

Installation instruction

CTS 602 by Nilan

Comfort 250 Top

Comfort 300 *

Comfort 300 Top

Comfort CT300

Comfort 450

Comfort 600

Version: 10.00, 13-04-2015
Software-version: 2.30

*Item no 7113F / 7113HF



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Introduction



Please control that the following documents have been delivered together with the unit:

- Directions for assembly & use (this document)
- CTS 600 directions
- Electrical chart

Should you have any questions on how to operate the system, contact your nearest Nilan dealer, who you can find at www.nilan.dk/dealers

The purpose of this instruction manual is to offer the installation contractor and the user instructions on correct installation and maintenance of the Comfort system.

Comfort is a ventilation unit with heat recovery. The unit can yield up to 600m³/h at 100Pa external back pressures. The energy in the exhaust air is being transferred to the inlet air.

The system is prepared for retrofitting of a post-heating element (electricity or water) for supply heating of the inlet air. The post-heating element is controlled via CTS 602.

The unit is delivered with a G4 filter. In addition to this the unit can be equipped with different accessories e.g. hygrostat and filter box with pollen filter.

Operating the unit is done with the CTS 602 control. The control has many functions such as menu based attendance, week programme, time controlled filter guard and adjustment of the velocity of the ventilator. (Directions for the CTS 602 control is described in another document delivered with the unit.)

For accessories see page 34.

Comfort is delivered tested and ready for use. Installation and start-up must be carried out by an authorized electrician.



We recommend that the system as well as the installation itself are adjusted/looked through in order to ensure a healthy indoor climate and optimal operation

Power supply



Power supply including safety switch must be installed by an authorized electrician. The Comfort-unit must be connected according to the attached electrical chart.

The unit is delivered with 1m test cable for the CTS 602 panel. The panel should be connected to the CTS 602 control in the unit with cable type 2x2x0.25mm² twisted in pairs. (Maximum length 50m).

The CTS 602 panel must be placed dry and frost-proof. The panels' integrated feeler prevents further cooling of the building if the primary heat-supply stops by stopping the ventilation if the panel feeler gets below a specific value. (Factory setting is 10°C; the value can be set from 1-20°C.)



Figure 1: CTS 602 control

If a water heating element is installed in the system, the regulation vent must be connected electrically as described in the enclosed wiring diagrams.

Assembly of Comfort



When mounting the Comfort-unit future service and maintenance should be considered. There is required a minimum of open space in front and behind of the unit of 60 cm. For Comfort Top a minimum free space in front of the plant at 60 cm and above the plant at 50 cm is recommended. For the Comfort CT300 a free place of minimum 60 cm in front of the system and 20 cm below the system is recommended. The CT300 can be mounted directly on the wall.

In order to ease the mounting each of the connection pieces is labeled. Please notice the labels. The connection between the unit and the ducting should be a flexible transition.

The system must be level because of the condense outlet. The condense outlet requires a minimum clearance height of 125 mm beneath the outlet connection.

The exchanger is low-noise and low-vibration. However, potential vibrations spreading from the system to the individual building parts must be taken into account. To detach the system from the floor, we recommend that the system is placed on vibration absorbers. The vibration absorbers must be placed diagonally on each corner to ensure that the system does not “fall down” from them. If a water heating element is installed in Comfort 300/450/600, a clearance distance of 60cm is required behind the system.

It is not necessary to re-insulate the system as it is delivered with a 20 mm standard insulation.

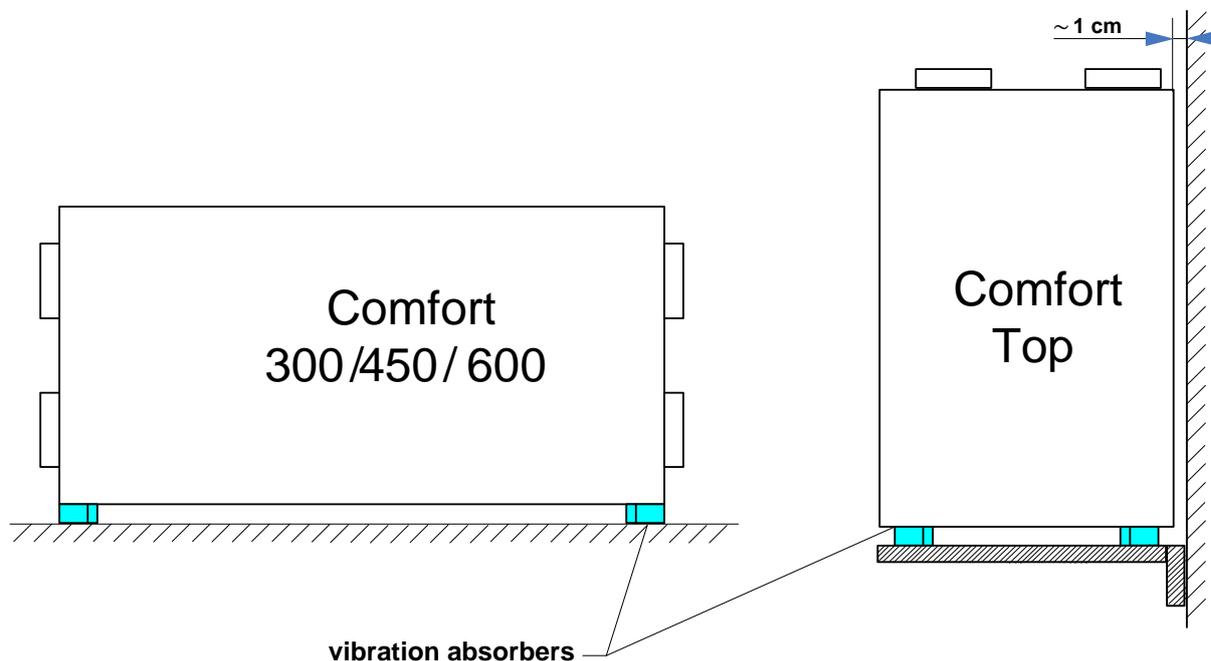


Figure 2: Mounting the Comfort unit

Condensation drain / water seal

The Comfort unit is delivered with a 20mm condensation drain. (PVC, GF-fittings). The drain is placed under the discharge.



The condensation drain should be carried with an even inclination of at least 1cm per metre, frost-proof to the nearest outlet. The overflow from the safety valve should also be carried to the nearest outlet.

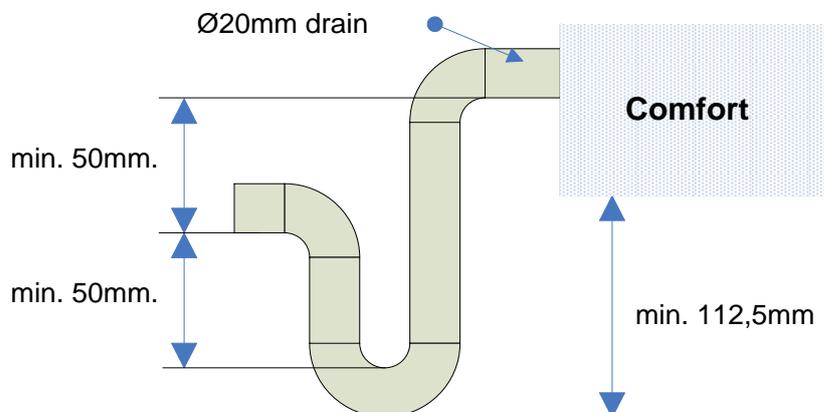


To avoid frost problems it can be necessary to supply the condensation drain with a heating cable. It is the plumbers' responsibility to secure the drain. (See Accessories)

When the system is running, there can be a vacuum of up to 500Pa (corresponding to 50mm water column) in the outlet. For this reason, the difference in height in the water seal must be minimum 50mm. This means that the first bend of the water seal must be at least twice as long in order for the system to be able to dispose of the condense water (see figure 3).

The condensation drain must be airtight from the unit to the water seal in order for the condensation water to be let away from the unit. If the condensation drain is not airtight false air will be sucked in to the unit and the water will stay inside the unit.

The water seal can dry out and avoid the water from running out of the unit. Therefore the water seal should be tested regularly and refilled with water if necessary. An elevated height of the water seal will reduce the need for refilling with water.



The water seal should be tested as described below. (the unit must be connected to the ducting and the front door should be closed):

The condensation tray is filled with water and the unit is started at the highest ventilation step. The unit should run for a couple of minutes. Check that the condensation tray is empty when the test is finished.

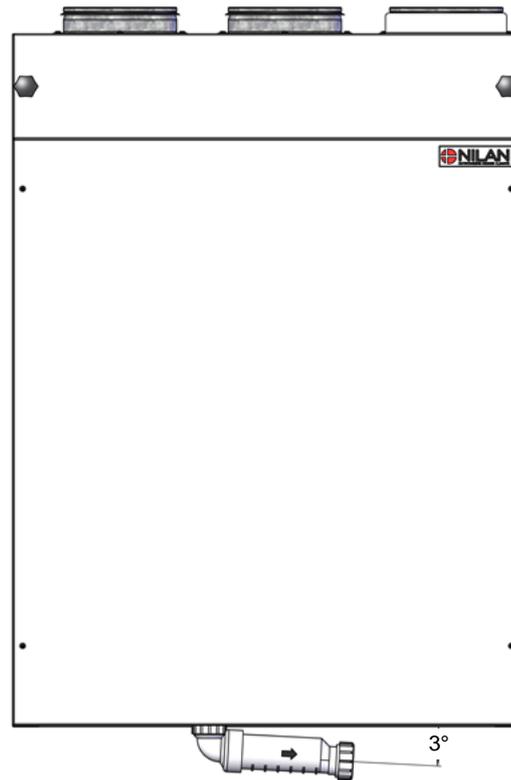


Figure 3: Installation of water trap



After the installation of the water trap, the operation can be tested in the following manner (the unit must be connected to the canal system and the front door of the unit must be closed):

Fill the condensate tray with water and start the unit on the highest fan speed. Let the system run for a few minutes. Make sure that there is no water in the condensate tray when the test is completed.

Ducting

We recommend that there are used ducts and fittings with rubber packing that meet sealing class B and that the connections between the unit and the ducting are made with 1 meter sound absorbing flexible transitions as regards sound reduction.

The ducts should be shortened with a hacksaw or an angle grinder and laid out according to the working drawing. The ducts are typically laid out on the main beam of the truss frame and are secured with hole belts or they are being hanged in assembly belts. Please avoid any unnecessary area reductions and breaks of the ducting.

The ducts should be insulated – in some cases with the ordinary attic-insulation. All ducts should be insulated with 100mm mineral wool to avoid heat loss and condensation. This also applies for flexible transitions. It is recommended that the insulation is carried out with 2 layers of 50mm. If the ducts are laid out in an unheated room it will cause condensation problems if the unit are turned off for a longer period of time as the hot air from the heated room will rise to the ducts and cause condensation which can cause damp problems.

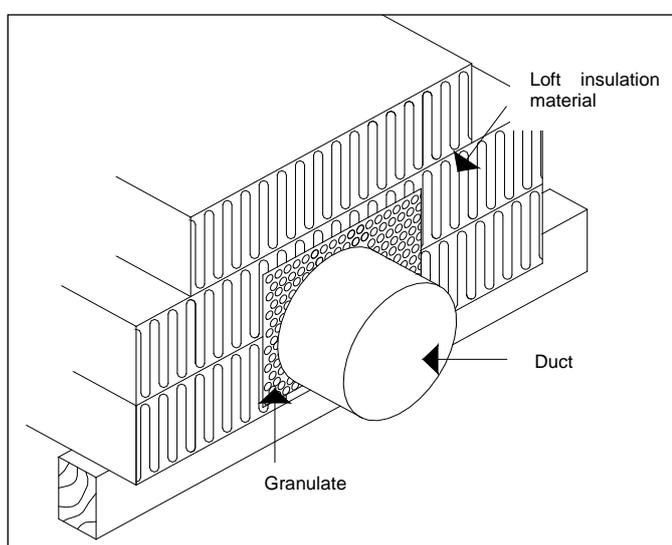


Figure 4: Insulation of ducting

The discharge duct leads the exhaust air (from which the system has recovered the energy it contained) to the outside through the roof or outer wall. It is important that the roof stack or wall grille has at least the same area as the duct immediately ahead of the stack or grille. Any contraction will cause unnecessary pressure drop, which may reduce ventilation capacity.

The holes for the inlet- and exhaust valves should be cut according to the mounting-frame for the prescribed valve. The frame for the valve must be secured with screws before placing the valve in the frame. The valves are placed in accordance with the size, construction and use of the room. As an example we would not recommend placing an inlet valve just above people with sedentary work because the inlet air in some cases would be experienced as a draught.

Heating surface, water



Connecting the heating surface must be done by an authorized plumber.



If the unit is placed outside or in a cold location the installation must frost secured.

