Vent R/C 2/4/6

User's guide

EN

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1.   General.

The control system is based on the following control units:

- A STXC2 control circuit board that is mounted in the ventilation unit.
- A STPT circuit board with a two-channel pressure sensor. It is mounted in the ventilation unit.
- A STCU wall mounted MMI (Man Machine Interface).
- A STLD wall mounted flow chart with LED's (option).
- A STIO circuit board for connection to a BMS (Building Management System) (option).

A single wire system (serial) communication) connects the circuit boards.

1.1   Control circuit board STXC2.

The STXC2 control circuit board and the two-channel pressure circuit board STPT2 give complete control of air temperature and air volume by measuring and regulating the incoming signals (data).

The control of the air volume set point is displayed in m³/h, and keeps the air volume constant independent of the duct pressures.

Regulating the amount of energy recovery by speed control of the heat wheel or, controlling the by-pass damper in an air-to-air plate heat exchanger controls the temperature.
The active part of the temperature control is based on a plug connection on the ventilation unit. The plug gives the possibility of connecting an external electric or water (LPHW) heating coil.
The ventilation system can also control a Chilled water or DX cooling coil.

There is the option of pre-cooling at night in the summer periods and reduction of ambient air introduction in extreme cold winter periods.

1.1.1 Function switch.

The ventilation unit is equipped with a function switch that has the positions **AUTO**, **OFF** and **MAN** (Manual).
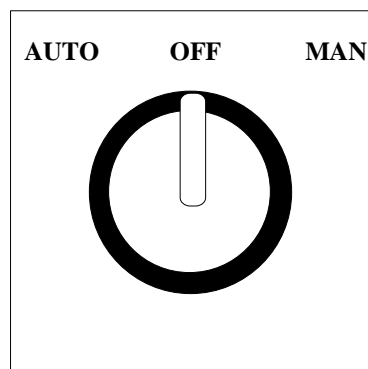
If the serial connection to the MMI is not present and the function switch is in position **MAN**, the ventilation unit is controlled by the following factory settings on the control circuit board STXC2:

- Humidity set point: 60%.
- Ambient air volume: 100% (with mixing section).
- Fan set point: Maximum air volume.
- Temperature set point: 20°C (room temperature control).

The MMI is connected and the function switch is in position **MAN**, the ventilation unit is controlled by the manual settings. See chapter *2.5 Setting of manual running mode*.

The ventilation unit is controlled in a priority, that defines the operational mode:

1:   The function switch on the ventilation unit has the highest priority.

2:   Then the communication module STIO controls the operation. See chapter *1.5 Communication module STIO*. The function switch on the ventilation unit is in position **AUTO**.

3:   The MMI STCU controls the operation. See chapter *1.3 MMI STCU description*.
     By activating the push button **Manual** the ventilation unit is controlled by the manual settings.
     By activating the push button **Auto** the ventilation unit is controlled by the week program.
     The function switch on the ventilation unit is in position **AUTO**.

1.2   MMI STCU.

The separate STCU MMI is equipped with an alphanumeric display and push buttons, and can be placed on a wall up to 50m away from the ventilation unit. The wiring must not be fitted outside the building. The ventilation unit is simple to operate with the MMI and it is with this that the settings for the running conditions are entered.

The primary settings for the running conditions are entered in a week program.

A six-wire plug connection connects the control circuit board STXC2 to the MMI.
If the function switch on the ventilation unit is in position **AUTO** the ventilation unit will not run without the MMI or the communication module STIO connected (*See chapter 1.5 Communication module STIO (Option)*).

If the serial connection to the MMI is not present and the function switch is in position **MAN**, the ventilation unit is controlled by the following factory settings on the control circuit board STXC2 (*See chapter 1.1.1 Function switch*).

1.3 MMI STCU description.

The MMI STCU unit is delivered in a separate cabinet ready for DIN-rail mounting on a wall. The display texts on the MMI STCU can be selected in Danish, English or Swedish.

