# User manual

**CTS 602** by Nilan


## Compact S

**Version: 10.01, 09-03-2016**
**Software-version: 2.32**
**Original User manual**

NILAN®
OUTSTANDING INDOOR CLIMATE

## Contents



## Figure table

# Introduction

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

- *Directions for assembly and use*
- *CTS602 directions (this document)*
- *Electrical chart*

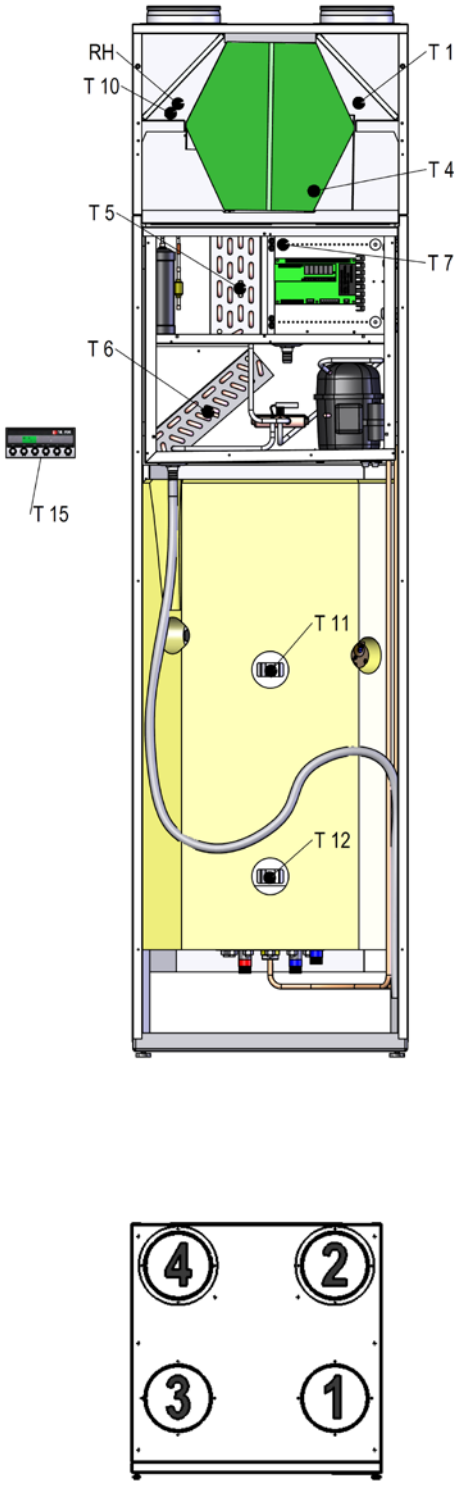
The purpose of this manual is to clearly show the menus and possibilities of the CTS602 control.
This manual may describe functions that are not accessible in your unit.
The directions can be used for all types of units described in figure 1 page 4.

PLEASE NOTE: If the system is damaged in any way, it must be inspected and repaired by licensed personnel

**GETTING STARTED**

**The system is delivered ready for use.**

**The factory settings are suitable for most user requirements and it should therefore not be necessary to change any settings other than those found in the main menu.**
**The main menu is described on pages 8 +9.**




**Explanation temperature sensors:**

**T1**: Fresh air
**T4**: In the counter flow heat exchanger
**T5**: Condenser
**T6**: Evaporator
**T7**: Inlet air after the electrical heating surface. (T2 is change to T7, by mounting Heating surface)
**T10**: Exhaust. The temperature is shown in the ”Show data” menu”
**T11**: Top of the hot water tank
**T12**: Bottom of the hot water tank
**T15**: CTS602 panel.

**E5**: Heating element 1,5kW

**Figure 2: Location of temperature sensors**

## CTS602 control panel


Use of the CTS602 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 3: CTS602 control panel**

The following is indicated by the light-emitting diode at the front of the CTS602 panel:
Constant yellow light: the compressor is in operation
Flashing yellow: the unit is in alarm condition

The panel can show 2 lines of text with each 8 characters.
The upper line shows a guiding text.
The bottom line shows the matching values to the guiding text.

The text in the display in “on” as long as there is power to the unit and will not turn off even though the unit is set to “off” or has not been operated for a longer period of time.

### How to use the menu:

It is possible to adjust a value or a function by finding the matching menu via ▲ or ▼.

To activate the desired menu press **ENTER**.

To adjust the settings of the value press **ENTER** until the value flashes.

The adjustment can now be done via▲▼.

To save the chosen value press **ENTER.**

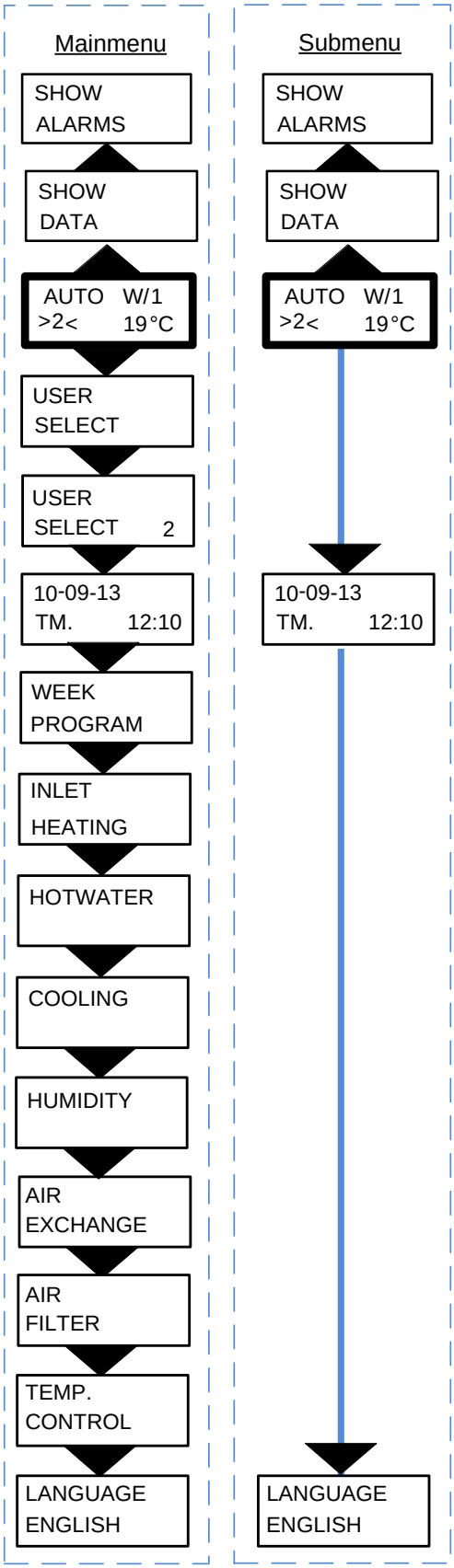
It is advisable to have the panel and/or the review of the menus near by during the reading of the menus.

If none of the press buttons are activated for one minute the control will automatically return to the main menu.

If you are in the middle of the programming when the control returns to the main menu all data will be saved if they previously are saved by pressing **ENTER.** It is always possible to return to the programming to continue.

## Menu overview

The control will have the main menu as starting point, (the menu in the full-drawn frame). From here it is possible to go through the other menus via ▲▼.




Showing of alarms and resetting of alarms. Alarm log with the latest 16 alarms.

Operating mode ( heat, auto, cool), temperatures, fan speed and software version.

Main menu: shows operating mode. Press ESC to main menu.

There are five custom options: ”ext offs”, ”exhaust”, “inlet”, “extend” and “OFF”.

User select 2 as user select.

Setting of clock

Activating the week programme

Setting of inlet temperature (heating via compressor). The menu is only shown when a supplementary heating surface is installed.

Showing of data for hot water production.

Setting of inlet temperature for cooling via bypassing the inlet air around the heat exchanger and via compressor if this is an option (not possible on all types of units)

Offers the option to set a higher/lower fan speed at a high/ low humidity level

Starts the compressor and enable you to choose a low fan speed when the outdoor air temperature is low.

In the ”Air filter” menu it is possible to chose the interval of the filter guard.

Setting of minimum inlet temperatures

Choose language shown in control panel

**Figure 4: ”Menu overview”**

## Operating mode

The main menu shows 3 different values: operating mode, ventilation step and temperature. Those values indicate the state of the unit and are selected by the user.

The main menu is automatically shown 15 seconds after the unit is electrically connected and is now ready to be set.

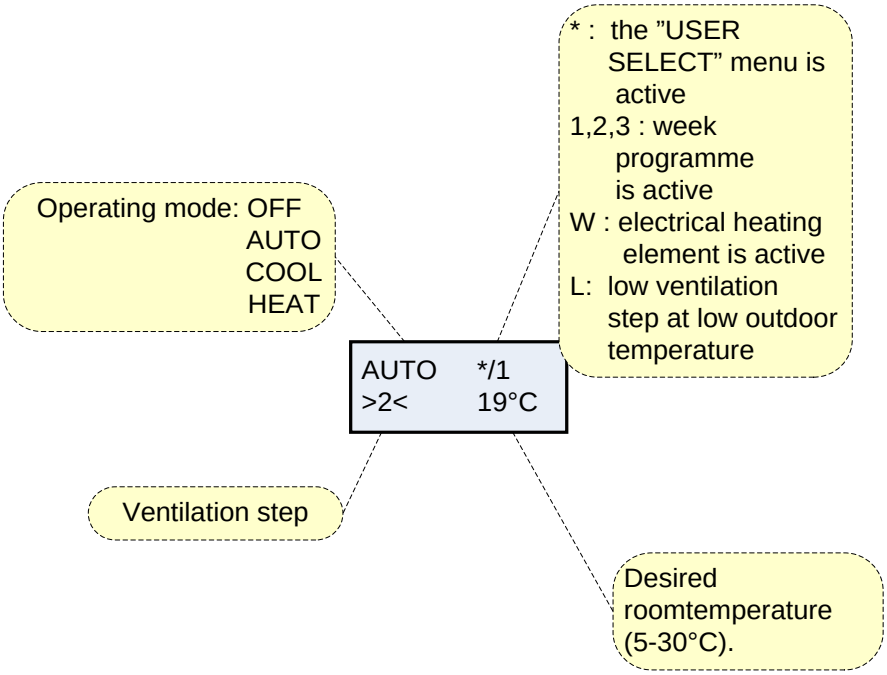



**Figure 5: Main menu**

Desired room temperature can be adjusted by pressing **ENTER** once. The number at °C flashes and the value can be set via ▲▼. The desired value must be approved by pressing **ENTER** once.