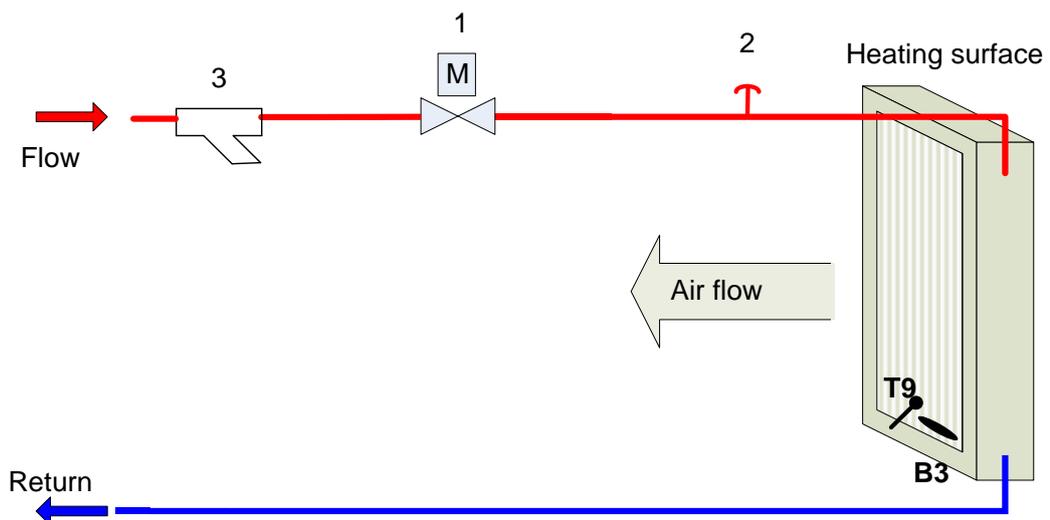
Comfort 300/450/600:

The heating unit is delivered as accessory and consists of heating surface with temperature sensor T9 and frost-protection B3, actuator and regulating valve.

The heating surface is to be installed internally in the unit at the preinstalled slides. The heating surface must also be activated in the CTS 602 control as described on page 15.

The heating surface should be connected, scavenged and checked for any leakages before starting the unit.

The dirt-catcher should be checked and cleaned after a thoroughly flushing of the system.



Note that the temperature sensor T9 and frost-protection B3 is placed at the heated side of the heating surface close to the return connection. See electrical chart.

- 1: Actuator and regulating valve:
Danfoss AME 140/24V 0-10V signal, 2-way valve VZ2 Kvs 0,4, (Nilan delivery) Kvs-value must be checked in accordance with supply.
Differential pressure: 0,1 – 0,6 bar
There is calculated with a cooling of 20°C over the heating surface at a flow of 60°C.
- 2: Scavenging (not Nilan delivery)
- 3: Dirt-catcher (not Nilan delivery)

Figure 5: Connecting the heating surface, suggestion

IMPORTANT regarding Danfoss Actuator type AME 140:

Re-installing the actuator must be done as described below:

1. Disconnect the power supply and remove the cover of the actuator.
2. Liberate the gear by pressing down the button as the spindle is turned up (counter clockwise)
3. Re-install the actuator and turn on power.
4. DIP-switch nr. 1 should be moved to ON and then to OFF.
5. The actuator is automatically calibrating for up to 6 minutes.
(The LED is flashing when calibrating and is lit constantly when finished).
6. Re-install the cover of the actuator.

The actuator should be placed in an environment of 0°C to 55°C.

Technical specifications, heating surface, water

Connections: 15mm Cu-pipes for flow and return.

Air pressure drop: 12Pa.

Maximum output for Comfort 300 is 2,0kW at a waterflow of 0,09m³/h, a pressure drop of 1,9kPa at the waterside and a flow temperature of 60°C. Pressure tested to 13,5Bar..

Maximum output for Comfort 450 is 3,7kW at a waterflow of 0,16m³/h, a pressure drop of 10kPa at the waterside and a flow temperature of 60°C. Pressure tested to 13,5Bar

Maximum output for Comfort 600 is 4,5kW at a waterflow of 0,2m³/h, a pressure drop of 2,5kPa at the waterside and a flow temperature of 60°C. Pressure tested to 13,5Bar.

See electrical chart.

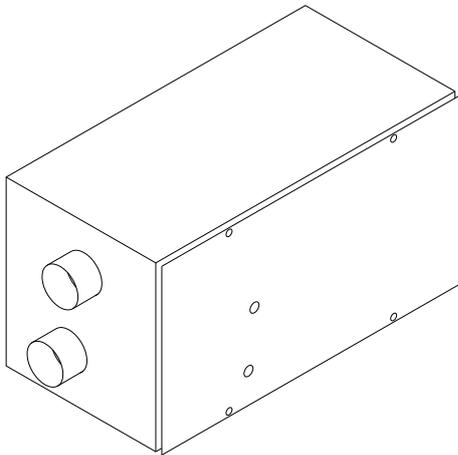
Comfort 250 & 300 Top:

Heating surface for Comfort 250 Top and 300 Top is a surface that should be installed in the ducting. The surface cannot be placed in the unit.

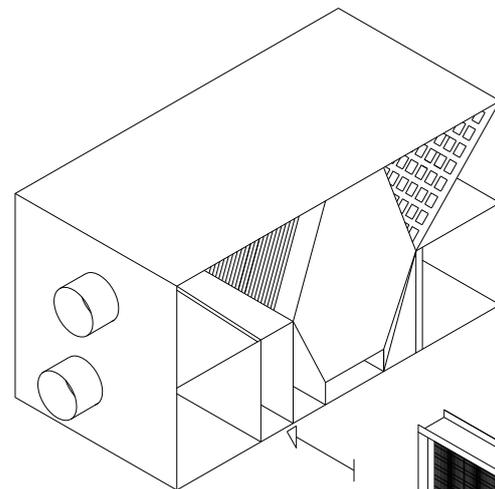
Heating surface, water (retrofitting)

Comfort EC can be retrofitted with heating surfaces for water or electrical heating surfaces. When retrofitting the heating surfaces must be activated in the CTS 602 control panel as described on page 15.

Comfort 300/450/600:



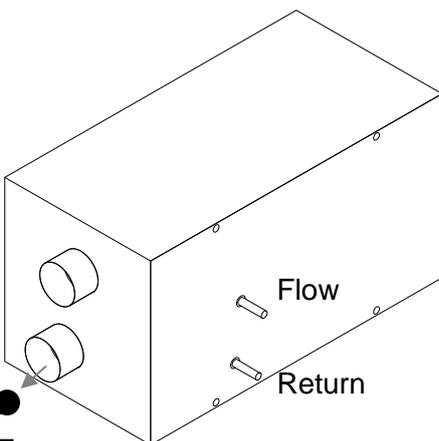
Remove the 4 screws at the backside of the Comfort unit and take off the plate.



Heating surface

B3

T9



T7
(Should be let into the inlet duct app. 0,5m)

The plate is replaced and the pre-fabricated rubber lead-in is perforated and the branches can then carefully be let through.

Heating surface, electrical (retrofitting)

Electrical heating surface should be installed in the ducting (Ø160/Ø200). When retrofitting an electrical heating surface it should be activated in the CTS 602 control panel as described on page 15.



Power supply must be installed by an authorized electrician.

See electrical chart for the ventilation unit.

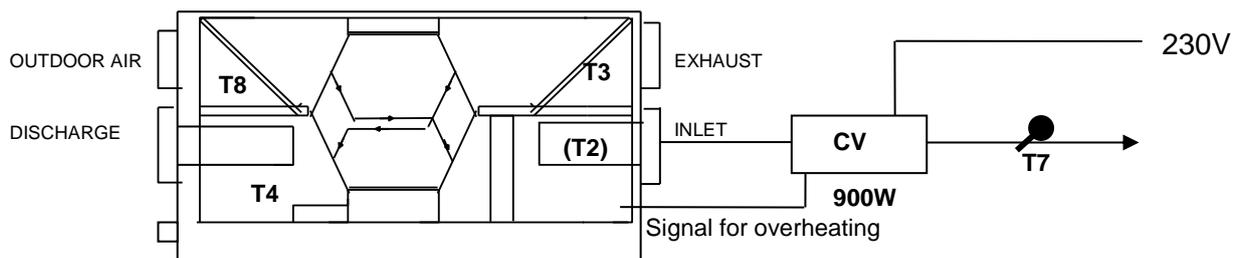
Heating surface, electrical (retrofitting)

The heating surface should be installed in the inlet duct immediately after the unit. There should be a safety distance of minimum 150mm from the heating surface to any flammable materials. The heating surface must be insulated with a fire resistant material. However the electrical box may not be insulated. (Important: instructions from the manufacturer of the heating surface must be followed).

See electrical chart.

The heating surface delivered a temperature regulator and a safety thermostat installed. Clamps 3 & 4 in CN6 should be short-circuited. The heating surface must equipped with a temperature regulator and a safety thermostat.

heating coil is fitted with temperature limiter and safety thermostat state. Here is short-circuited terminals 3 & 4 of CN6. When installing other hot surfaces should be thought carefully about the safety of these. Heating coil must be equipped with temperature limiter and safety thermostat.



The heating surface must be activated in the CTS 602 control panel. See page 15.

T2 is annulled when the heating surface is activated in the CTS 602 control. See page 15.

Starting and set up of the CTS 602 control

Before starting the Comfort please check all functions as by-pass/cooling, heating and heating surface if installed.

In this passage we will go through the service menu of the CTS 602 control. For daily use of the CTS 602 control please see the CTS 602 directions. (delivered together with the Comfort).



Use of the CTS600 panel:

- press ESC to go one step back in the menu
- press ▼▲ to move up or down in a menu or to adjust an activated menu
- press ENTER to activate a menu
- press ENTER to confirm a menu
- press OFF to turn off the unit
- press ON to turn the unit on

Figure 6: CTS 602 control

Activating the service menu

Press ▼ and **ENTER** at the same time for 10 seconds. The service menu is now available. Press ▼ multiple times until the panel shows **SERVICE**. Press **ENTER** to enter the service menu. It is now possible to move around in the menu by using ▲▼. The headlines of the service menu are shown below:

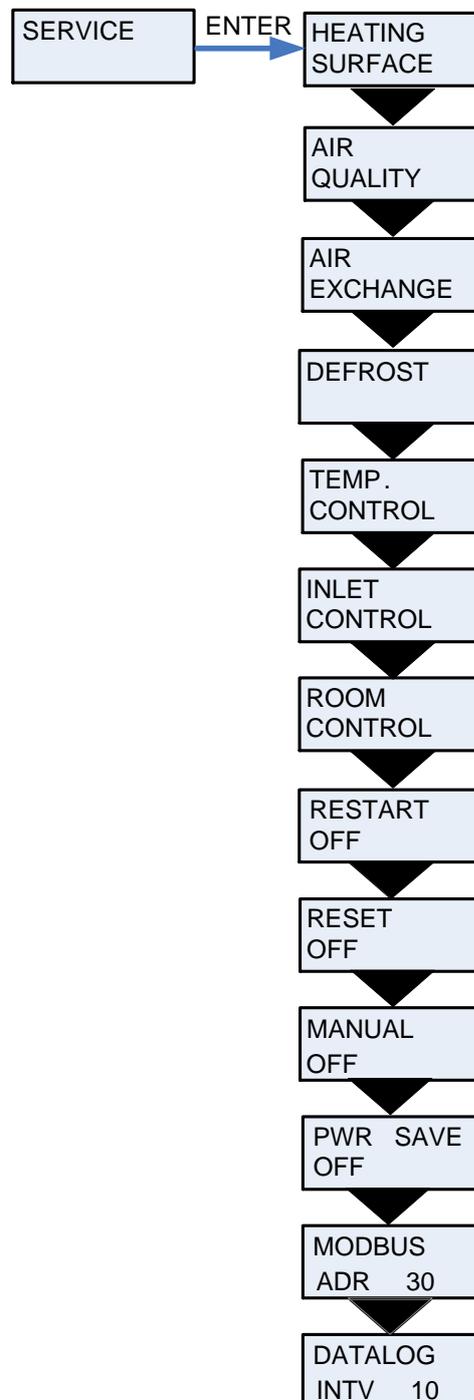


Figure 7: Headlines in the service menu

Heating surface

The unit can be equipped with a heating surface.

It is possible to retrofit a heating surface. The surface must be activated in the CTS 602 control in order to function together with the unit and for the frost-protection to be active.

When installing a heating surface T7 is the temperature sensor in the inlet.