The MMI STCU is equipped with an alphanumeric display, a three-coloured indication LED and eight push buttons.
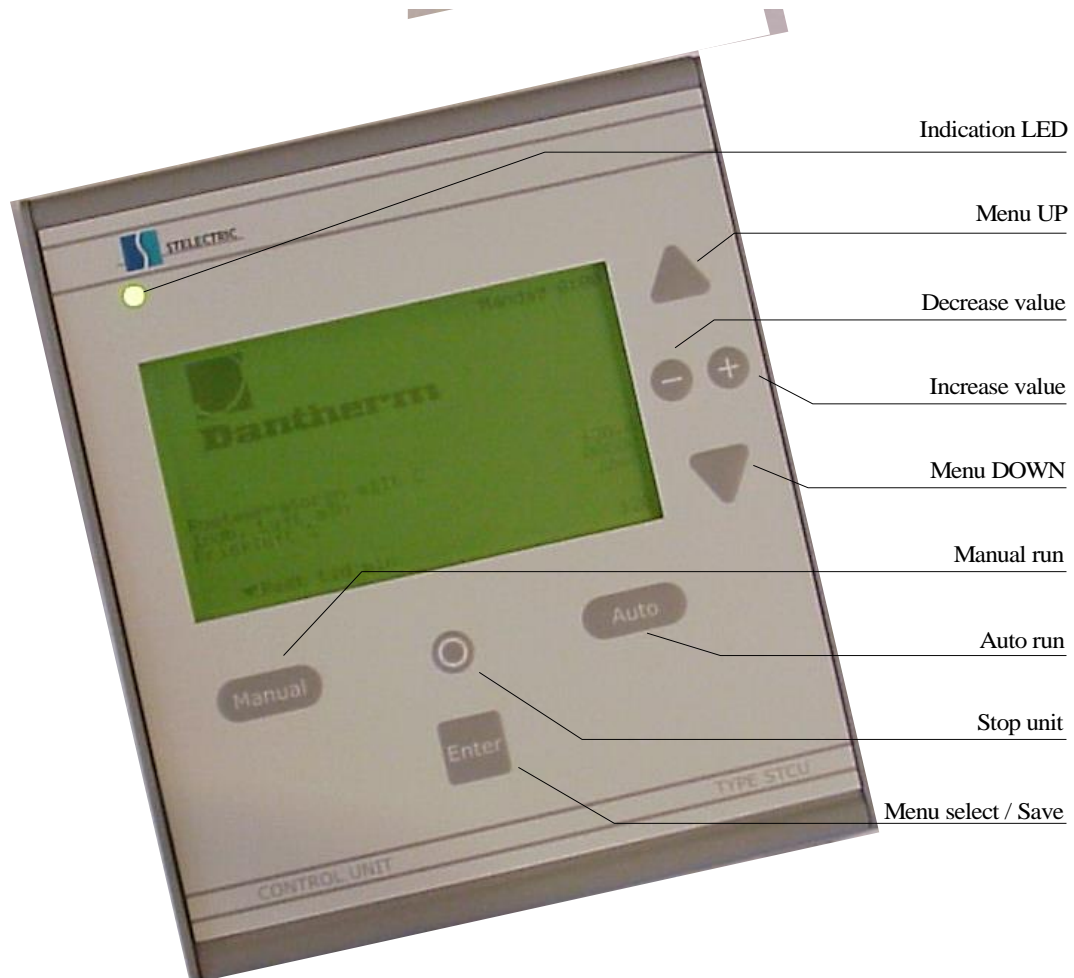
The three-coloured indication LED provides information quickly about the running condition:

- Green: The ventilation unit is OK.
- Yellow: The ventilation unit needs inspection but runs (blocked filter).
- Red: The ventilation unit is stopped due to a critical failure.

The indication LED shifts from green to yellow or red if a failure occurs on the ventilation unit. The relevant alarm text is shown on the display (*See chapter 2.7 Alarms*).

The three push buttons **Manual**, **0** and **Auto** are used to select the running mode of the ventilation unit. The lowest line on the display indicates the actual running mode with the symbol ♦, which points to one of the three push buttons.