The operating mode can be adjusted by pressing **ENTER** twice. The actual mode is flashing and can be set via ▲▼ and approved by pressing **ENTER** once. In “AUTO”-mode the bypass-draught control is automatically opened or closed according to the temperature setting and the unit automatically switches between cooling and heating. As regards cooling there is a neutral zone of 5 °C below room temperature before the unit actively cools via compressor. For further information see page 20.

The ventilation step can be adjusted by pressing **ENTER** three times. The actual ventilation step is flashing and can be set via ▲▼ and approved by pressing **ENTER** once.

## Main menu

The main menu is automatically shown 15 seconds after the unit is electrically connected.

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

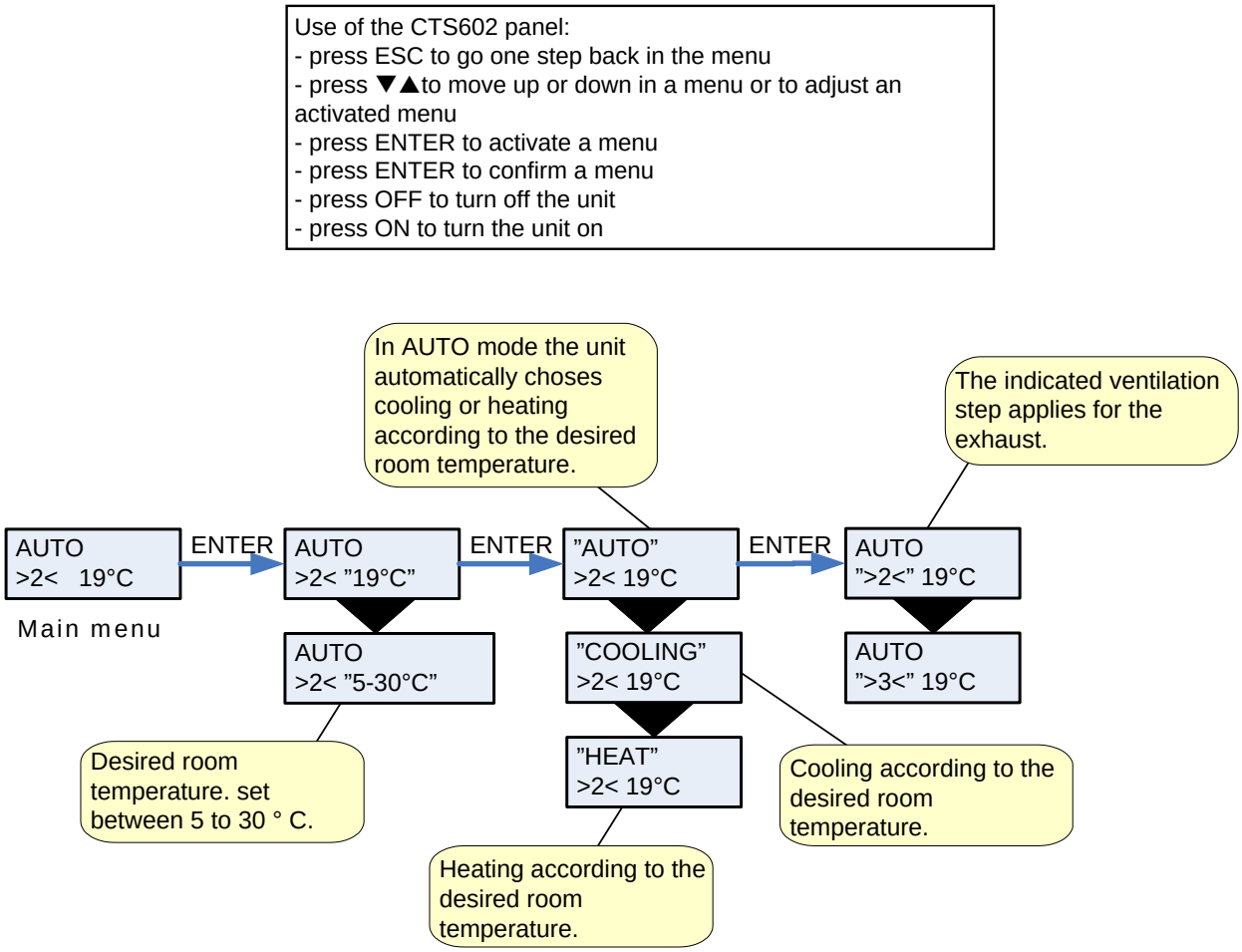



**Figure 6: Headlines in the ”Main menu”**

## Show alarms

If the unit is in a state of alarm the yellow light-emitting diode on the front of the CTS600 panel will flash.

The ”Show alarms” menu indicates the type of alarm and the time of the alarm. This is also the menu where the alarm should be reset.

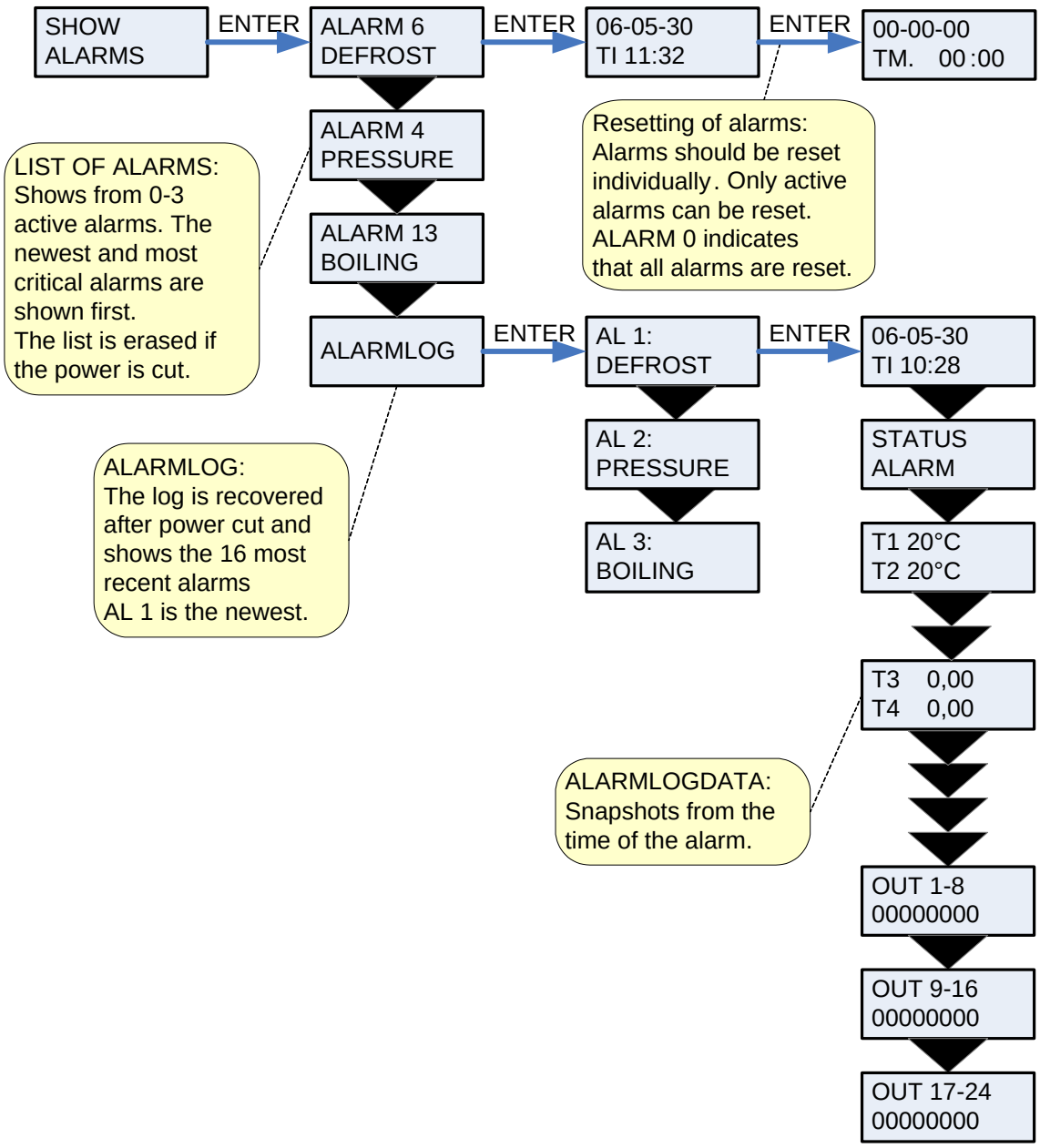



**Figure 7: The ”Show alarms” menu**

Alarm codes are given because of a fault situation or when it is important to inform the user.

The alarms are divided into the following categories:

| | | |
|---|---|---|
| **C** | **Critical** | Operation is partly or completely stopped as long as the alarm is active. |
| **W** | **Warning** | These types of alarms will become critical if the problem is not solved quickly. |
| **I** | **Informative** | Normal operation is not affected. Alarm disappears when it is reset. |

| ***Alarm code*** | ***Categori*** | ***Text in display*** | ***Description/ cause*** | ***How to remedy alarms*** |
|---|---|---|---|---|
| *00* | *--* | *--* | *No alarms* | |
| *01* | *C* | ***HARDWARE*** | *Error in control hardware* | *Contact service if reset does not help* |
| *02* | *C* | ***TIMEOUT*** | *Warning alarm W has become a critical alarm.* | *Note and reset the alarm. Contact service if alarm does not disappear.* |
| *03* | *C* | ***FIRE*** | *Fire detecting thermostat. Unit is stopped because the fire detecting thermostat has been activated.* | *If there has not been a fire please contact service.* |
| *04* | *C* | ***PRESSURE*** | *High or low pressure switch in the cooling circuit has been triggered, probably caused by: High pressure: Extreme hot Cloaked filter Defective fan Low pressure: Extreme cold Unit might have lost coolant Cloaked filter Defective fan* | *Check for errors and reset alarms. If you are unable to reset the alarm or if the alarm occurs often please contact service.* |
| *06* | *C* | ***DEFROST*** | *The unit is defrosting. The frost protection of the heat recovery system is insufficient and the unit will stop. This can be caused by extreme low outdoor temperatures* | *Contact service if reset does not help. Note the actual sensor temperatures from the menu "Show data" to help service.* |
| *08* | *C* | ***FROST*** | *One of the temperature sensors in the unit is short circuit or defect.* | *Note the sensor and contact service.* |
| *09* | *C* | ***OVERTEMP*** | *One of the temperature sensors in the unit is disconnected or defect.* | *Note the sensor and contact service.* |
| *10* | *C* | ***OVERHEAT*** | *The electrical heating element is overheated. Lack of airflow due to cloaked filters, cloaked air intake or defect inlet fan.* | *Check if air flows into the house. Check filter and air intake. Reset alarm. Contact service if the above does not help.* |
| *11* | *C* | ***AIRFLOW*** | *Lacking inlet airflow* | *See alarm code 10* |
| *13* | *C* | ***BOILING*** | *Boiling protection of the hot water* | *Contact service* |
| *15* | *W* | ***ROOM LOW*** | *When room temperature drops below 10°C the unit will stop in order to protect the house from further cooling down. The function is useful when the house is not occupied and the main heating has stopped.* | *Heat up the house and reset the alarm* |