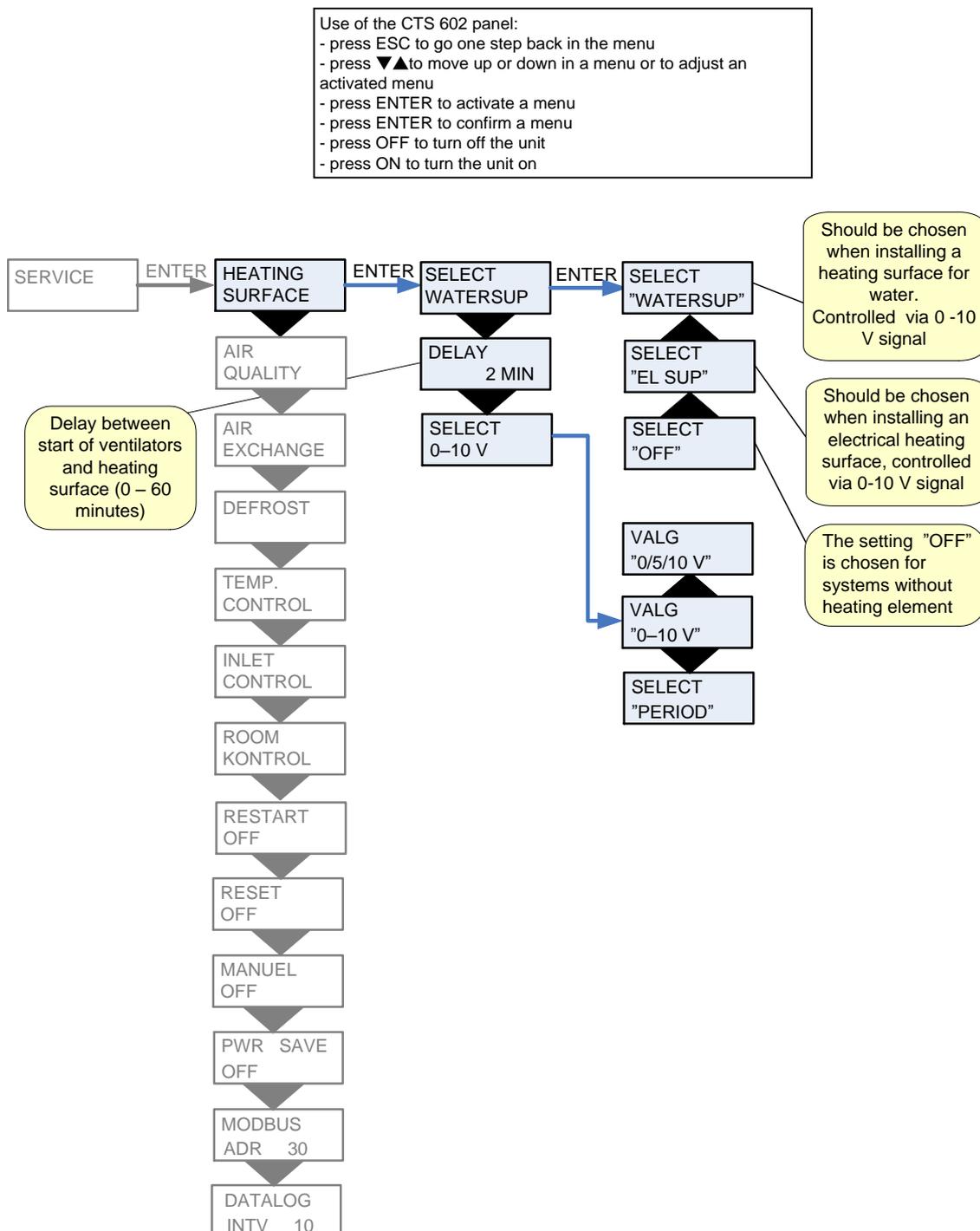


Figure 8: The “Central heating” menu

Air quality

In the "Air quality" menu it is possible to choose between 3 types of regulation: Humidity, Humidity + CO₂ or OFF.

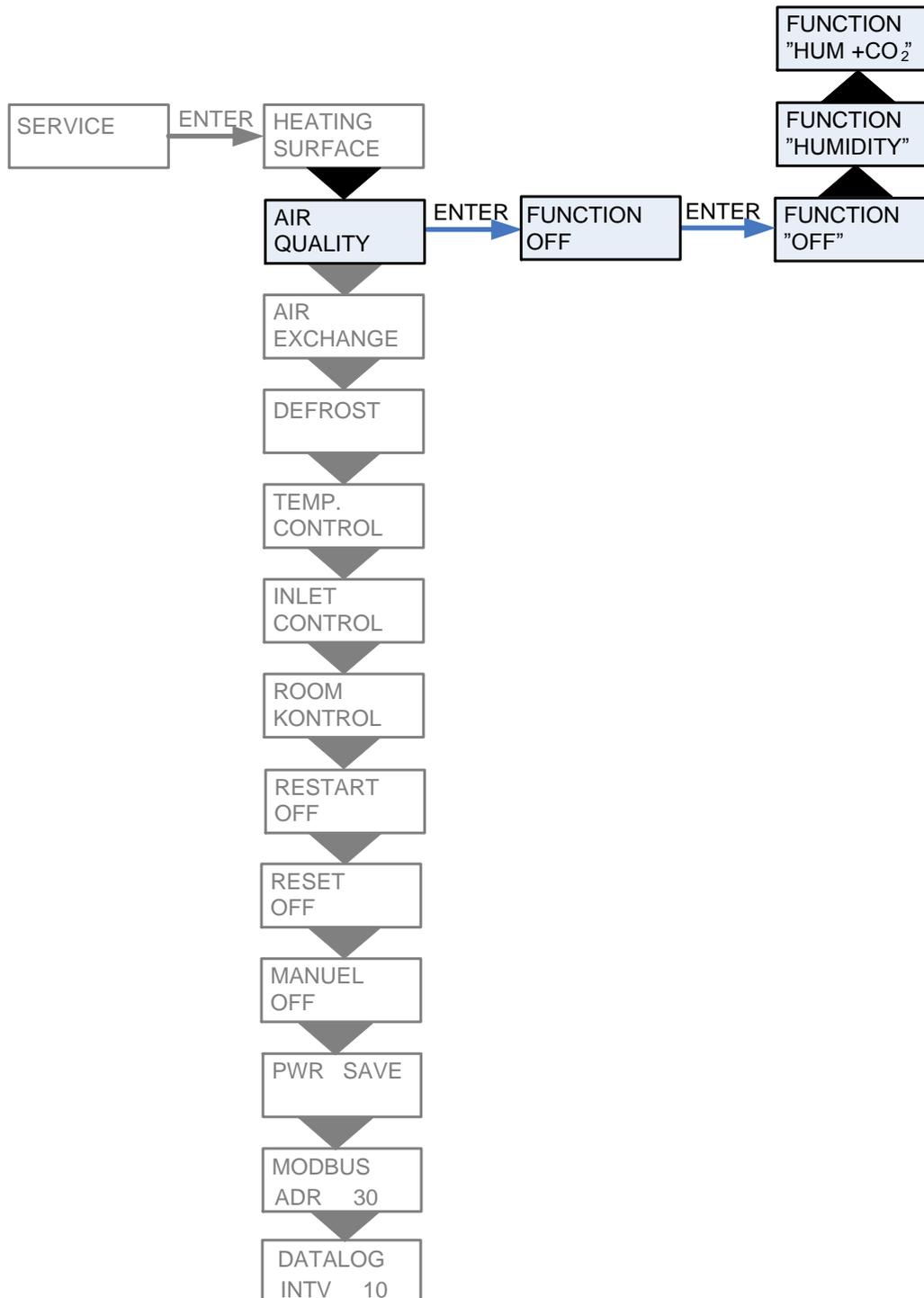


Figure 9: The "Air quality" menu

Air exchange

In the "Air exchange" menu it is possible to adjust 4 steps of ventilation speed (air volume). Inlet and exhaust is to be adjusted individually at each level.

The inlet speed can be adjusted to a minimum and the exhaust can be adjusted to both a maximum and a minimum.

It is possible to delay the starting of the fan in order to give time to the register to open.

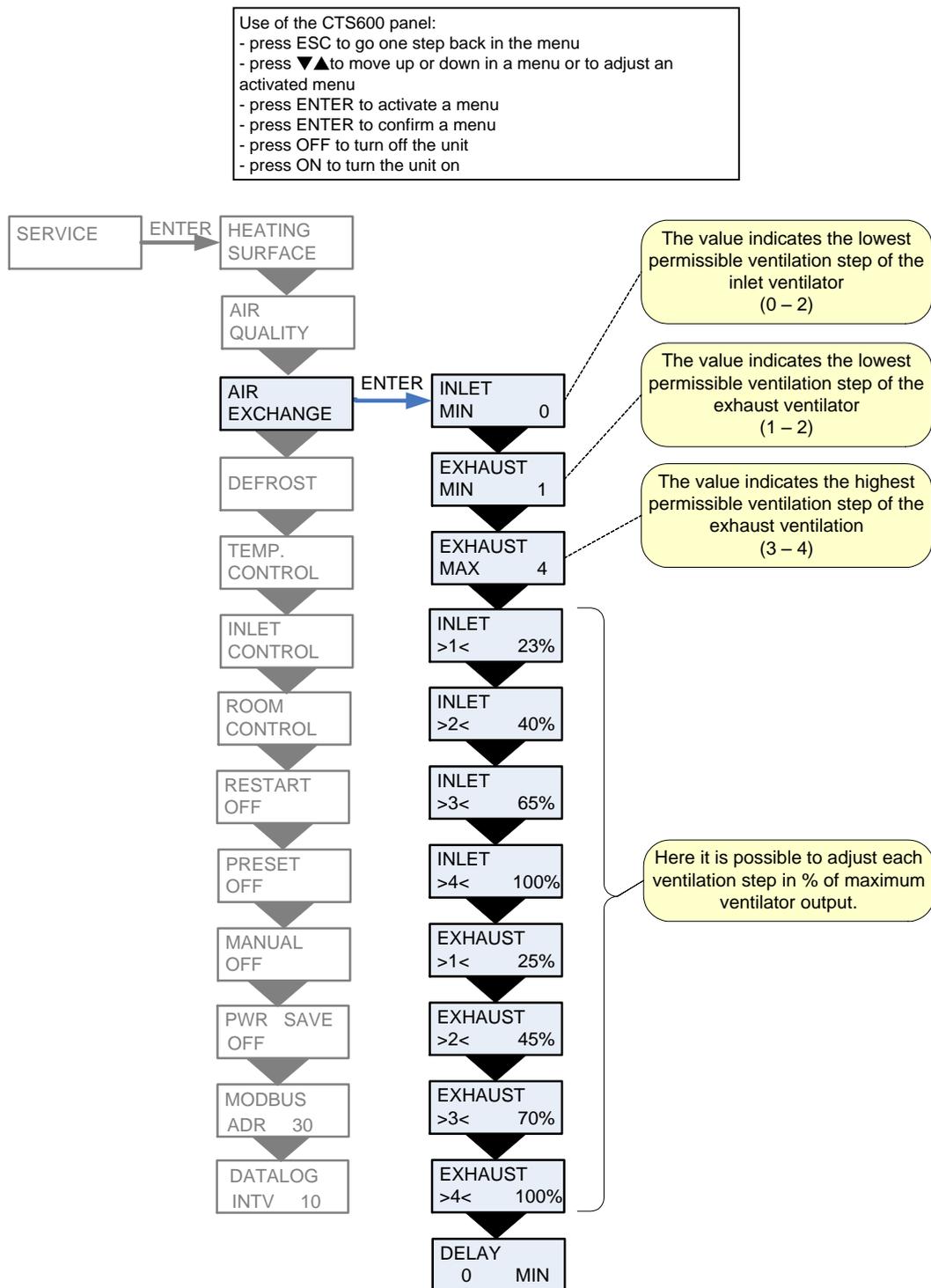


Figure 10: The "Air exchange" menu

Balancing of the air volume (Comfort CT300, 7110301)

Comfort CT300 is equipped with fans with a variable rotation speed.

To regulate the fan speed in the control – see the air exchange section

By balancing the air volume on the air supply side respectively to the discharge air side the curve below can be used to rough adjustments of the main air volumes by dry operation without condensation precipitate.

For the discharge air the pressure variations dP_{11-12} [Pa] is measured between the connections marked 11 and 12 (see figure xx) and the air volume q_v [m³/h] is read of on the curve.

For the supply air side the pressure variations dP_{21-22} [Pa] is measured between the connections 21 and 22 and the air volume q_v [m³/h] is read of on the curve.



Figure 11: Connection positions

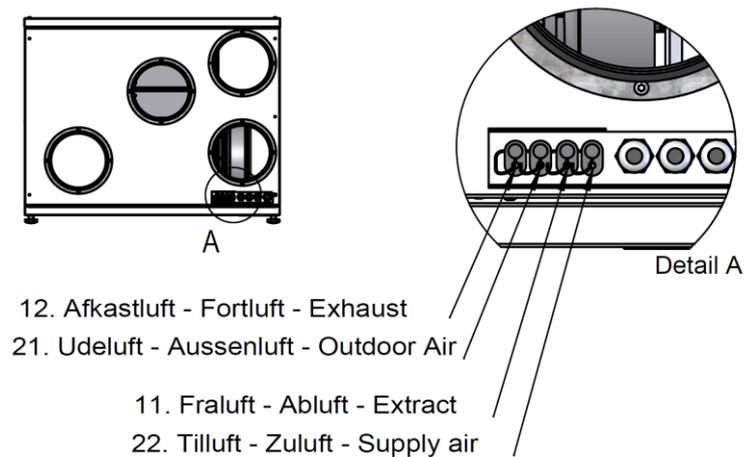


Figure 12: Balancing connections

CT300

Pressure drop diagram CT300, extract and outdoor temperature 20 °C, dry exchanger . $dp=p_{22}-p_{21}$ [Pa], $dp=p_{12}-p_{11}$ [Pa].