By activating **Manual** the ventilation unit is switched to run in manual mode, that is user defined (*See chapter 2.5 Setting of manual running mode*). The ventilation unit will now run according to the manual settings for the next 2 hours (*factory setting 2 hours - maximum 24 hours*) and, once this time has elapsed it will return back to the settings in the week program.
This function is very useful if, for example, you want to start or stop the ventilation unit in unoccupied periods, without making changes in the week program.

By activating **0** the ventilation unit stops until **Auto** or **Manual** gets activated. This function can be useful if you want to stop the ventilation unit on short working days.

By activating **Auto** the ventilation unit follows a pre-defined week program, which is user defined (*See chapter 2.6 Setting a week program*).

The following push buttons are used to select menu and change/save settings on the display.

By pressing ♦ or ♦ it is possible to pick a specified menu line. The highlighted menu line shows the actual sub menu.

When you want to select a sub menu you have to press **Enter**.

To increase or decrease a set point value push the buttons + or –. Press **Enter** to save the corrected set point.

Moving to a menu that is above the actual menu press ♦ until the required menu appears.

1.4   Flow chart (option).

A flow chart equipped with LED's can be connected to the MMI. The flow chart indicates the actual condition for security thermostats, fans, filters etc.
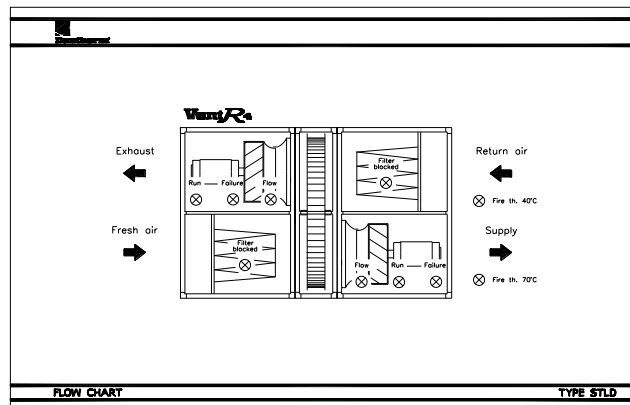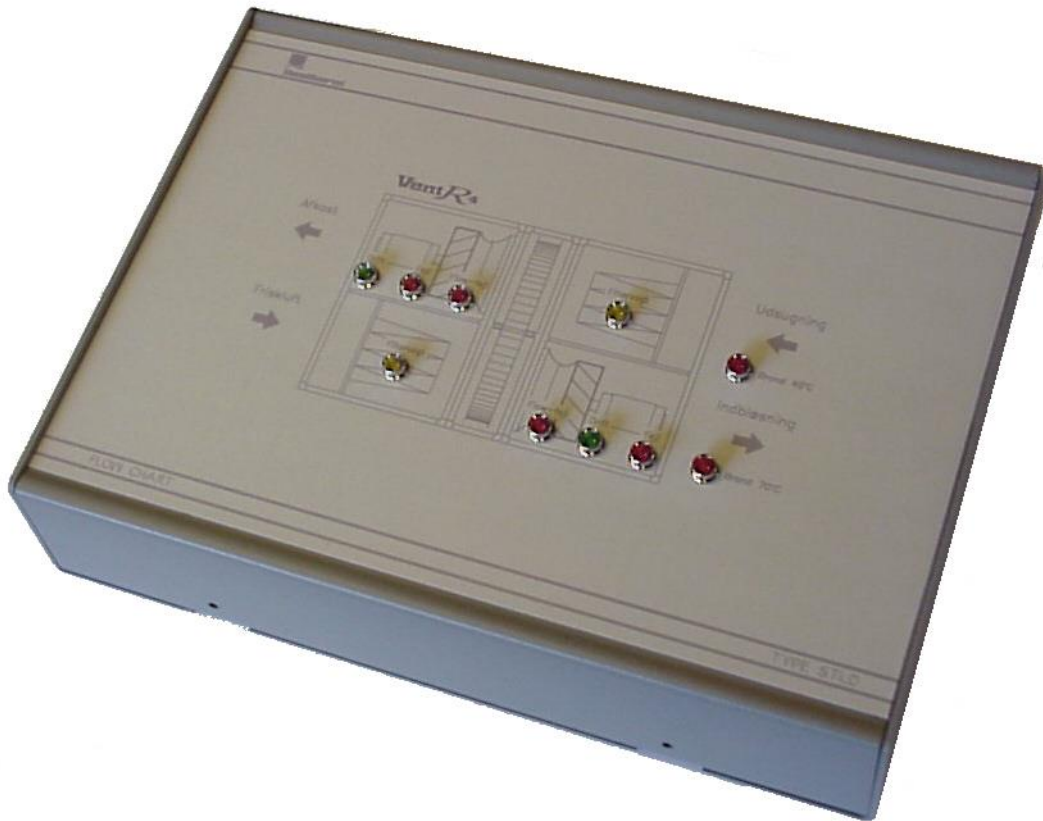
The flow chart gives an easy to read and a clear view of run and fault conditions in the ventilation unit.