| Alarm code | Categori | Text of display | Description/ cause | How to remedy alarms |
|---|---|---|---|---|
| 16 | I | **SOFTWARE** | Error in software | Contact service |
| 17 | I | **WATCHDOG** | Error in software | Contact service |
| 18 | I | **CONFIG** | Parts of the programming are lost and can be caused by a longer period of power failure or lightning. The unit will keep on operating on standard programming. | Reset alarm<br>Re-programme the week programme.<br>Contact service if the unit does not operate as before. Supplementary programs can be lost.<br>Only service can access the supplementary programs and menus. |
| 19 | I | **FILTER** | The filter guard is set to give alarm when a pre-set period of time has occurred | Clean /replace filter and reset alarm |
| 20 | I | **LEGIONEL** | Legionella temperature has not been reached within the time limit | Contact service |
| 21 | I | **POWER** | Occurs if power has been cut off for a longer period of time | The week programme should be checked and adjusted if necessary.<br>Reset alarm. |
| 22 | I | **T AIR** | The pre-set temperature of the inlet air cannot be reached | Set a lower air inlet temperature and reset alarm. |
| 23 | I | **T WATER** | Warming up the hot water is not possible | Contact service. |
| 24 | I | **T HEAT** | Warming up the water for central heating is not possible. | Contact service. |
| 27-57 | C | **$T_x$ KURZ** | One of the temperature sensor of the device is shorted or defective.Tx = +99 °C | Please note which sensor T x, there is shorted, and contact the customer service. |
| 28-58 | C | **$T_x$ OFFEN** | One of the temperature sensor of the device is disconnected or defect Tx= -40 ° C | Please note which sensor T x, there is interruped, and contact the customer service. |
| 70 | W | **ANODE** | There is an error at the anode on the hot-water tank. It has not been connected correctly or it has corroded. | Contact service. |
| 71 | I | **DFR EXCH** | The maximum defrosting time for the counter flow heat exchanger has been exceeded. This could be due to the fact that the system has been exposed to very low temperatures. | Contact our after sales department if resetting the alarm does not help.<br>If possible, inform the after sales department of the current working temperature from the menu VIS DATA (SHOW DATA). |
| 72 | I | **EVAP LOW** | Abnormally low evaporator temperature | Check supply air valve |
| 92 | I | **PRESET** | Error by writing or input of the electrician's adjustments | Contact service. |

**Figure 8: The "Alarm Indicators" menu**

## Show data

The actual operation data can be read in the ”Show data” menu. See review of thermometer sensors at page 5.

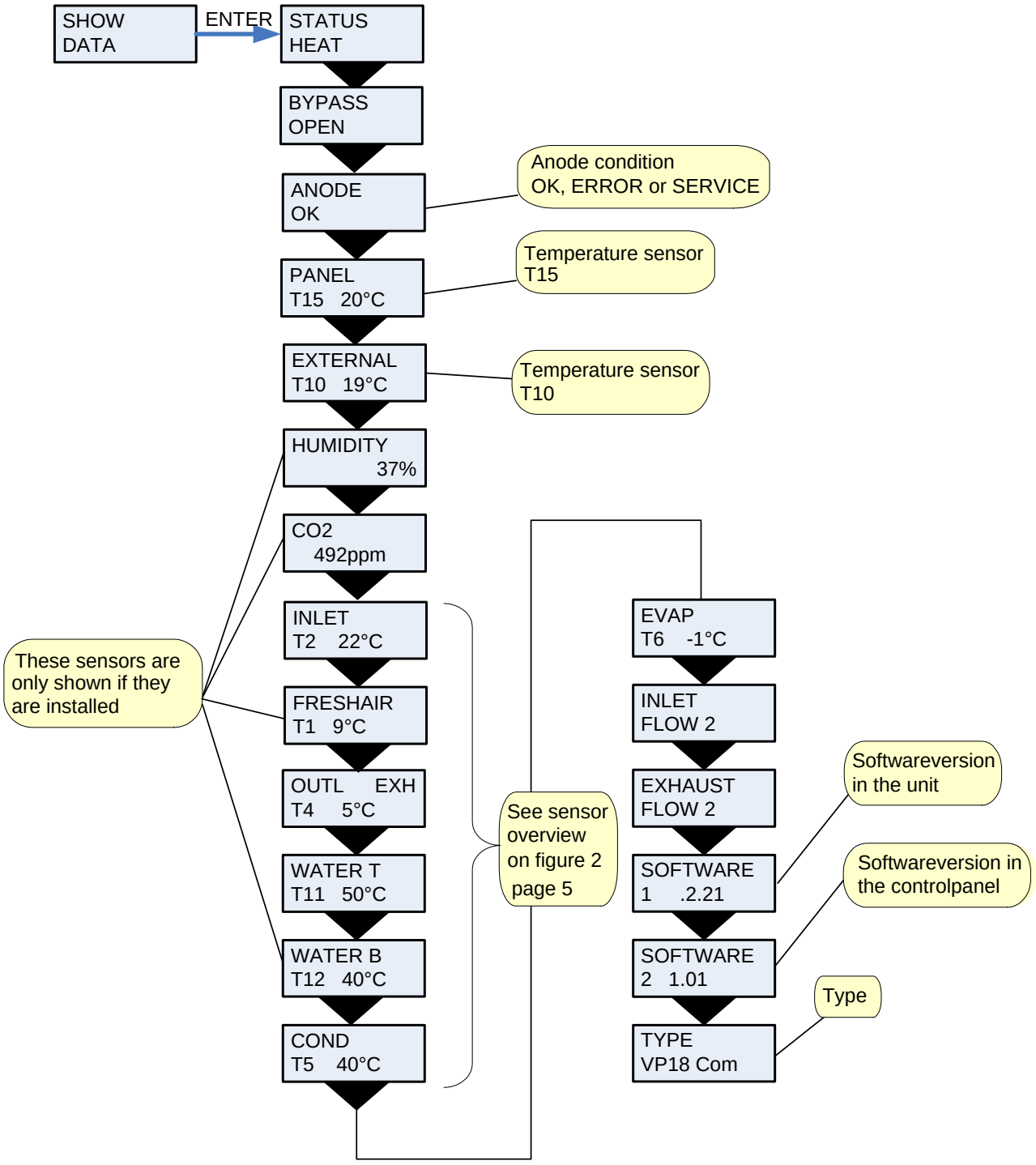



**Figure 9: The ”Show data" menu**

## User select

The menu CUSTOM OPTIONS overrides the operating mode of the main menu by activating an external switch.

”VENTILAT”: There is a possibility here to run with a higher or lower speed on the air exhaust and air inlet for a limited amount of time. The external pressure will activate the function. The function has high priority.

”exhaust” and ”inlet”: These two options increase or reduce the velocity of the exhaust or inlet air respectively for a limited period of time. The remaining functions of the operating mode remain unaltered. An external switch activates the timer function.
Another external switch ensures that the fans remain at the desired ventilation level until the switch is turned off.

”extend”: This option controls the velocity of the exhaust and inlet air and can be used to change the temperature of the inlet air for a limited period of time. An external switch activates the timer function.

“OFF”: Deactivates the external switch.

”ext offs”: Provides the possibility of choosing an afterflow time and changing the set point in external rooms.