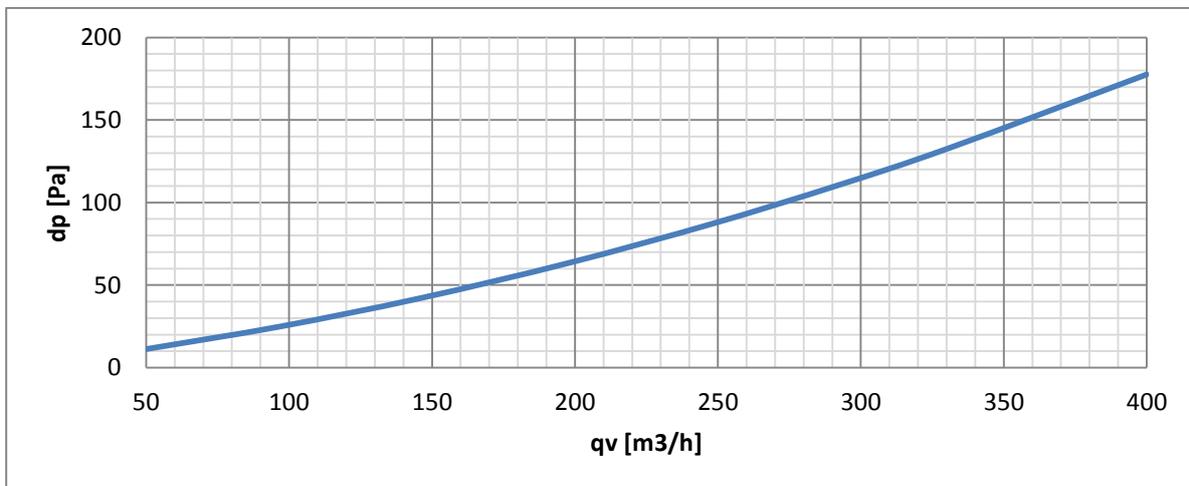


Figure 13: Capacitet

Pre-heater

By outdoor temperatures less than approximately -4°C will it be possible to form frost in the heat exchanger. Comfort CT300 will defrost when necessary. This happens automatically through the CTS602 control.

If you require a continuous operation of the heat exchanger without defrosting, the system can be equipped with an external duct mounted electric pre-heating element (accessory) in the fresh air duct with its own power supply and a control to regulate the air temperature. Nilan suggest that you use a pre-heater product VEAB type MQU 160mm for 230V (with a minimum air velocity of 1,5 m/s) or VEAB type PQU 160mm for 230V (with a minimum air velocity of 0,5 m/s). We refer to VE-ABs documentation.

Defrost

In the "Defrost" menu it is possible to choose how the unit should perform during defrosting of the evaporator in the exhaust.

" " indicates that the menu point flashes and can be set to another value

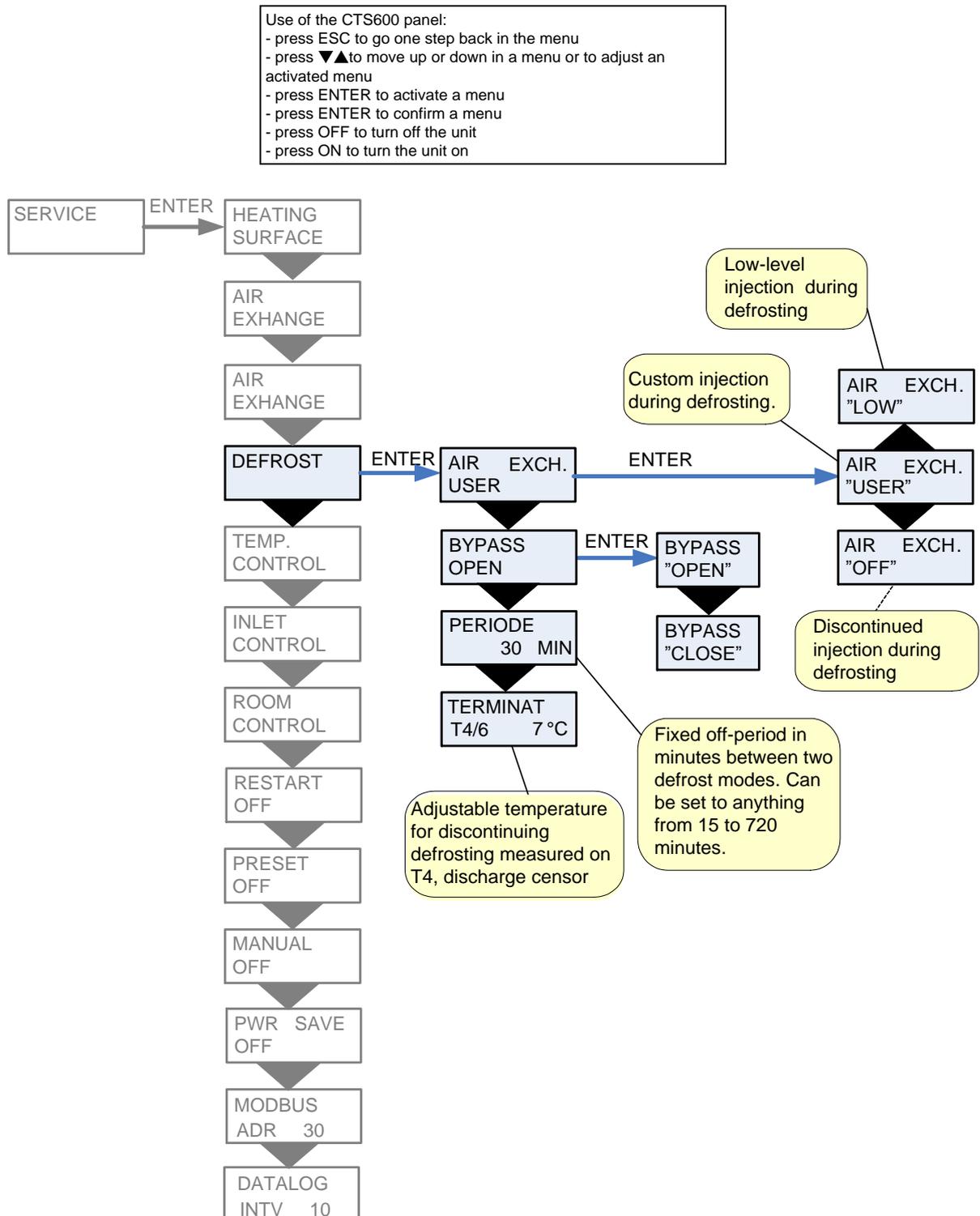


Figure 14: The "Defrost" menu

Inlet control

In the "Inlet control" menu it is possible to adjust the regulation of the inlet. The menu is only accessible when the unit has a heating surface installed.



The "Inlet control" menu should only be adjusted by persons with knowledge of control engineering.

" " indicates that the menu point flashes and can be set to another value.

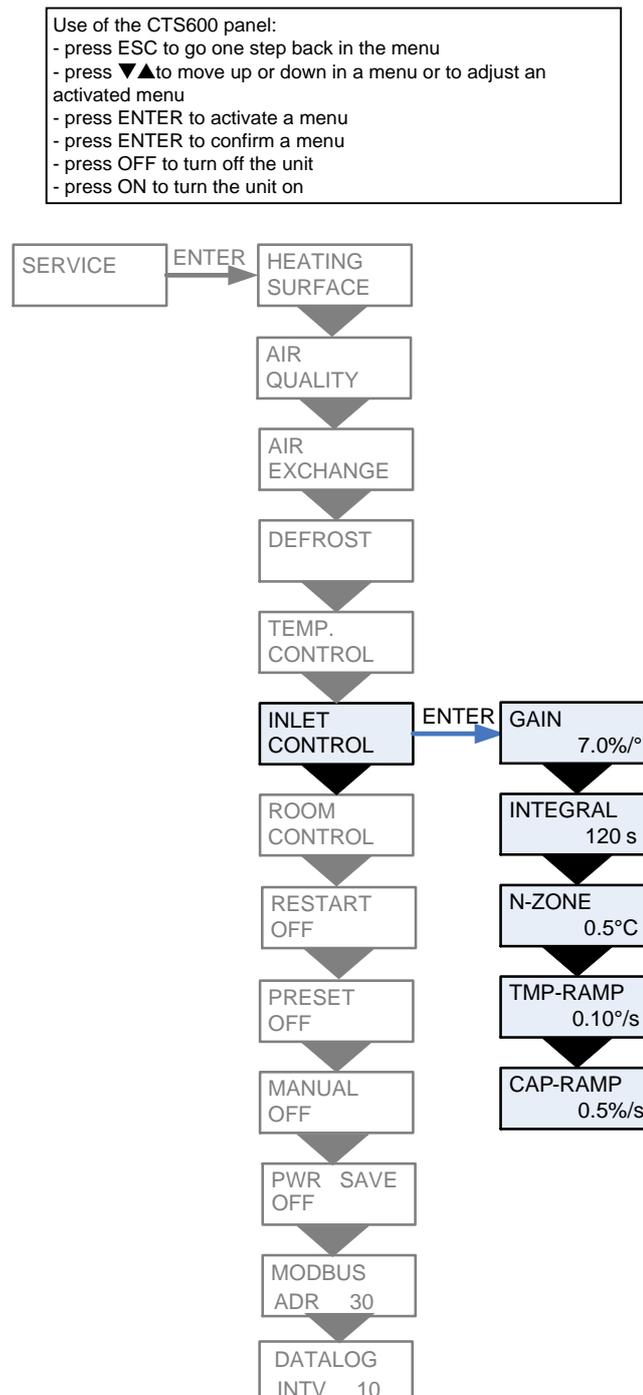


Figure 16: The "Inlet control" menu

Room control

In the "Room control" menu it is possible to adjust the regulator for controlling the room temperature.



The "Room control" menu should only be adjusted by persons with knowledge of control engineering.

" " indicates that the menu point flashes and can be set to another value.

Use of the CTS600 panel:
 - press ESC to go one step back in the menu
 - press ▼▲ to move up or down in a menu or to adjust an activated menu
 - press ENTER to activate a menu
 - press ENTER to confirm a menu
 - press OFF to turn off the unit
 - press ON to turn the unit on

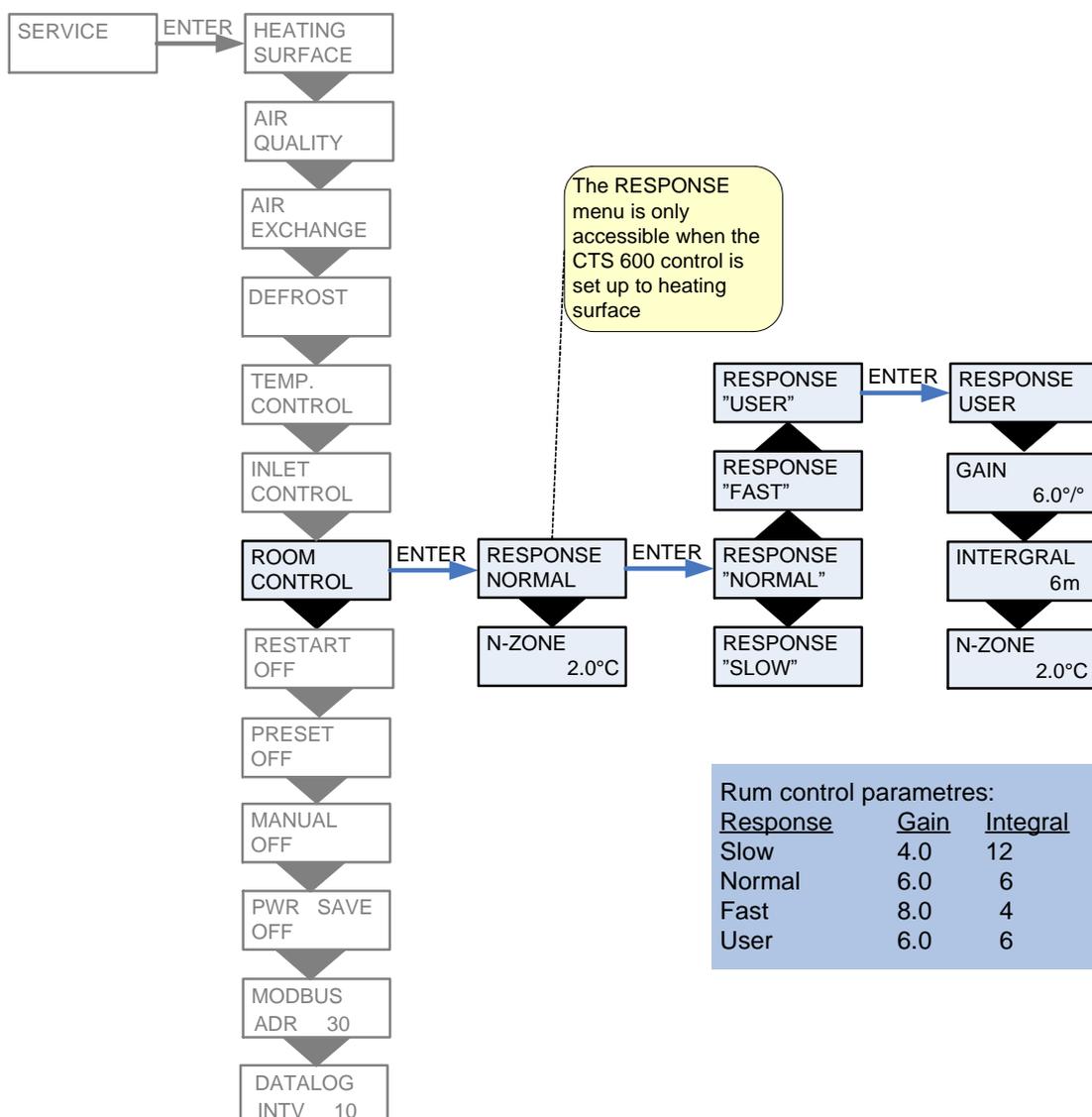


Figure 17: The "Room control" menu

Restart

Acknowledge of FIRE alarm.