1.5   Communication module STIO (option).

Connection of the communication module STIO via the serial communication line it enables the
operation and monitoring by the BMS. The function switch on the ventilation unit is in position
AUTO when using the communication module.

By activating the analogue and digital inputs of the STIO the control will more or less be taken from
the MMI STCU.

The analogue inputs are connected to 2-10VDC signals and the digital outputs are activated by
24Vac or 12VDC supply. Some of the analogue inputs have predefined functions as set points and
running conditions.
Every single input has it's own enable input, that activates the specific function. Functions that not
are selected on the STIO will automatically be controlled by the MMI STCU.

The analogue and digital outputs makes external monitoring possible.

2. User's guide.

2.1 Main menu.

When there has been no activity for a few minutes the display will show the following primary menu:

```
                                           Monday 12:21



            Dantherm®




    Actual room temp C                      +20,7
    Supply m3h                              02500

    Actual prog no  01                         ▼
```
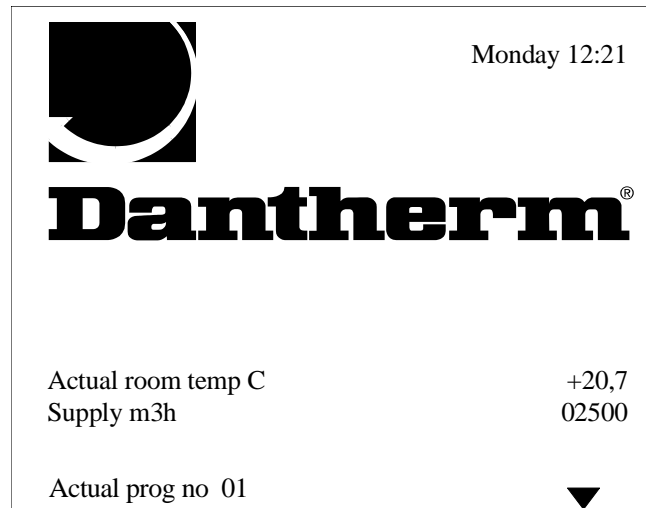
The actual room temperature, supply air volume and the running program step are shown on the display.
If the ventilation unit is equipped with damper motors (ON/OFF or modulated 0-10V) on the fresh air duct and exhaust air duct or a humidity sensor, the status for these is also shown on the display.

By pressing **Enter** the display shifts to the main menu. The backlight on the display is turned on. If no push button has been activated within 2 minutes, the STCU automatically turns back to the primary menu and the back light is turned off.

```
    Main menu                     Monday 12:21
    ☐   Adjustm. / clock
    ■   Ventilation / climate
    ■   Alarms
    ■   Technical data
        ▼
```
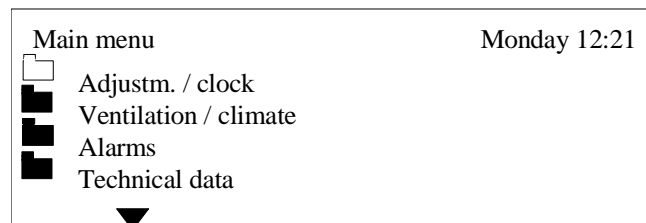
The push buttons ⬥ and ◆ shift between the sub menus.