Use of the CTS602 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

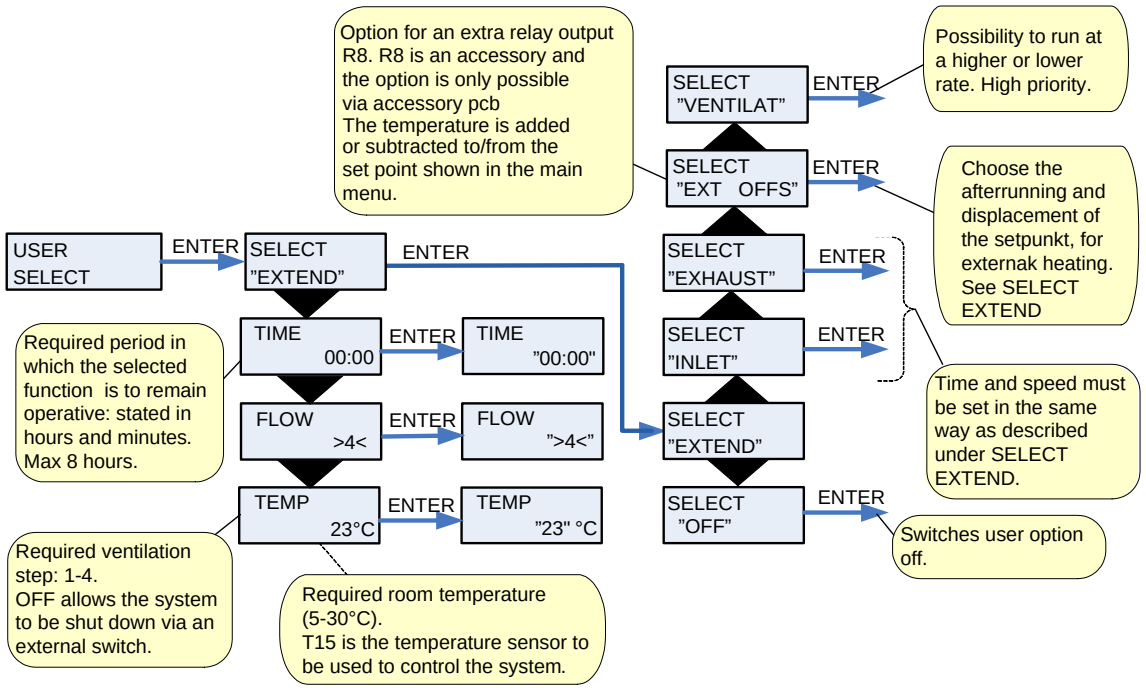



**Figure 10: The ”User select" menu**

## User select 2

User select 2 as user select

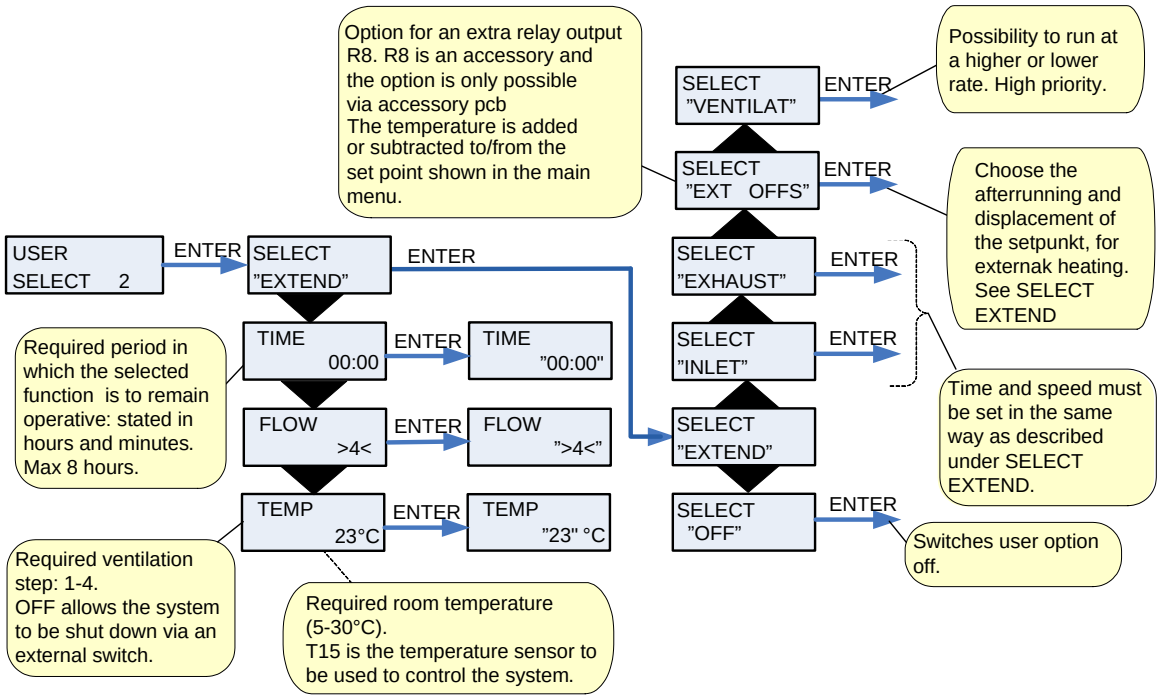



**Figure 11: The "User select 2" menu**

## Setting of clock

In case of power cut the clock will function for at least 24 hours. If the time function is lost there will be an alarm.

Changing to daylight saving time has to be done manually.

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

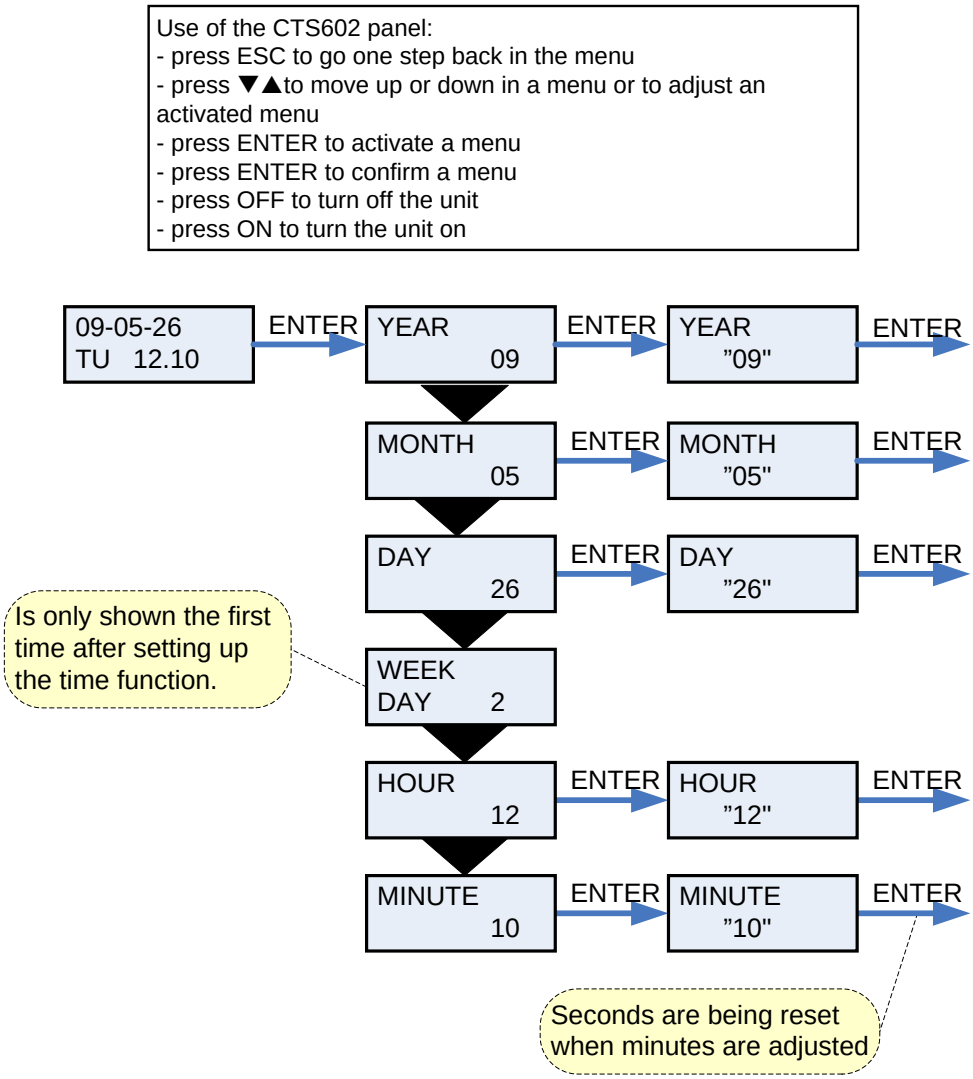



**Figure 12: ”Setting of clock"**

## Week programme

The unit is equipped with 3 standardized week programmes. See page 17.
The unit is set to programme 1 from the factory.

In addition to these programmes it is possible to program your own week programme which can be one of the standard programmes with minor alterations.

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

Use of the CTS602 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

| *Programmes* | *Weekday* | *Function* | *Time* | *Ventilation step* | *Temperature* |
|---|---|---|---|---|---|
| *Programme 1* | *Monday – Friday* | *1*<br>*2*<br>*3*<br>*4* | *6.00*<br>*8.00*<br>*15.00*<br>*22.00* | *3*<br>*1*<br>*3*<br>*1* | *21*<br>*17*<br>*21*<br>*17* |
| | *Saturday – Sunday* | *1*<br>*2* | *8.00*<br>*23.00* | *3*<br>*1* | *21*<br>*17* |
| *Programme 2* | *Monday – Sunday* | *1*<br>*2* | *8.00*<br>*23.00* | *3*<br>*1* | *21*<br>*17* |
| *Programme 3* | *Monday – Friday* | *1*<br>*2* | *7.00*<br>*16.00* | *3*<br>*OFF* | *21*<br>*21* |