Fire alarm (code 3) it can be acknowledged automatically by elections in SERVICE-RESTART menu:

[OFF, FIRE]

Fire alarms can be acknowledged automatically during fire drills / testings. It is a precondition of the acknowledgement, that the fire thermostat entry has returned to the normal condition (closed switch).

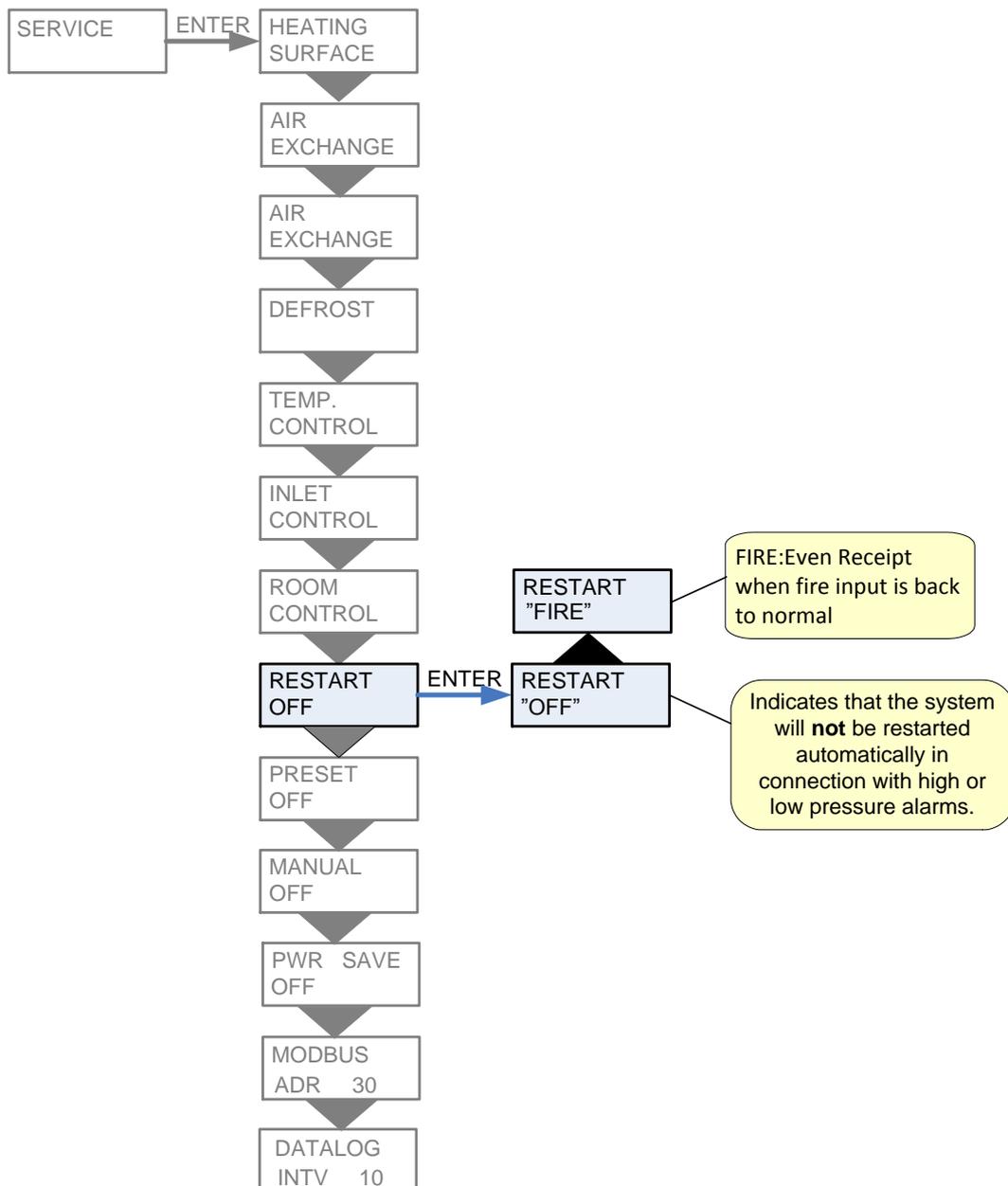


Figure 18: The "Restart" menu

Preset

” ” indicates that the menu point flashes and can be set to another value.

RESTORE menu allows you to reload a copy of the installation setup.

By keeping the ESC + ▲ key pressed for 5 seconds a new menu item RESTORE appear, this is then acceptable / activated by pressing the ENTER

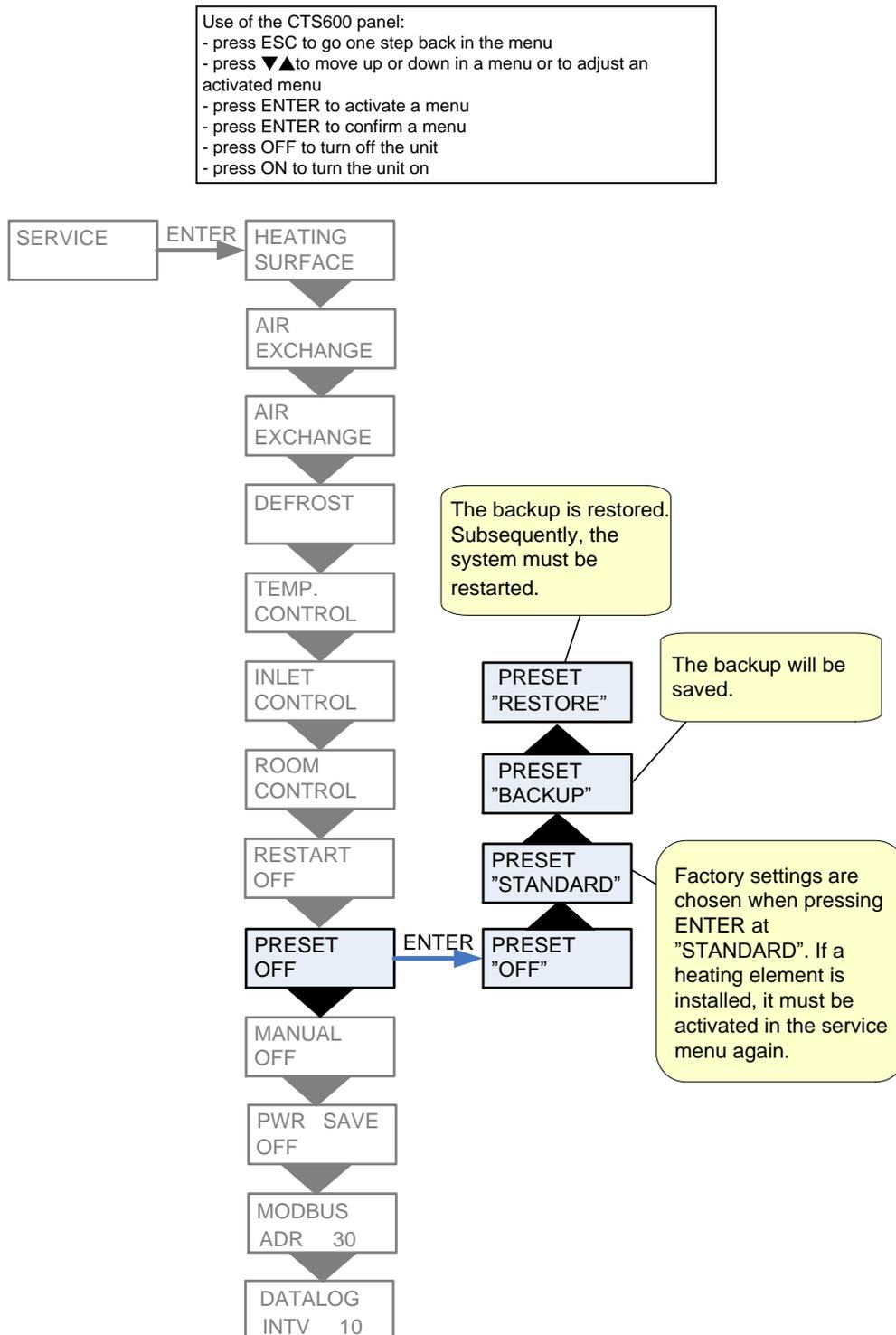


Figure 19: The "Preset" menu

Manual

In the "Manual" menu it is possible to test the functions of the unit manually.

" " indicates that the menu point flashes and can be set to another value.

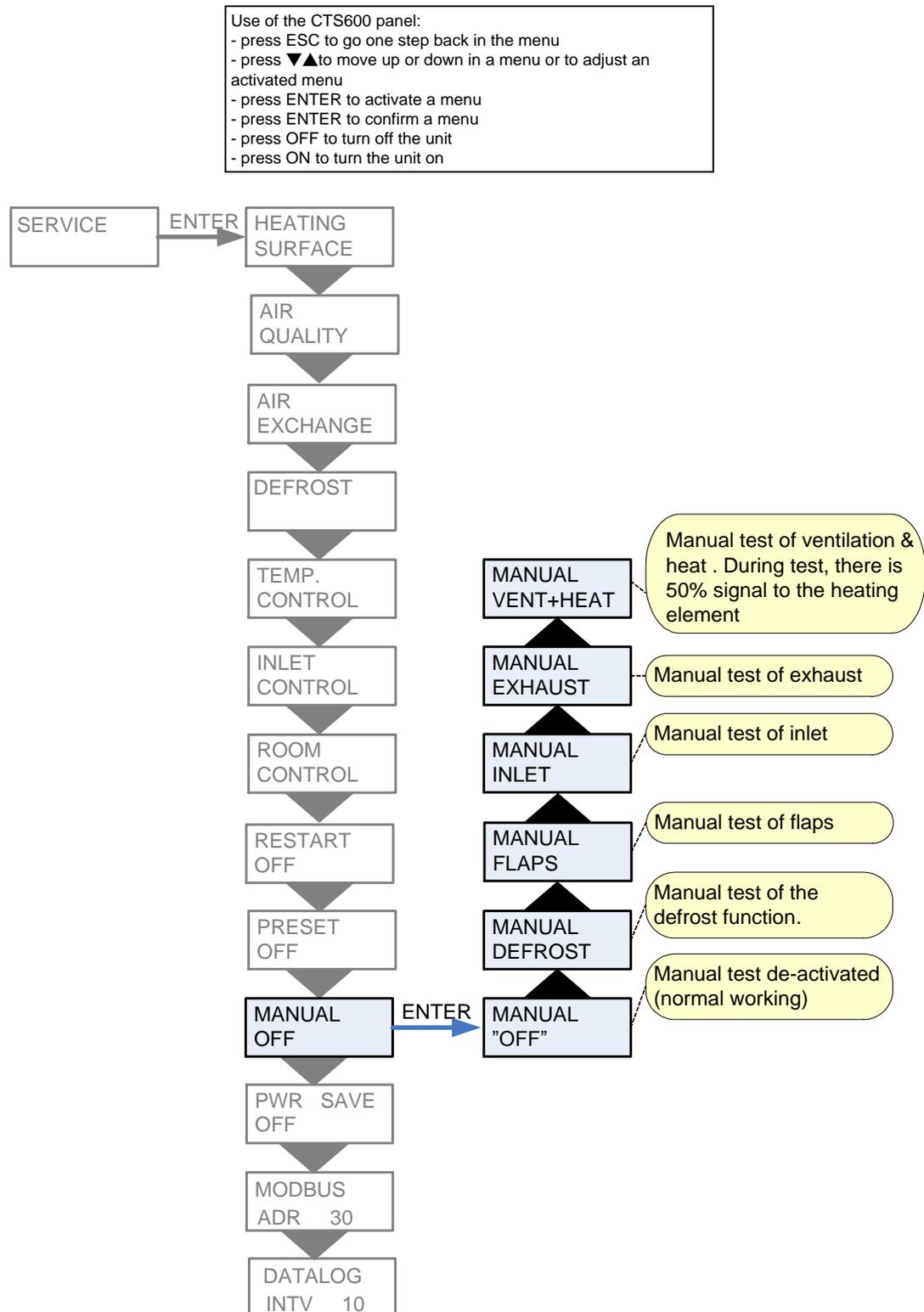


Figure 20: The "Manual" menu

PWS save

In the "Manual" menu it is possible to test the functions of the unit manually.