2.2   Display set-up.

2.2.1 Language selection.

From the main menu the sub menu *Technical data* is selected. The sub menu *Language* appears:

```
Main menu                              Monday 12:21
  Technical data
     Language
        English
     Danish
     Swedish
              ▼
```
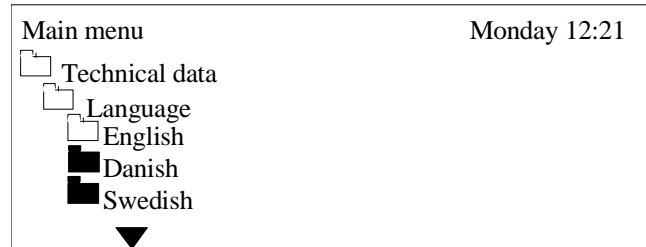
Selecting a language with the push buttons ⬩ and ♦. Then press **Enter** and the language is selected.

2.2.2 Adjusting the display contrast.

From the main menu the sub menu *Technical data* is selected. The sub menu *Processor* appears:

```
Main menu                              Monday 12:21
   Technical data
      Processor
         Run time                           00023
         Comm error %                         034
         STCU CpuVer                          017
         STXC CpuVer                          015
         STPT CpuVer                          011
         STHP CpuVer
         STIO CpuVer
         Mode                                   9
         Com Retry                          00726
```
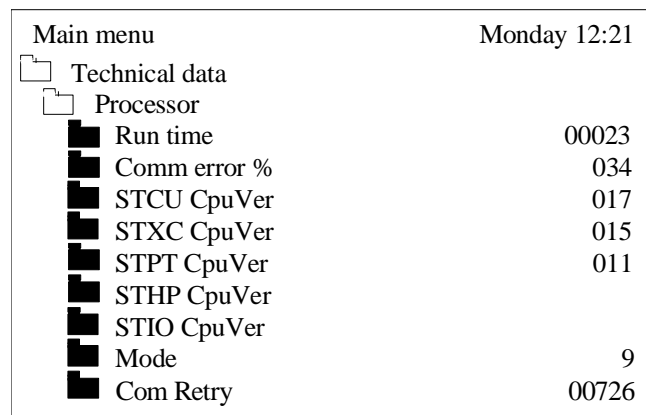
By pressing the push buttons **-** and **+** it is possible to adjust the display contrast. Then press **Enter** and the selected display contrast is saved.

2.3   Time setting.

From the main menu the sub menu ***Adjustm. / clock*** is selected. Select the sub menu ***Clock adjust***:

```
Main menu                                Monday 12:21
  ☐ Adjustm. / clock
    ☐ Clock adjust
      ☐ Day                                     Monday
      ■ Time                                      13:31
      ■ Date                                         29
      ■ Month                                        06
      ■ Year                                         00


            ▼
```
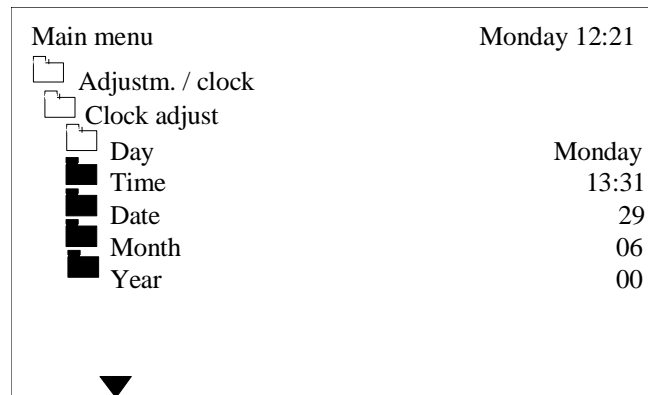
By pressing the push buttons ⬧ and ♦ the actual data for weekday, time, date, month and year are selected. The settings are changed by the push buttons + and −. Press **Enter** after inputting the settings and the changes are saved.