**Weekly program settings**

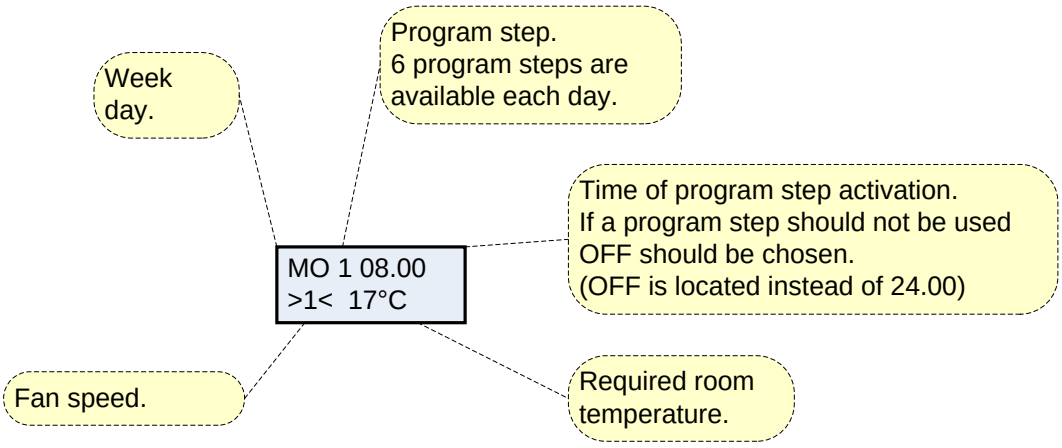



**Figure 13: The Settings of ”Week program”**

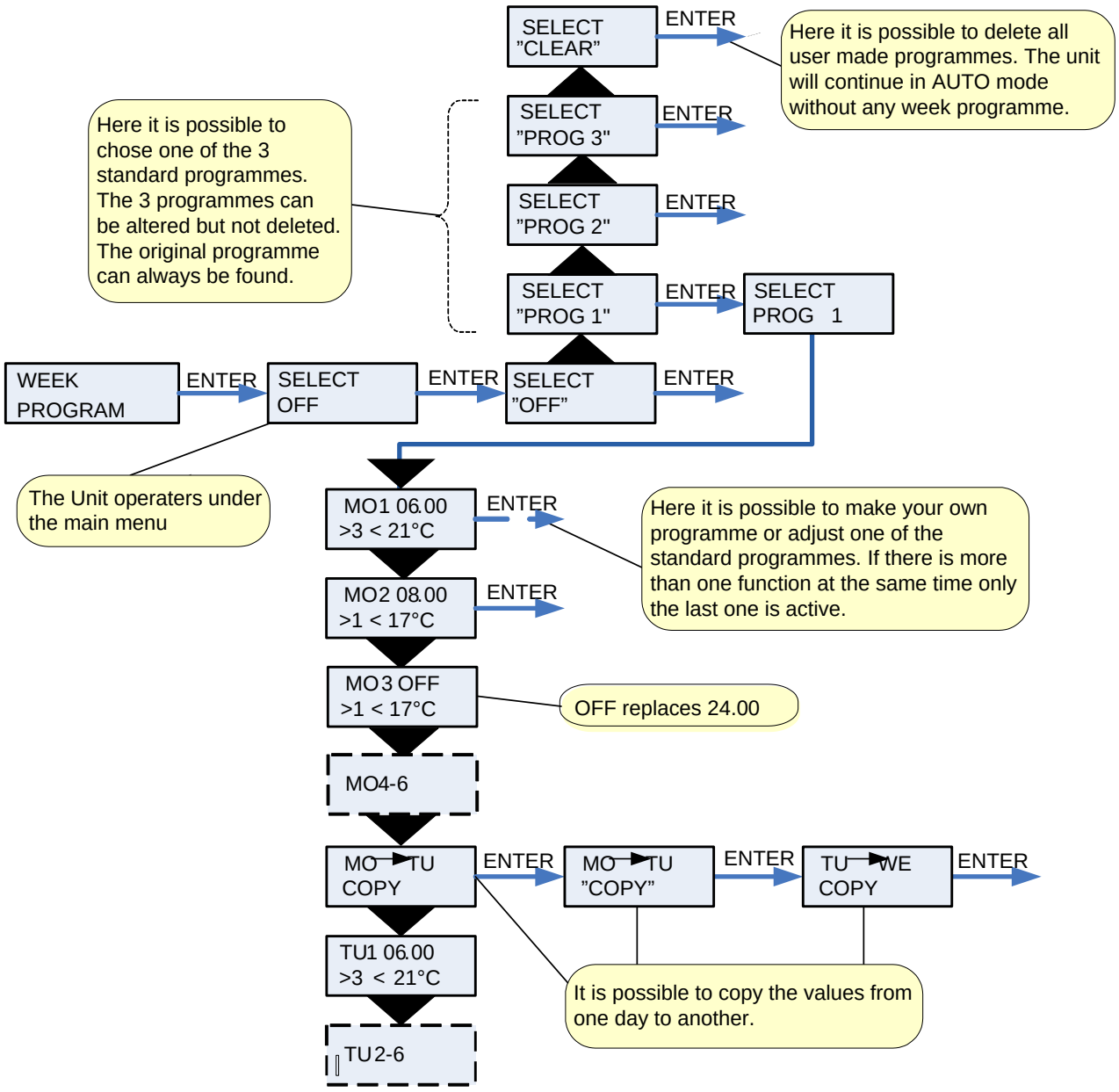



**Figure 14: The ”Week program” menu**

## Inlet heating

The menu is only shown if a waterheatingsurface is integrated into the system.

The inlet temperature is automatically controlled on the basis of a selected curve. Inlet temperature is controlled as a function of outdoor temperature, i.e. the lower the outdoor temperature, the higher the inlet temperature

**INLET MIN**: The setting overrides any lower setting calculated by the curve control.
**INLET MAX**: The setting overrides any higher setting calculated by the curve control.

When room temperature is below set point the compressor starts to heat the inlet air. It is possible to use the heat pump for heating the inlet air by delaying the start of the electrical heating surface.

**OFFSET T10** is the deviation below room temperature where the electrical heating surface is allowed to function. **DELAY** determines for how long the deviation may last before the electrical heating surface is activated.

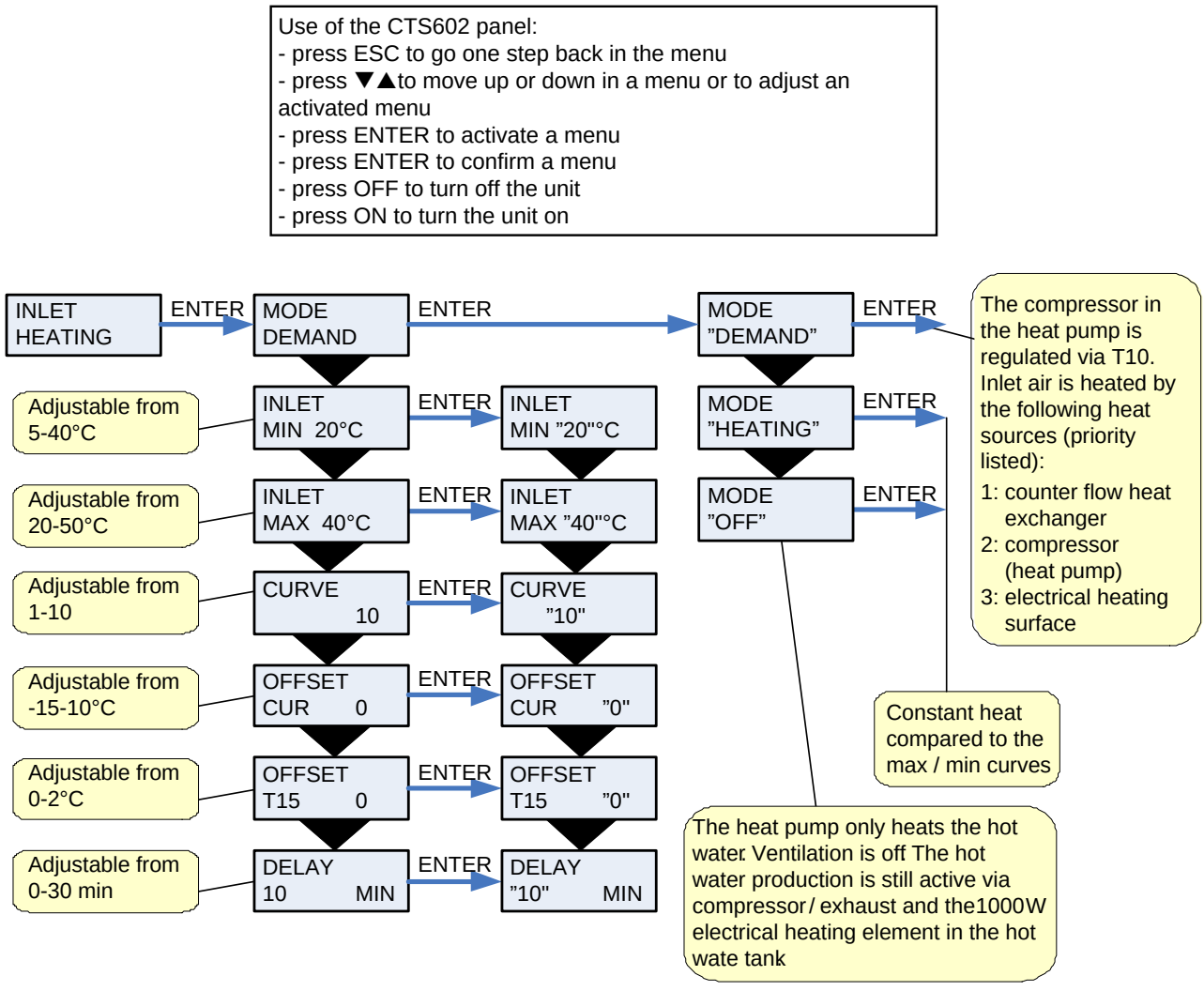



**Figure 15: The „Inlet heating“ menu**

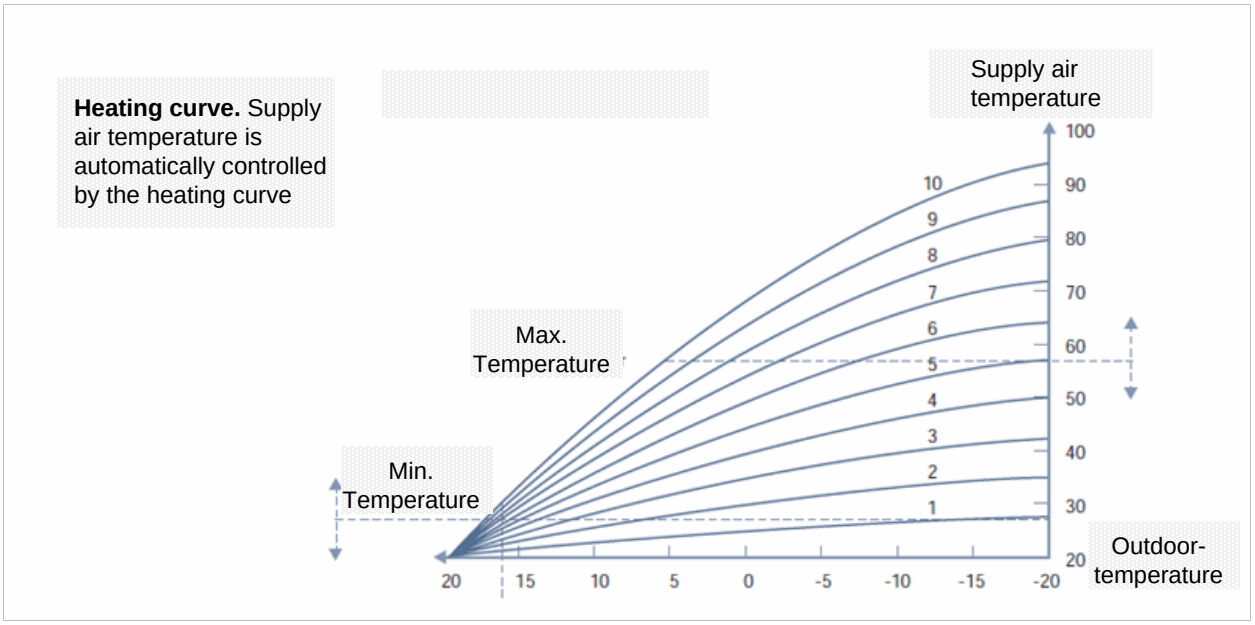



**Figure 15a: ”Heating curve”**

## Hot water

The ”Hot water” menu shows the data for production of hot water.