" " indicates that the menu point flashes and can be set to another value.

Use of the CTS600 panel:

- press ESC to go one step back in the menu
- press ▼▲to move up or down in a menu or to adjust an activated menu
- press ENTER to activate a menu
- press ENTER to confirm a menu
- press OFF to turn off the unit
- press ON to turn the unit on

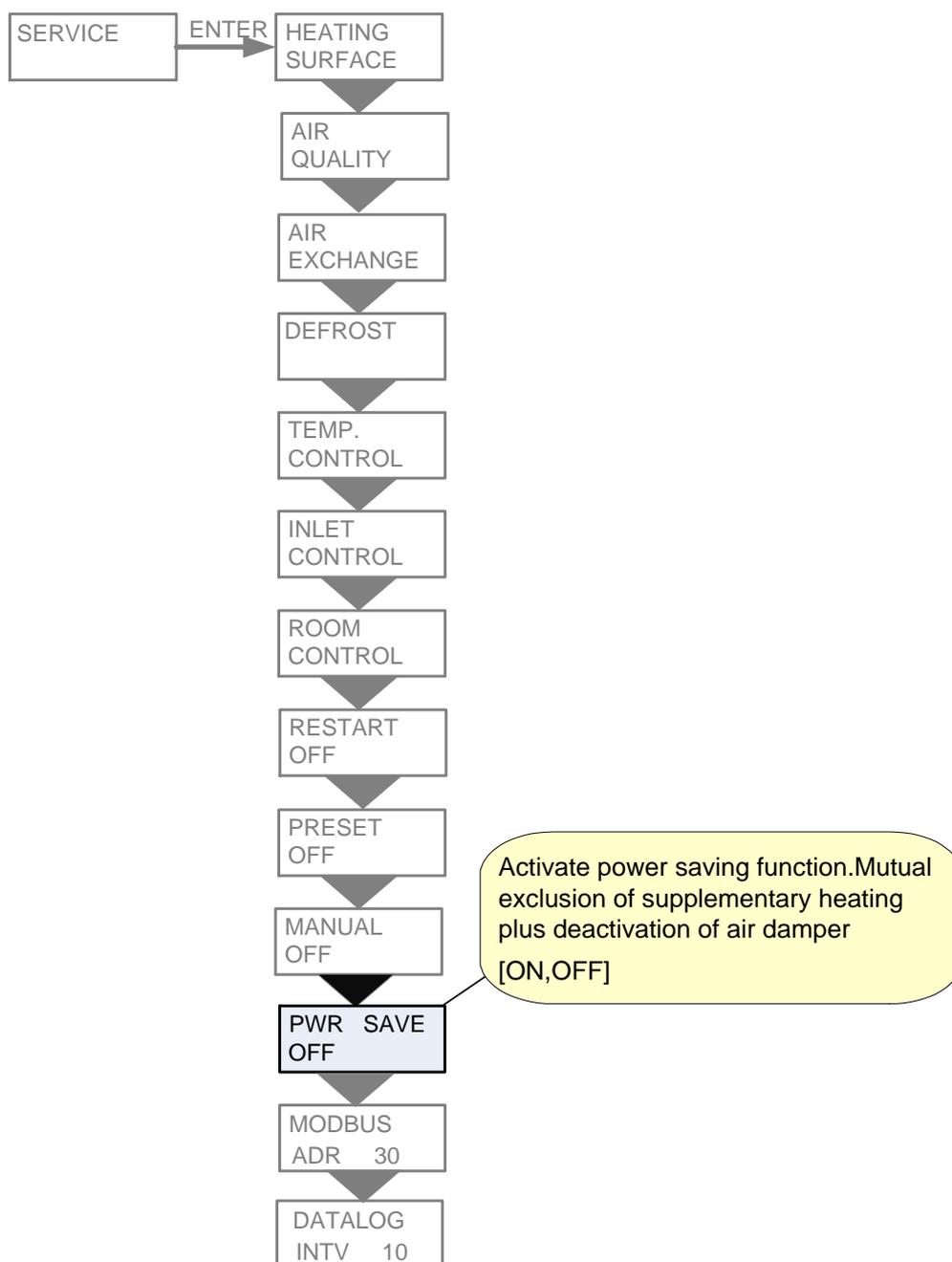


Figure 21: The "PWS save" menu

Modbus

In the "Manual" menu it is possible to test the functions of the unit manually.

" " indicates that the menu point flashes and can be set to another value.

Use of the CTS600 panel:

- press ESC to go one step back in the menu
- press ▼▲to move up or down in a menu or to adjust an activated menu
- press ENTER to activate a menu
- press ENTER to confirm a menu
- press OFF to turn off the unit
- press ON to turn the unit on

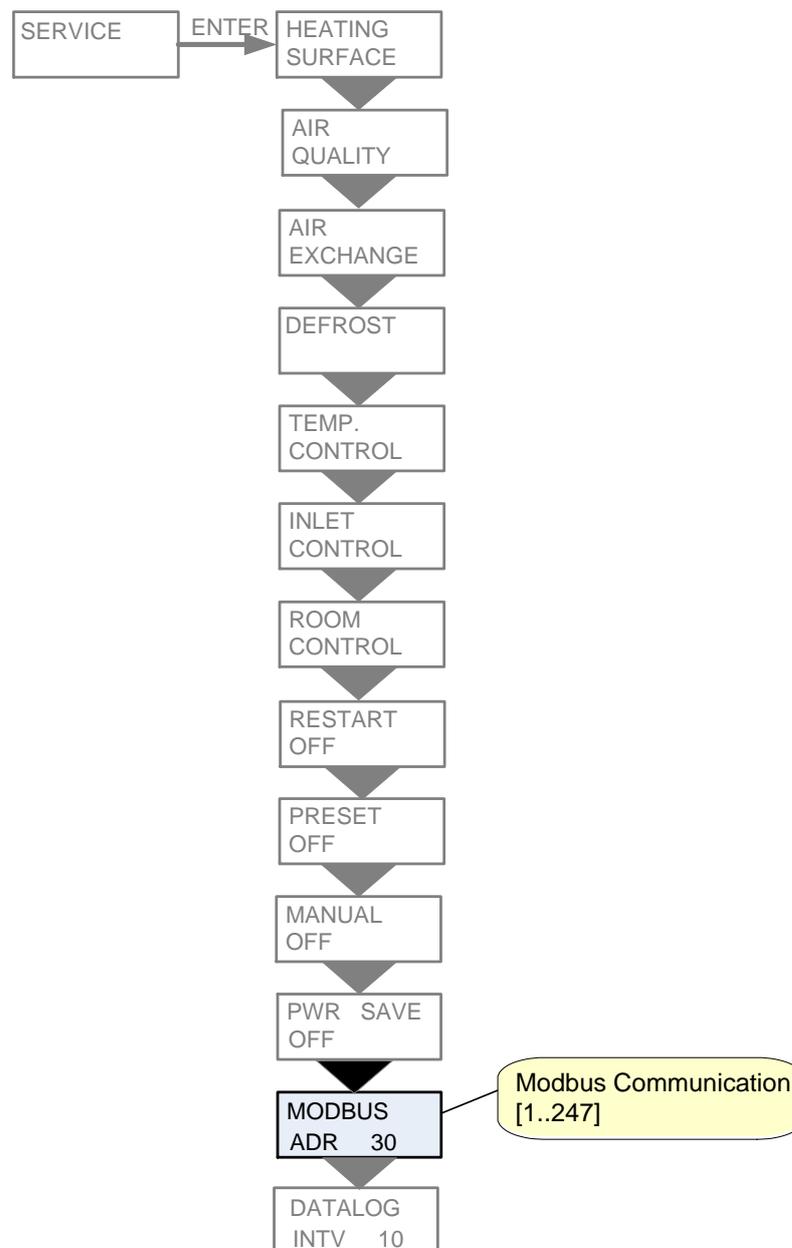


Figure 22: The "Modbus" menu

Datalog

The datalog interval is set via the menu SERVICE - DATALOG INTV at between 1 and 120 minutes.

If 0 / OFF is selected, logging is not periodical, but only on events and alarms.

- Temperatures are logged in Celsius, in whole degrees, in order to minimise the log file size.
- The status of digital inputs and outputs is combined in two shared log variables: "Din" and "Dout".

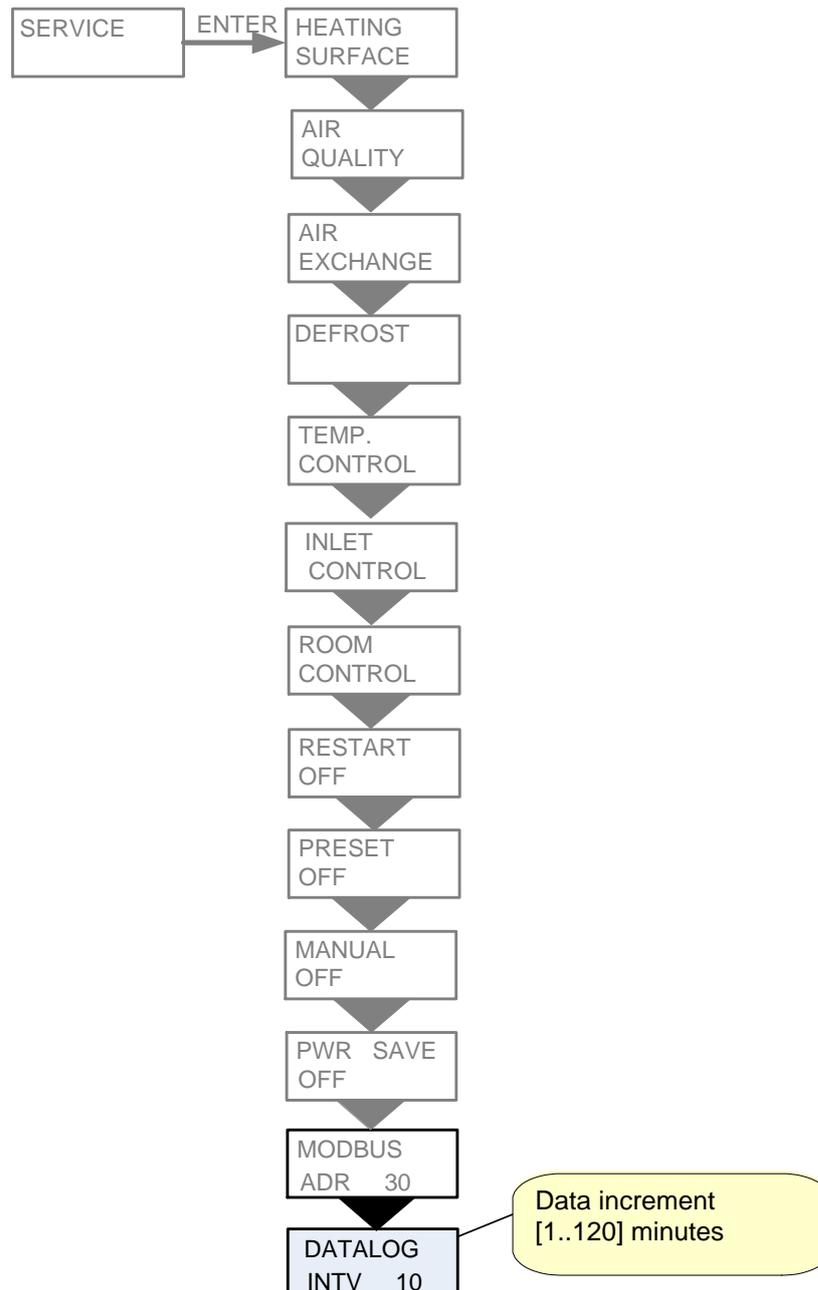
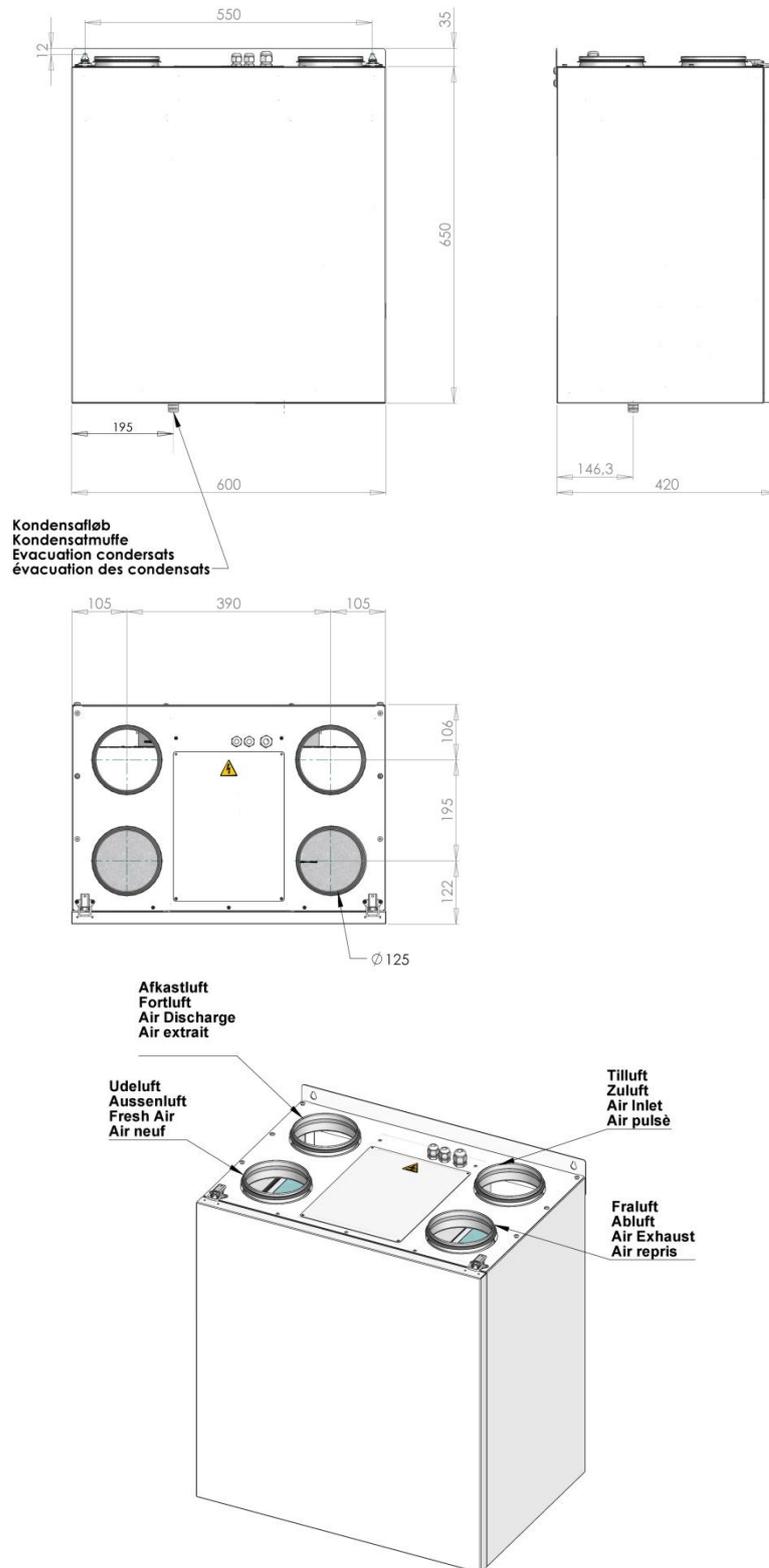
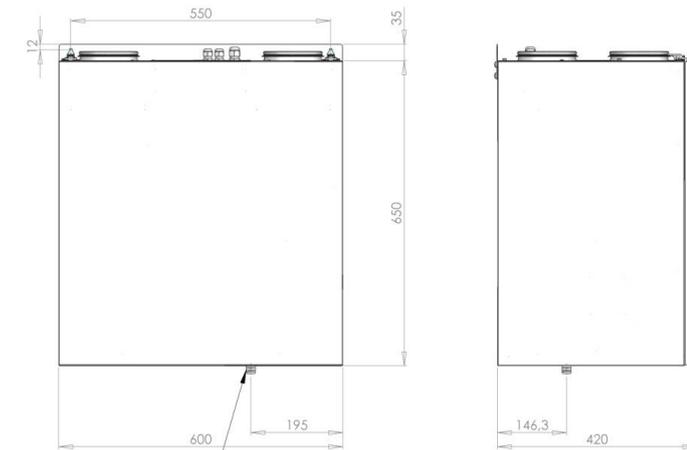


