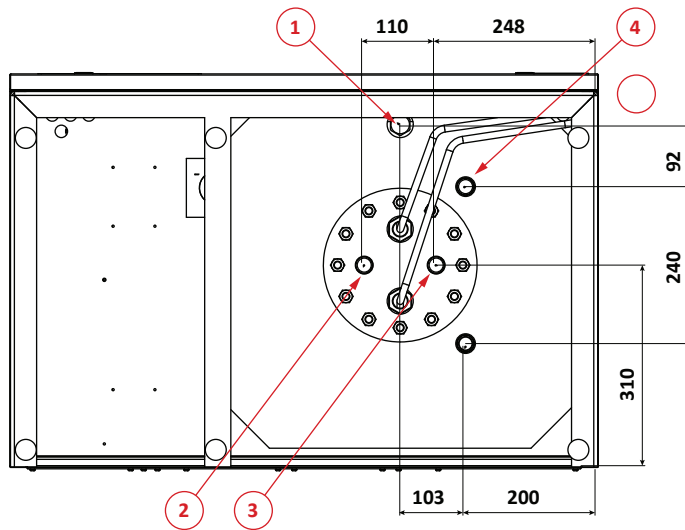
There is provided a loop of tubing from the condensate drain, which acts as a water trap. It is fixed with strips, which in no case must be cut up.



# Hot water tank

## Connection overview

Compact P front



### Connections:

1. Connection for 3/4" circulation pipe
2. Hot water outlet 3/4"
3. Cold water intake 3/4"
4. Return supplementary coil 3/4"

All listed measurements are in mm.

## Connection



### ATTENTION

All work must be performed by qualified personnel and in accordance with relevant legislation and provisions.

Nilan's hot water tanks are double-enamelled, ensuring long life. The efficient foam insulation protects against unnecessary heat loss. All connection nozzles for water have 3/4" thread and are located in the tank bottom.

The tank is also fitted with an electronically-monitored sacrificial anode that automatically displays a warning on the display when it needs changing.



### CAUTION

Changing the anode when notified on the display is important. Failure to do so can cancel the guarantee on the hot water tank.

The tank is fitted with supplementary electrical heater deactivated by default and activated via the control panel if required.



### ATTENTION

The supplementary heating must not be activated before the water tank is full of water.

## Requirements for water quality

The hot water tank in the Nilan units is made of steel, which has been given a double enamelling, to ensure an extra long service life. In addition, the tank is equipped with a sacrificial anode as extra protection. It is important that the sacrificial anode is replaced regularly.

Most units are equipped with an electronic monitoring sacrificial anode, which gives an alarm on the user panel when it is time to replace it.

In order for the sacrificial anode to function and protect the tank, it is required that the water quality complies with the following:

- Electrical conductivity (EC): Between 30 mS/m and 150 mS/m (millisiemens pr. m) @ 25 °C
- Chloride must be below 250 mg/L @ 65 °C

If the above criteria are not met, the sacrificial anode will not work as intended, after which the tank will be corroded., to

## Hot water circulation

Hot water circulation can be established by fitting a non-return valve and a circulation pump for domestic water to the tank's circulation connector.

If hot water circulation is not established, the connector must remain closed with the factory-mounted shut-off plug.



### ATTENTION

Hot water circulation can lead to a significant heat loss in the pipes, diverting a good proportion of the heat pump's output. To avoid this, circulation pipes and the hot water loop must be insulated with at least 30 mm mineral wool.

It is advisable to set a timer so that the circulation pump is not running constantly.

## Solar coil

All units ordered as a SOL models have integral supplementary coil, see connections list.

The supplemental coil is intended for solar heating systems, though it can also be connected to other heat sources, e.g. a heat pump.



### ATTENTION

If a solar collector or other heat source is connected to the supplementary coil, it is recommended to install a scald protection on the hot water outlet.

## Softened water

If it is wished to soften water with salt in a Nilan hot water tank, the following must be observed:

- The conductivity must be between 30 mS/m og 150 mS/m (millisiemens per m)
- The chlorine content must be under 250 mg Cl/l

If the above criteria are exceeded, the anode current will be too high, the anode will break down too quickly and the water will begin to smell bad.



### CAUTION

De-mineralised water (double ion exchange) must not be used, as the tank will quickly corrode. De-mineralised is also referred to as desalinated and de-ionised water.

# Plumbing connections for accessories

## Safety group



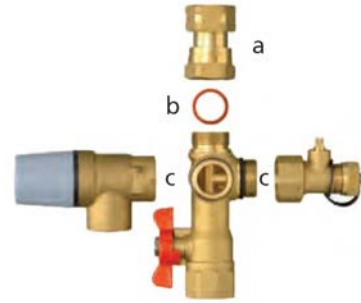
### CAUTION

Safety group must be installed in connection with hot water tanks.