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

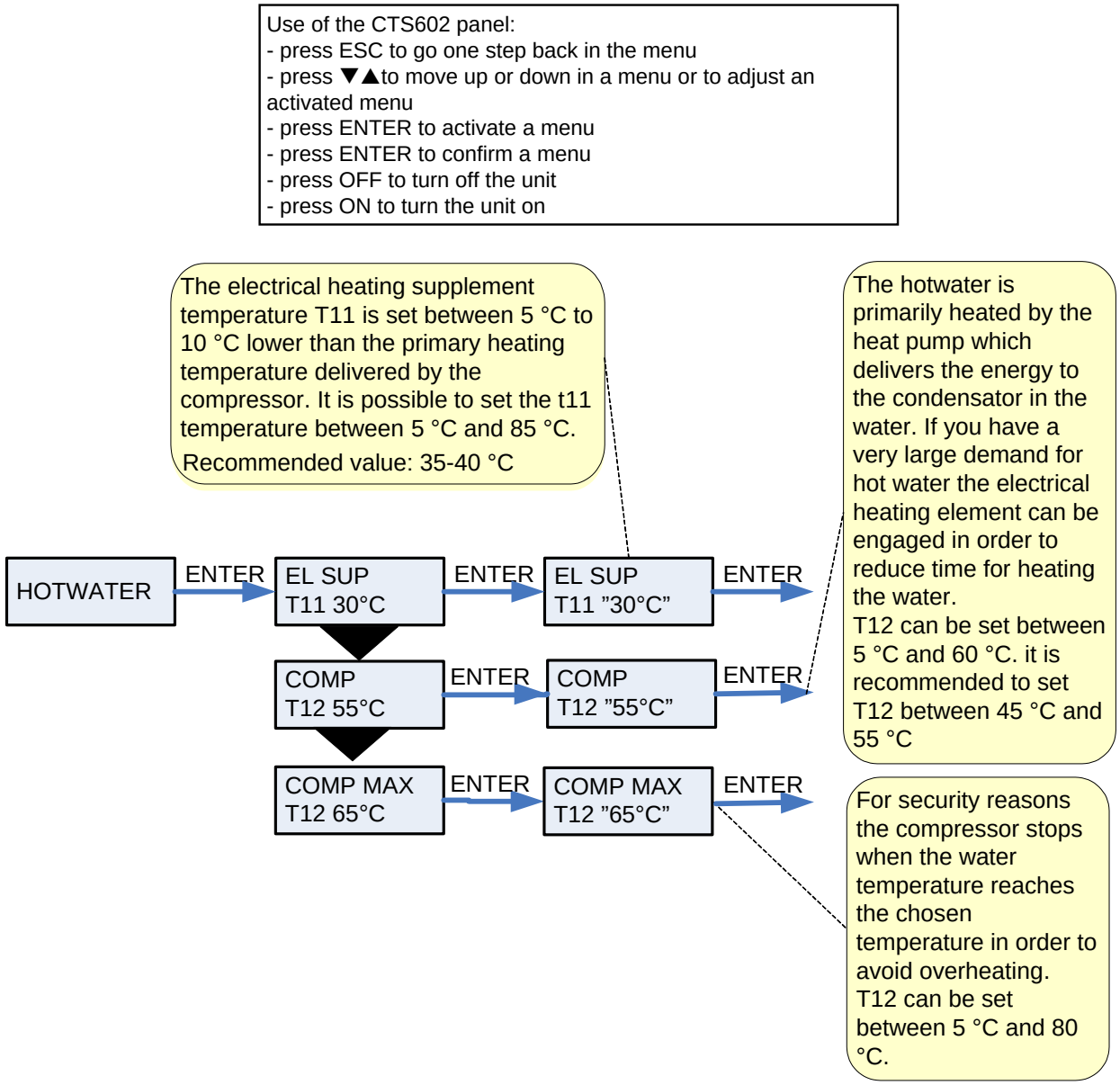



**Figure 16: The ”Hot water" menu**

## Cooling

In the “Cooling” menu it is possible to cool the inlet air by bypassing the inlet air around the counter flow heat exchanger. See figure 17a
The bypass setpoint opens the damper at the cooling setpoint of minus 2°C, but at least 0.5°C above the neutral zone.
If the unit has active cooling via compressor see figure 17b.

The COOLING menu gives the possibility of automatic high fan speed when high outside temperatures.
When the system is in WINTER status, and when the heating coil is active, and in HEAT operational mode, Bypass will not open (except on de-icing)

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

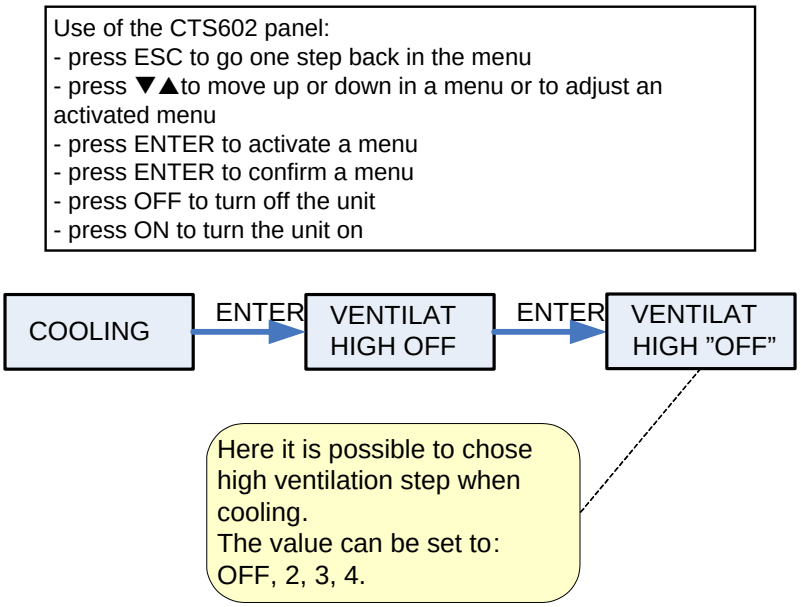



**Figure 17a: The ”Cooling" menu**

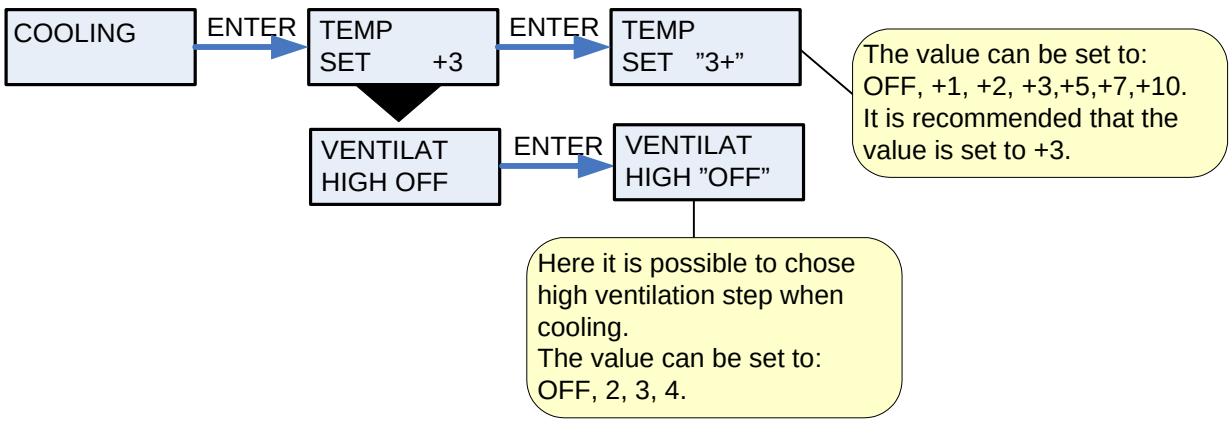



**Figure 17b: The ”Cooling" menu**

## Humidity

In the “Humidity” menu it is possible to regulate the ventilation step in accordance with the humidity level.

Low ventilation step is only active in wintertime and at humidity levels below 30%.
High step is activated by a change from 10-5% of average RH from 40-80% over the last 24 hours
High ventilation step is deactivated when humidity drops 3% or more compared to the average humidity level the last 24 hours.

It can last up to 3 minutes before high/low ventilation step i stabilized.

If there is a need for heat the "low humidity" is not activated.