Figure 23: The "Datalog" menu

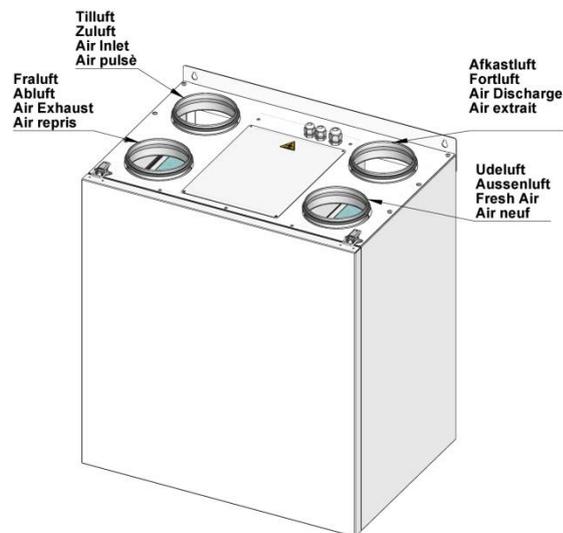
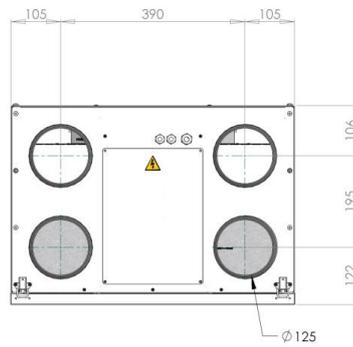
System dimensions



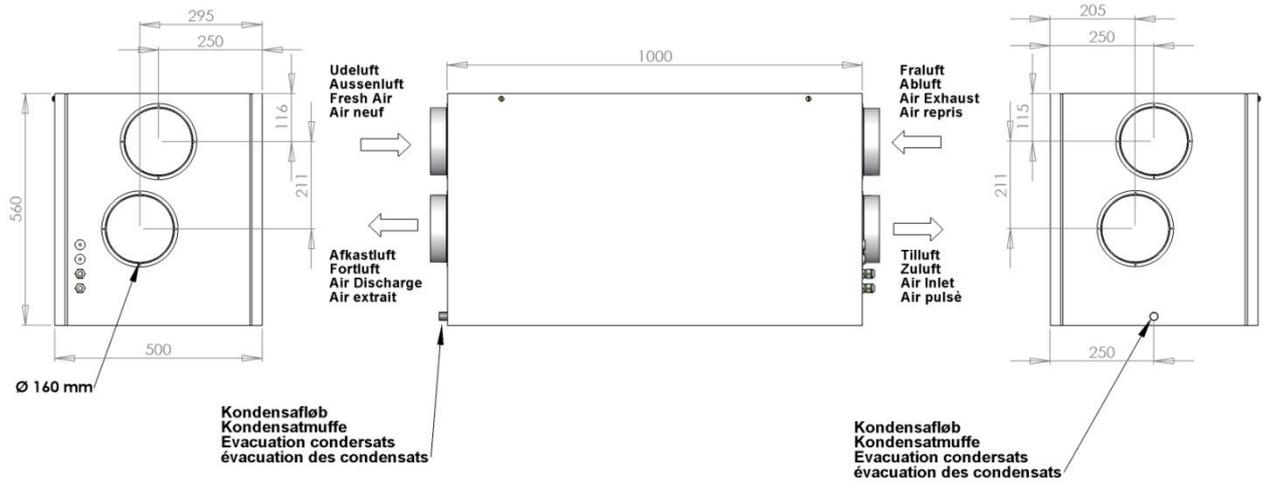
Comfort 250 right



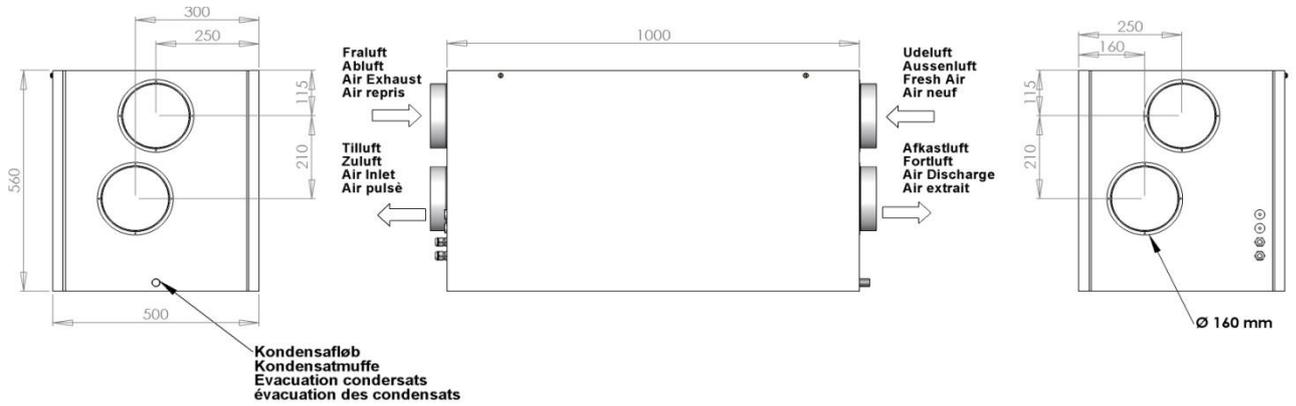
Kondensatfløb
Kondensatmuffe
Evacuation condensats
évacuation des condensats