When water is heated to 60 °C, it expands by 2%. A pressured tank could burst without a safety valve keeping excess water out. The safety valve should therefore drip during warming up.

### Installation:

- a. The double nut is attached to the water heater's cold water pipe so that the arrows are pointing in towards the water heater (in the direction of the flow). The joint with the water heater is sealed using a threaded washer.
- b. The joint between the double nut and the unit is sealed using fibre packing.
- c. The rubber ring seal (the O-ring) is fitted to the unit so that it can function as a seal between the safety valve and the unit in such a way that the valve is locked.



The end of the overflow pipe must be visible, and it must be able to run out safely via the drain.



### ATTENTION

As water expands as it heats up, the safety valve will drip.



### ATTENTION

The installer is responsibly to instruct the consumer about the location and function of the safety valve, as well as that the safety group at least twice a year should be tested to avoid overgrowth.

## Safety group with anti-scald protection

In the control, a temperature limit for the domestic hot water of 65°C is set as standard. This setting prevents scalding of the users when the hot water tap is opened.

When the unit is in cooling mode, the energy is deposited in the hot domestic water tank instead of leading it out of the house. This also means that if the hot water temperature exceeds 65°C, the unit stops cooling the supply air.

If there is a larger need for cooling, the temperature limit can be raised to 80°C, but then a scalding fuse must be fitted under the hot water tank, which prevents users from scalding when they open the hot water tap.

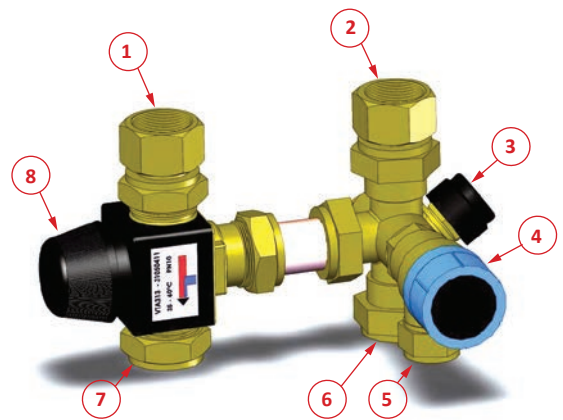
The scald protection mixes the hot water with cold water so that the temperature is lowered and scalding is avoided. This extended the period during which Compact can cool.



### CAUTION

If a solar panel is connected to the hot water tank, an anti-scald device must be mounted.

1. Hot water from the hot water tank
2. Cold water to the hot water tank
3. Stop tap cold water
4. Pressure relief valve (6 bar or 10 bar)
5. The overflows from the safety valve are led to a prominent drain
6. Cold water supply
7. Domestic hot water for the dwelling
8. Mixing valve for domestic hot water for the dwelling (can be set between 35 - 60 °C)



# Ventilation installation

## Duct system

### Legislation



#### ATTENTION

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

## 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 run the tubes from the box out to the individual rooms.

When using NilAIR tubes, you do not have to install silencers for each room. The sound-damping effect of the tubes ensures that sounds and noise will not be transmitted from room to room.

If you install the tubes outside the climate screen, you must insulate them to avoid heat loss and condensation. This is simpler than using spiral ducts as NilAIR tubes are easily led through the standard 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.

## Ventilation unit

Nilan recommends installation of flexible connections between the ventilation unit and the duct system.

This is to avoid vibrations from the unit being transmitted to the duct system. It will also make it easier to move the unit, which may be necessary during future services of the unit.

Nilan can supply Soundflex tubes that you can use as flexible connections between the ventilation unit and the duct system. They will also reduce sounds from the system considerably.

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

## Extract air

Install the extract air valves in high-humidity rooms and place them strategically where they can extract humid and vitiated air from the dwelling/building most efficiently.

High-humidity rooms are, for example:

- 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 may be, for example:

- Living room
- Family room
- Bedroom
- Study

## Facade terminals

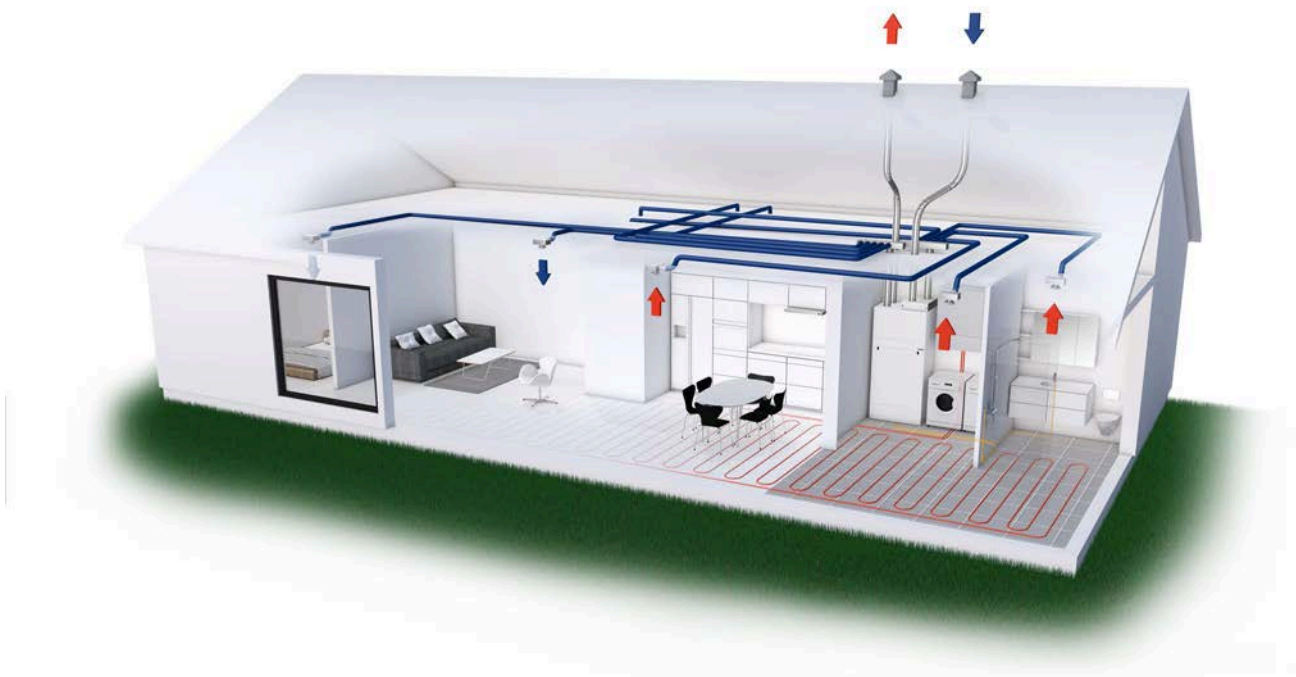
The position and design of air intake and air discharge should limit pressure oscillations in the ventilation unit caused by wind. Their position should also prevent birds and other animals from getting in. Finally, the position and design should ensure that air intake and the connected duct system are 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 minimised, and with attention to the prevailing wind direction.

The air intake should be placed at least 50 cm above the roof surface. On black, flat roofs the distance from the roof to the underside of the intake should be at least 1 m. This will ensure that warm air is not drawn into the building during summer. Air intakes should be placed 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 disturbance to your surroundings.

## Installation example



# 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 draw out more air than it blows in. This will prevent dampness from being forced into the constructions of the building.

## Balancing connectors

The ventilation unit is equipped with a balancing connectors to measure the air volume for supply air and extract air.

The curve can be used for coarse adjustment of the main air volume during dry operation without condensation.

For the extract air side, the pressure difference  $dp_{3-4}$  [Pa] is measured between the holes marked 3 and 4. The air volume  $qv$  [ $m^3/h$ ] is read on the curve.

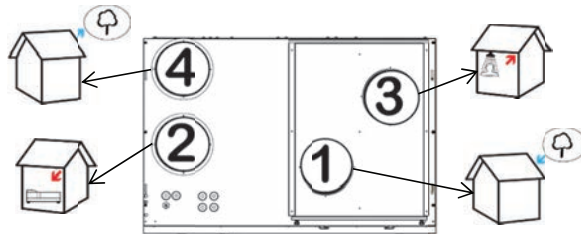
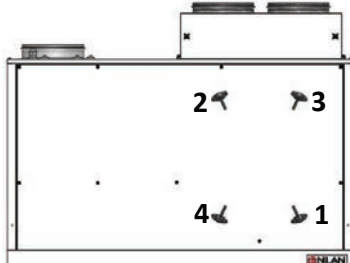
For the supply air side, the pressure difference  $dp_{1-2}$  [Pa] is measured between the holes marked 1 and 2. The air volume  $qv$  [ $m^3/h$ ] is read on the curve.