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

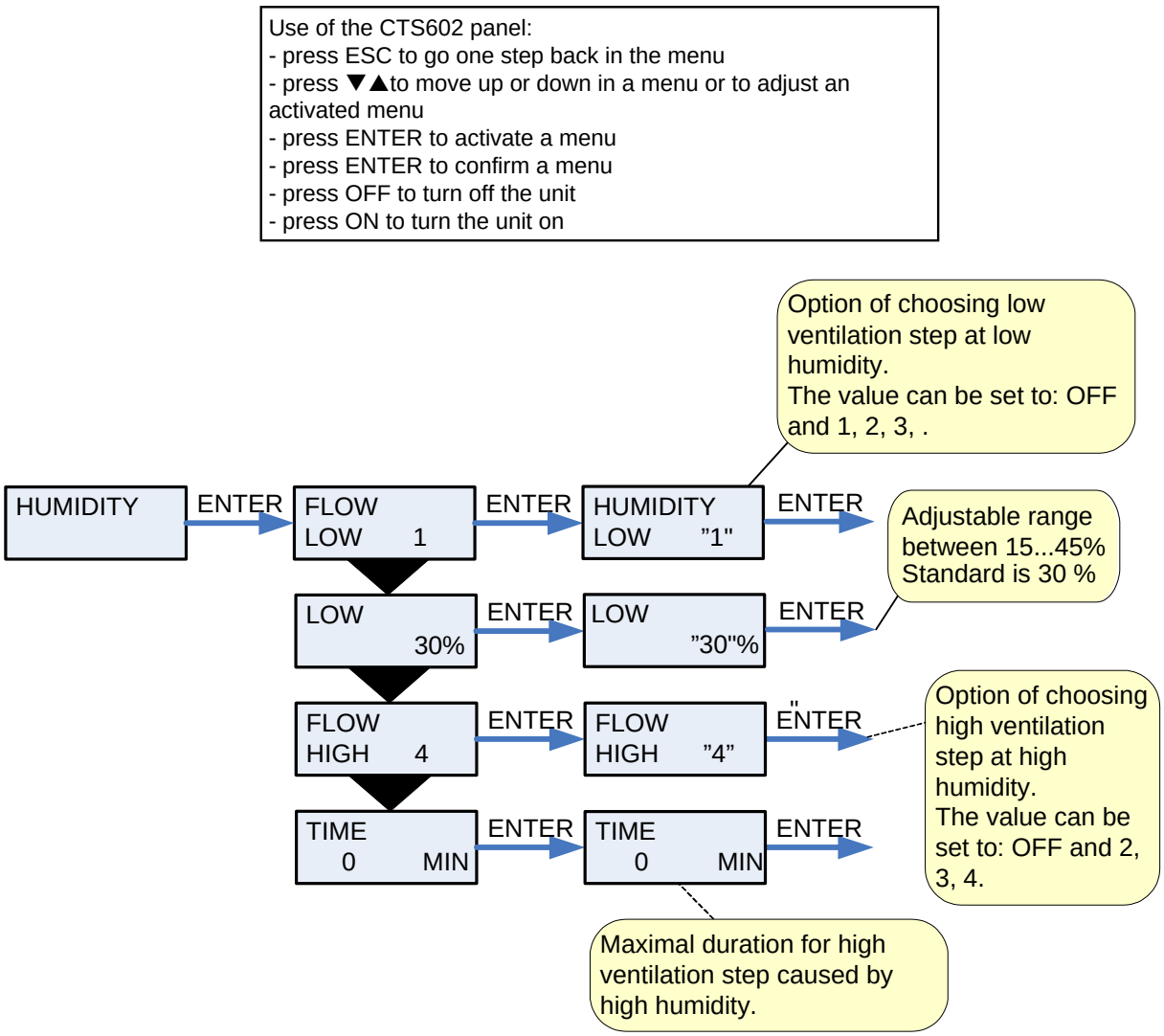



**Figure 18: The ”Humidity" menu**

## Air exchange

In the ”Air exchange” menu it is possible to regulate the airflow in wintertime

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

Use of the CTS602 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

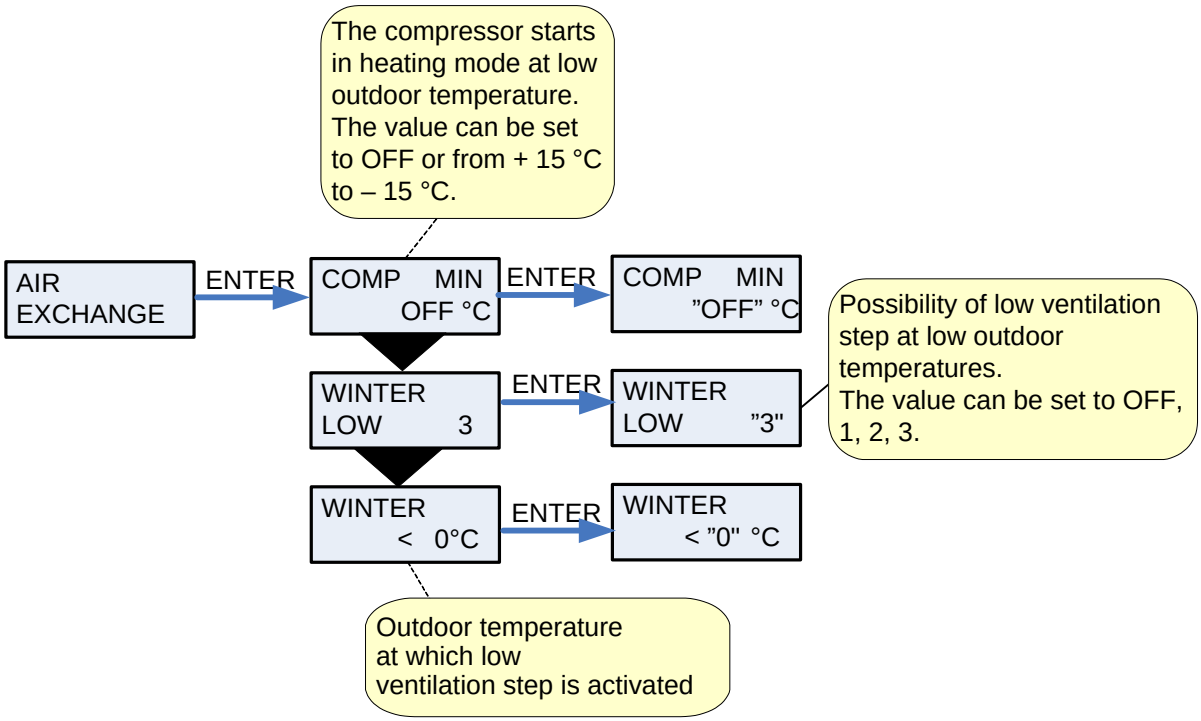



**Figure 19: The ”Air exchange" menu**

## Air filter

In the ”Air filter” menu it is possible to chose the interval of the filter guard.

The unit is factory configured to provide emergency with 90 days interval. It is then possible to change this range if necessary.

After the deadline you will see "Filter" as an information alert

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

Use of the CTS602 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

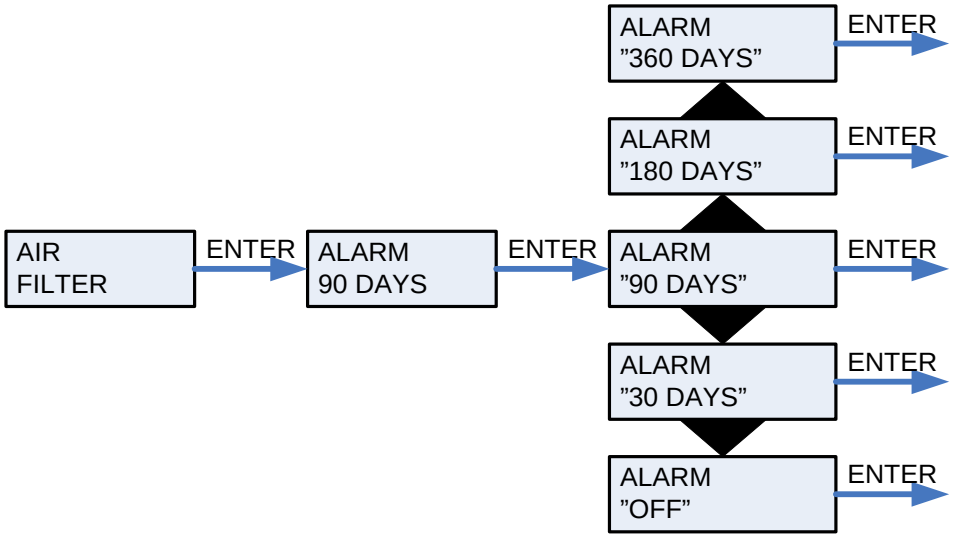



**Figure 20: The "Air filter" menu**

## Temp. control

In the ”Temp. control” menu it is possible to set the highest and lowest inlet temperature.

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

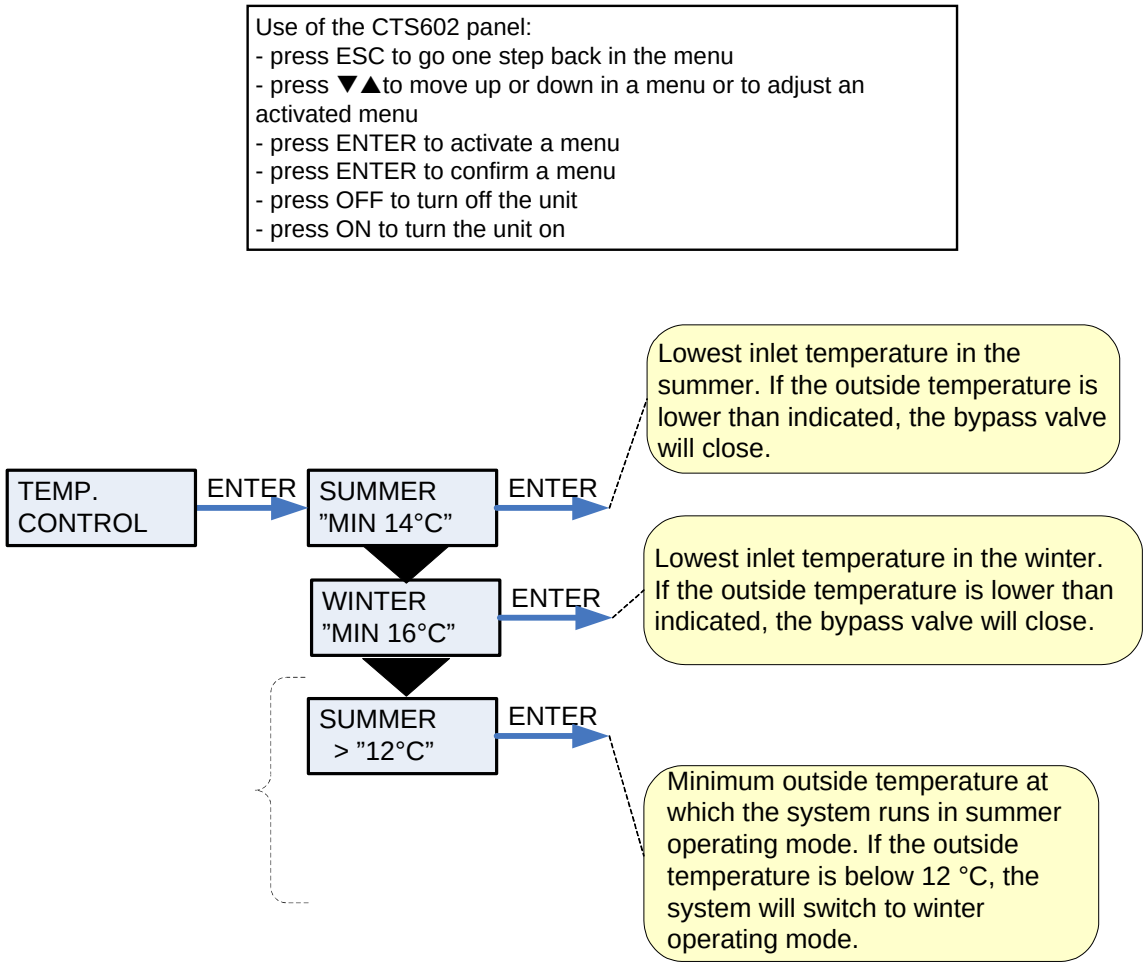



**Figure 21: The "Temp. control" menu**

## Setting of language

In this menu you set which language to be used in the CTS602 panel.

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

Use of the CTS602 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
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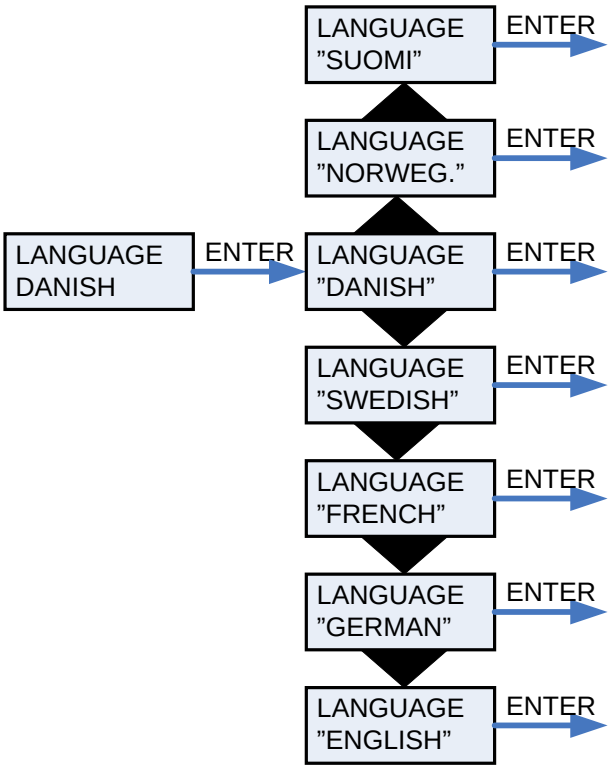


**Figure 22: The „Language" menu**

## Faultfinding

If there should be any operating errors please inspect the following before contacting your service mechanic:

Check if the alarm diode on the CTS602 panel is flashing. If this is the case please read the alarm in the “Show alarms” menu and correct the fault. If necessary please contact your local service mechanic. Alarm codes and directions for correcting alarms can be found in the CTS602 directions.