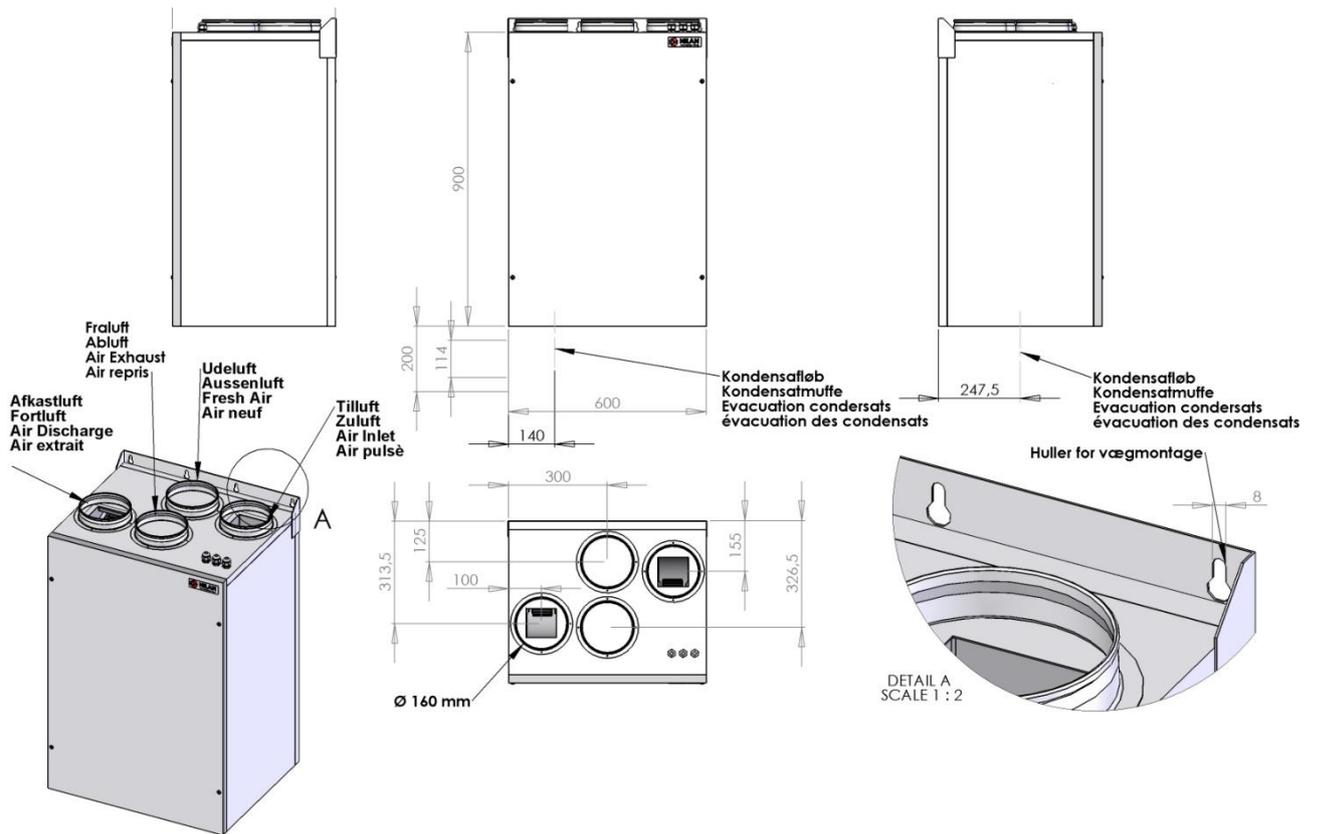
Comfort 250 left



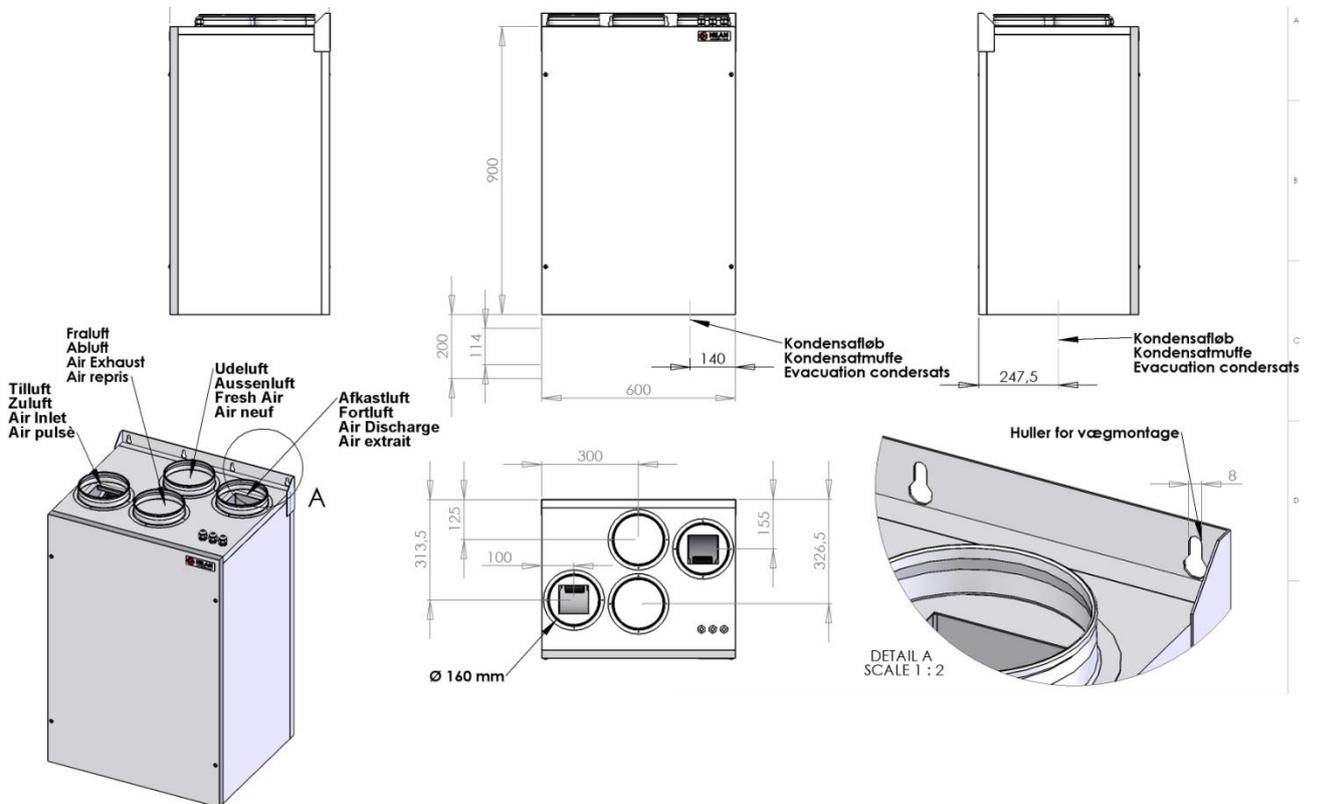
Comfort 300



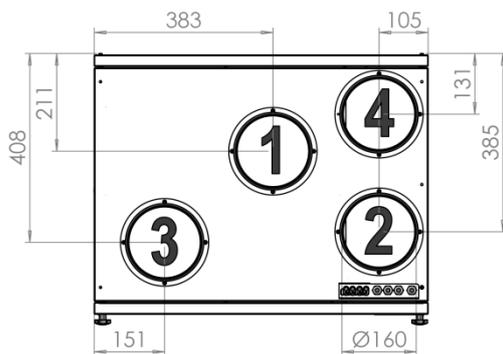
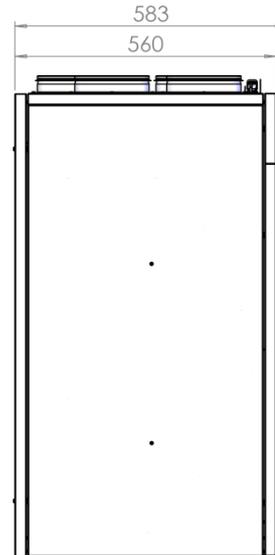
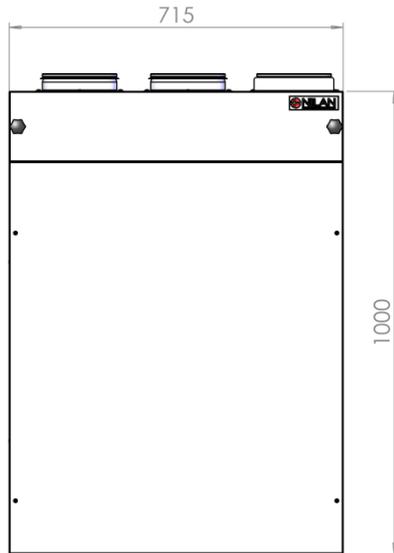
Comfort 300 Left



Comfort 300 Top

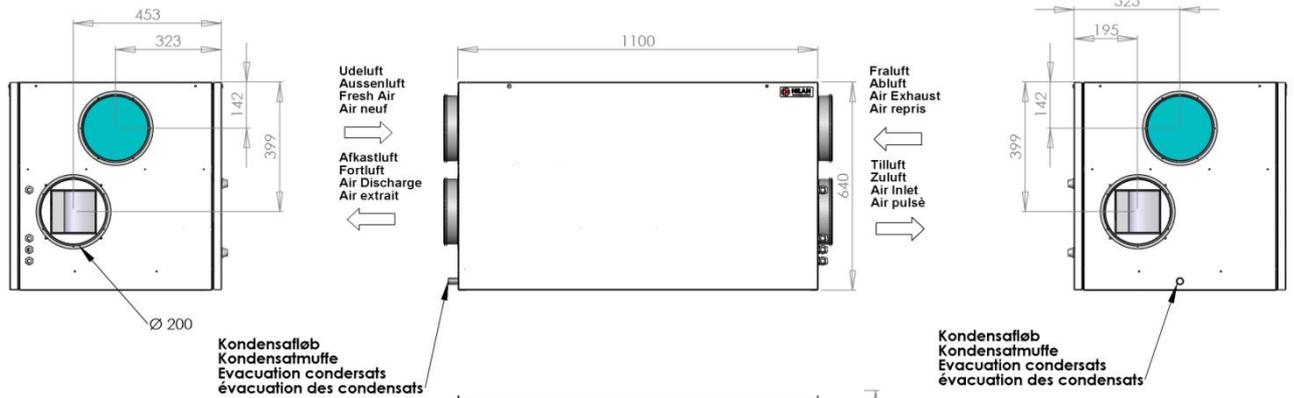


Comfort 300 Top Left

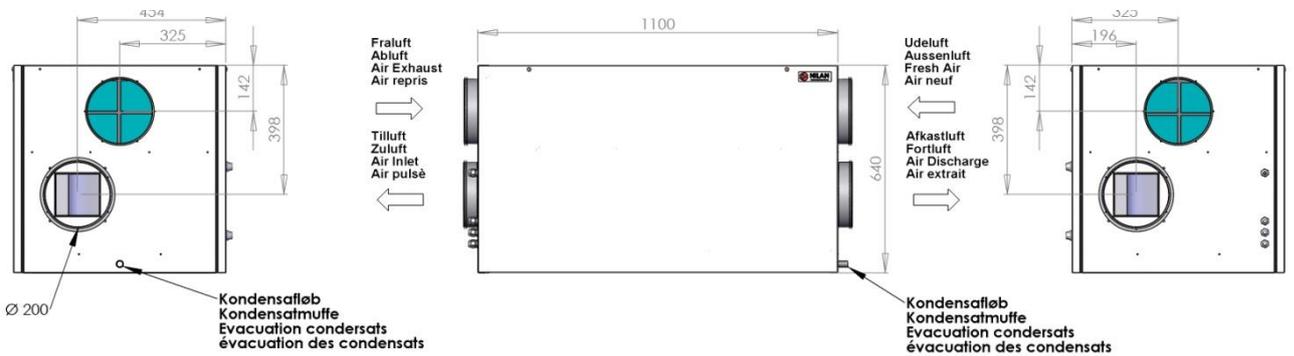


1. Udeluft
Aussenluft
Outdoor air
Air neuf
2. Tilluft
Zuluft
Supply air
Air pulsé
3. Fraluft
Abluft
Extract
Air repris
4. Afkastluft
Fortluft
Exhaust
Air extrait
5. Kondens afløb
Kondensatmuffe
Evacuation condensate
Vacuation des condensats

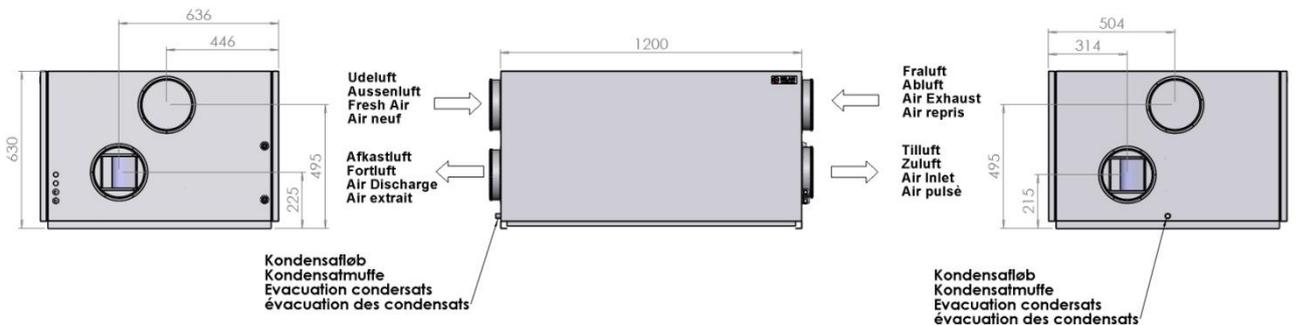
Comfort CT300



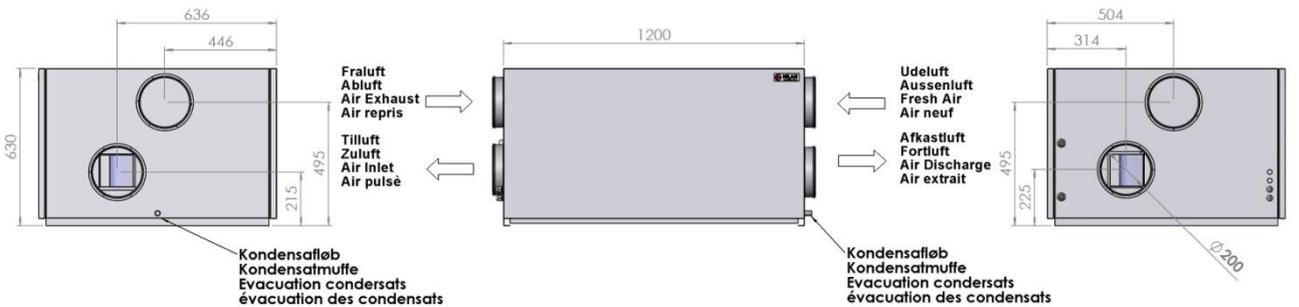
Comfort 450



Comfort 450 Left



Comfort 600



Comfort 600 Left

Figure 24: System dimensions for Comfort 250-600

Accessories/spare parts

Filters			
Type	System type	Qty	Nilan item no.
Insulated pollen filter unit with F7 filter, for fitting in inlet duct (Ø160)		1	8527
Pollen filter F7		1	3915
Pollen filter for fitting	Comfort 300	1	3954
Pollen filter for fitting	Comfort CT 300	1	3987
Pollen filter for fitting	Comfort 450	1	39541
Pollen filter for fitting	Comfort 600	1	3956
Filter G4 (1set = 2stk.)	Comfort 250 Top	1	39163
Filter G4 (1set = 2stk.)	Comfort 300	1	3916
Pollen filter for fitting	Comfort CT 300	1	3885
Filter G4 (1set = 2stk.)	Comfort CT 300		3939001
Filter G4 (1set = 2stk.)	Comfort 300 Top	1	39161
Filter G4 (1set = 2stk.)	Comfort 450	1	39165
Filter G4 (1set = 2stk.)	Comfort 600	1	39162

Heating surface for water incl. regulation		
System	Qty	Nilan item no.
Comfort 300	1	768913
Comfort 300 Top	1	768893
Comfort CT 300	1	768893Z
Comfort 450	1	769062
Comfort 600	1	769063

Electrical heating surface (for fitting in inlet duct)			
System	Output	Qty	Nilan item no.
Comfort 300, 300 Top	0,9kW	1	76413
Comfort 450	6,0kW	1	764331
Comfort 600	6,0kW	1	76433

Spare parts/accessories		
Type	Qty	Nilan item no.
CTS 602, control PCB	1	229933
CTS 602, control panel, complete	1	2398
CTS 602, white control panel enclosure	1	2398HX
Filterguard excl. hose (3m item nr. 3049)	1	3635
Humidity sensor	1	23997
CO ₂ -Sensor	1	7134B13

Heating cable for condensation outlet (frost protection)		
System	Type	Nilan item no.
Comfort	Heating cable	2172