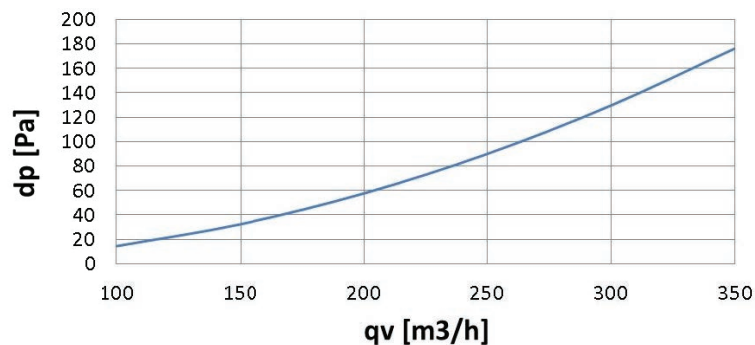
### ATTENTION

The capacity in the pressure drop diagram is based on a dry heat exchanger.

## Pressure fall diagram



The measuring connectors are inside behind the top front panel.

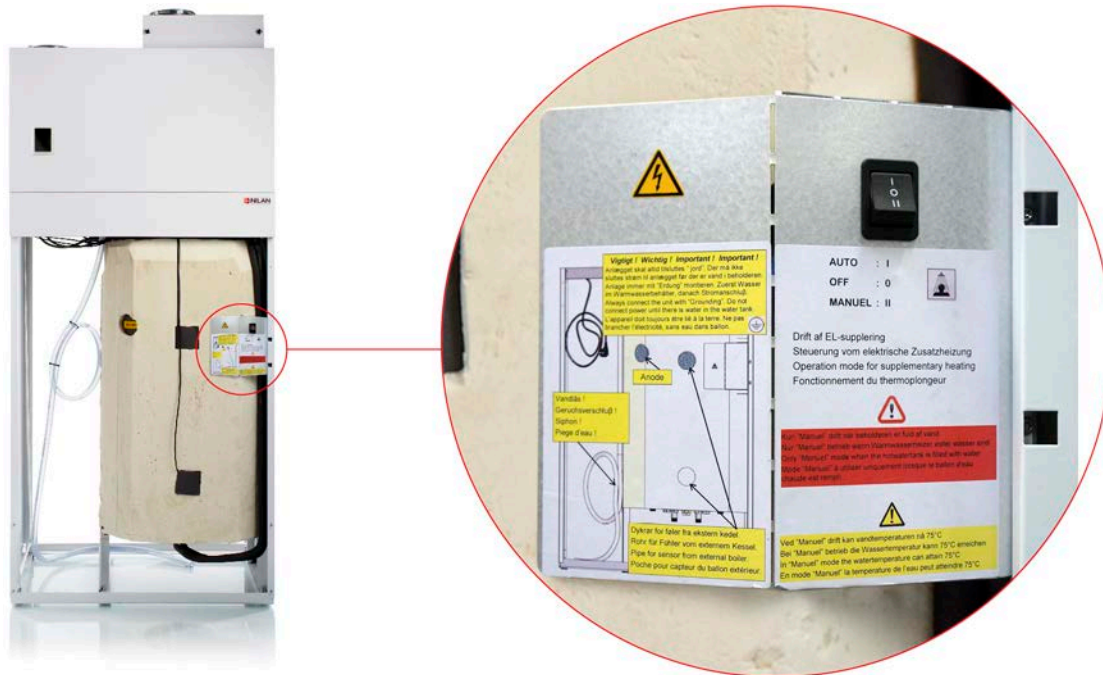


# Troubleshooting

## Emergency operation domestic hot water

If an error occurs in the controller or components in the Compact P, and the unit therefore stops, it will not be able to produce domestic hot water.

If the installer is not able to come right away or the error happens outside the opening hours, and you therefore cannot contact the in-staller, there is a possibility to get hot water by setting the unit into emergency mode.



The button for emergency operation is located behind the large door.

The emergency operation has three settings:

### I - Auto:

El-supplementation is controlled by the control in the unit (standard setting)

### 0 - Off:

El-supplementation is off and cannot be turned on again by the control in the unit

### II - Manuel:

El-supplementation is turned on, and cannot be turned off by the control in the unit (Don't turn it on if there is no water in the tank)



### CAUTION

In manual operation, the water temperature can achieve 75 °C, which can cause scalding, if you are not careful when you open the hot water.



# Domestic hot water

## Errors and solutions domestic hot water

Problem	Possible cause	Solution
The unit produces insufficient domestic hot water.	<p>The filters may be blocked so that insufficient air is reaching the unit.</p> <p>This can occur if the filters are not changed frequently.</p> <p>This can occur if the unit has been operated during the building process and the filters are filled with dust and dirt.</p>	Change the filters and, if necessary, change the filter change period to a shorter interval.



United Kingdom:  
Nilan England & Wales  
Old Bank Court  
Morocco Street  
London SE1 3HB

Tel: +44 (0)208 142 9373  
sales:ronan.bourke@nilan.uk.com  
technical: mark.pearce@nilan.uk.com [www.nilan.uk.com](http://www.nilan.uk.com)