- VP18-10P M2 **is functioning but with reduced output.**
  Please inspect if the unit is supplied with enough air. Check the filters and control that the air valves are sufficiently opened. In 98% of the cases the fault derives from obstructed filters. The ventilators can be set on a higher speed if necessary. Any draught controls to the outside should be closed at outside temperatures below 6°C.

- VP18-10P M2 **is functioning but there is no hot water.**
  Please check if the hot water tank is emptied. If the unit is supplied with hot-water circulation and the pipes are not insulated there can be a significant heat-loss which can cause a reduced output of the VP18-10P M2.

  Is the water temperature adjusted correctly in the CTS602 control? (T12). The temperature should normally bet set to 45–55°C. To adjust the temperature, please see the CTS602 directions.

  Is the air supply too cold or is the air flow too little? Please check the filters and valves and if the insulation of the ducts is sufficient and dense.

- VP18-10P M2 **is not functioning.**
  Please inspect the fuse. Check if the safety thermostat for hot water has disengaged the electricity. If this is the case please press the button and the thermostat will connect when the water temperature has dropped 10-15°C. if the thermostat disengages the electricity several times please contact your service mechanic.

## Maintenance

**At least every 3 months:**
The filters should be cleaned and renewed when needed. Usually the filters need to be renewed every 3 Months. The filter guard in the CTS602 control can be used in order to make sure that the filters are checked. The filters can be cleaned by vacuuming or shaking them.

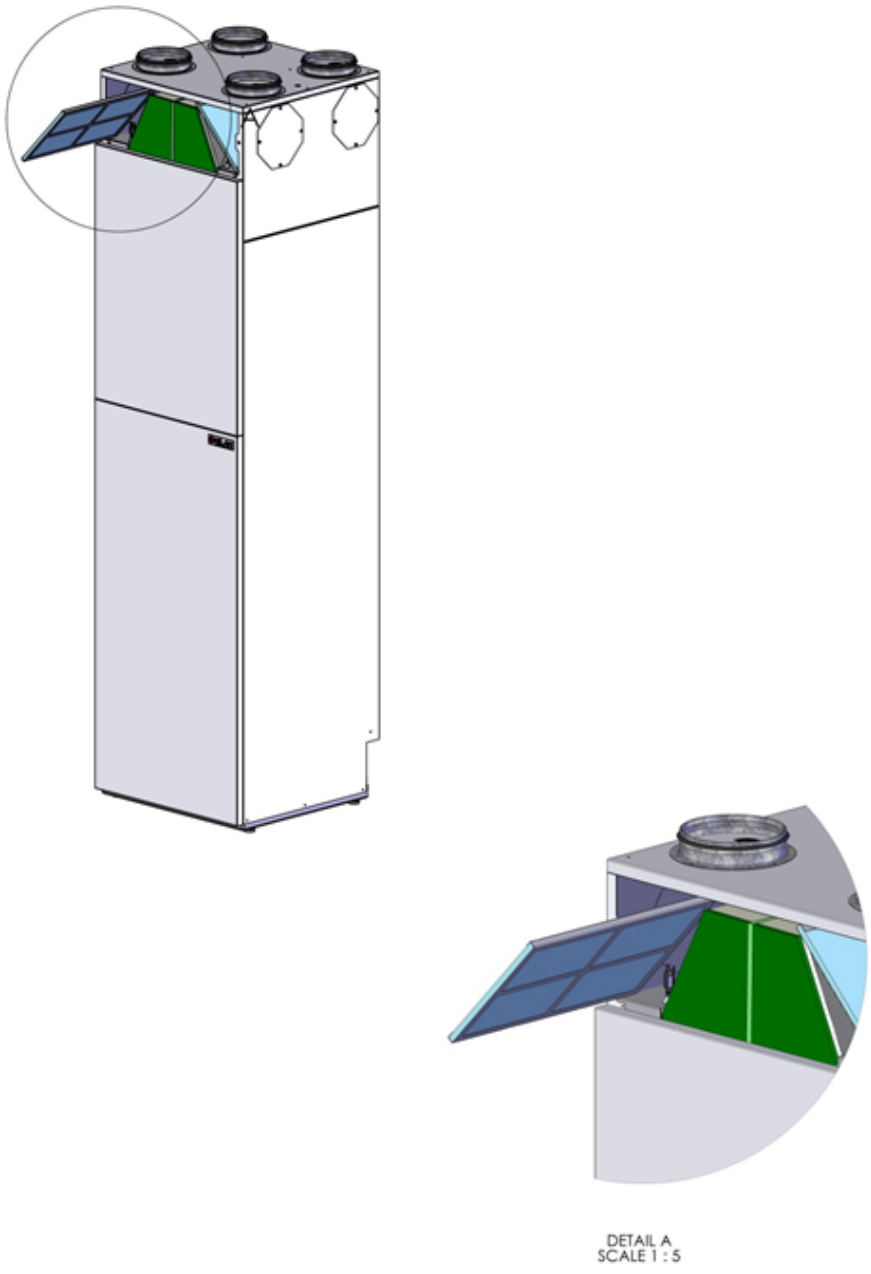


**Figure 23: Air Filter change**

Changing filters:

1. Loosen screws
2. Remove the filter hatch
3. Pull out the two filter frames for change/vacuuming

**Once a year:**

- The sacrificial anode must be checked to ensure that monitoring of the anode is intact.
    - The wire marked with “yellow/green” is dismantled at the anode. This produces the “ALARM 70” (LED flashing)
    - The wire marked with “yellow/green” is reassembled at the anode. “ALARM 70” (LED not flashing)

  The hot-water tank can corrode if the anode is left unchanged.
- The intake should be inspected and any uncleanness should be removed.
- The evaporator should be inspected and cleaned.
- It should be checked that the condensate has free passage through the water seal and the condensation drain.
- The safety switch for the hot water tank should be controlled.
- It is recommended to take out a subscription for service.

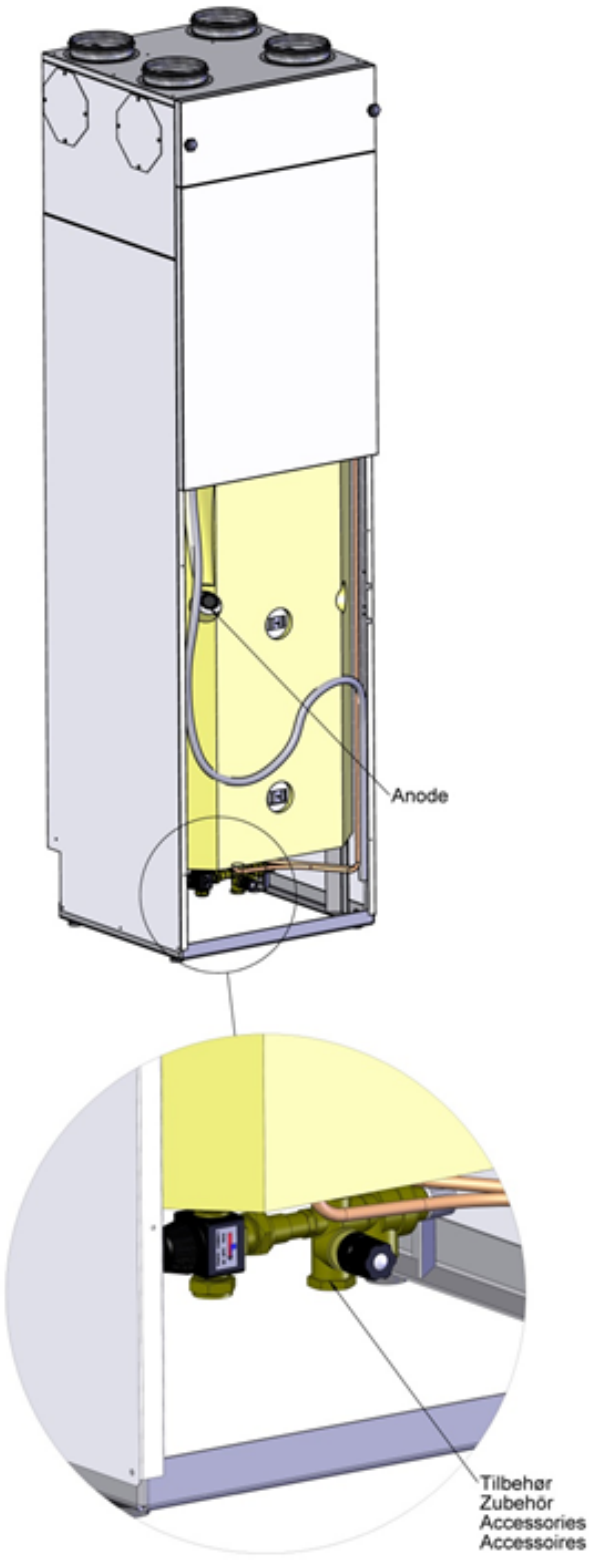


**Figure 24: Placement oft he safety switch and the sacrificial anode**

## Energy saving

- Keep the hot-water at a low temperature. Try with 45°C.
- The auxiliary heating element should be cut off and only be used at very large hot-water demands. Please see CTS602 directions
- The ventilation speed should not be set higher than necessary.
- Avoid hot-water circulation.
- Spread out the bathing times as the VP18-10P M2 needs 6-7 hours to heat the 180L water.
- Insulate the ducting as prescribed.
- Do not cool during winter time.

## Accessories / spare parts

| **Accessories / spare parts** | | |
|---|---|---|
| *Type* | *Antal* | *Nilan varenummer* |
| Compressor (heat pump)( electrical) 0,9kW | 1 | 764131 |
| Compressor (heat pump)( electrical) 2,0kW | 1 | 76431 |
| Sensor for relative humidity (Humidity sensor) | 1 | 23997 |
| Sensor for $CO_2$ in the air ($CO_2$-Sensor) | 1 | 239995 |
| CTS602, control PCB | 1 | 229933 |
| CTS602, control panel complete | 1 | 2398 |
| Heating Cable for condensate drain (frost protection) | 1 | 2172 |
| Security group that boil protection (in line pressure to 10 bar) | 1 | 3690 |
| Security group that boil protection (at line pressure up to 6 bar) | 1 | 3691 |
| Sacrificial anode 5/4” MG ø33x450mm | 1 | 19203 |
| PEX Pipe (for use with a hot water-circulation) | 1 | 9825 |

**Figure 25: Accessories/ spare parts**

## Recycling of this HVAC equipment

Up to 98 % of this equipment can be recycled.
Please contact your local authority for information on disposal and recycling of heat pumps. This heat pump contains the refrigerant R134a, which may be harmful to the environment if not handled properly.