2.4   Filter configuration.

It is necessary to run the filter test program at a specific air volume ("filter check value") to enable & set the filter failure (dirty filter) alarm. It is only possible to get an alarm at the specific air volume. The filter test is made by the following procedure:

1.   The ventilation unit is turned off. The function switch is in position **OFF**.
2.   The push button **0** is activated on the MMI STCU.
3.   Choose a maximum air volume [m³/h].
       Choose an acceptable differential pressure loss for the filter(difference between clean and dirty filter).
       Dantherm Air Handling recommends a differential pressure loss of **60 Pa**.
       The function switch on the ventilation unit is now turned to position **AUTO**.
       In the following example a "filter check value" at 2500m3h is used. This is the air volume setting used in the week program (*See chapter 2.6 Setting a week program*).

```
Main menu                        Monday 12:21
⌐ Technical data
     ⌐ Filter configuration
         ⌐ Check at m3h                02500
         ■ Accepted d/Pa               0060
         ■ Start filtertest            ENTER



                         ▼
```

Use the push button ♦ to select the data point *Start filtertest* and press **ENTER**.

The control system accelerates the fan motors up to the selected "filter check value". 350 seconds after the fan motors are accelerated up to their maximum speed they run for further 50 seconds. Data for the ventilation unit is set.

```
Main menu                        Monday 12:21
⌐ Technical data
     ⌐ Filter configuration
         ⌐ Check at m3h                02500
         ■ Accepted d/Pa               0060
         ■ Start filtertest            ENTER

     Measuring wait sec.              400
                         ▼
```

The time left for the filter test is show on the display.

With 48 seconds remaining the control system gives a feedback about the filter test.

```
Main menu                        Monday 12:21
⊡ Technical data
    ⊡ Filter configuration
        ⊡ Check at m3h                02500
        ■ Accepted d/Pa               0060
        ■ Start filtertest            ENTER

        Measuring wait sec.           048
        Filter test Ok
                            ▼
```
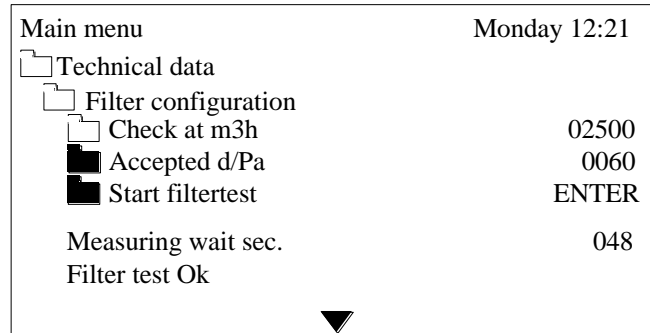
If the selected "filter check value" is near the maximum air volume that the ventilation unit can handle, the filter test will fail.

```
Main menu                        Monday 12:21
⊡ Technical data
    ⊡ Filter configuration
        ⊡ Check at m3h                02500
        ■ Accepted d/Pa               0060
        ■ Start filtertest            ENTER

        Measuring wait sec.           048
        Filter test failed
                            ▼
```
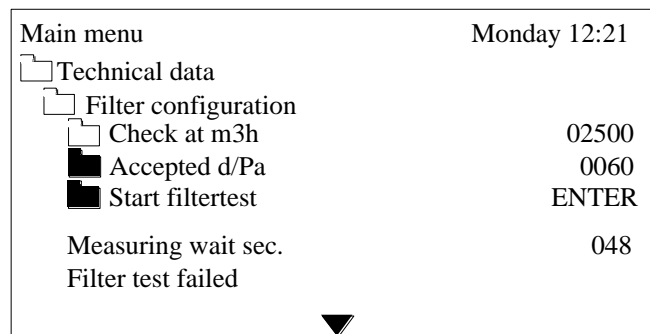
If a lower air volume is accepted in the week program, the filter test can be made another time with a lower "filter check value".

But if a lower air volume is̲n̲'̲t̲ accepted in the week program, the ventilation unit can't run with automatic filter surveillance.
In the configuration menu the function automatic filter surveillance (menu point *"Auto filter surv."*) is then going to be disabled. See service engineer's guide for further information.

After 400 seconds (approximately 7 minutes) the ventilation unit is ready for use.

2.5   Setting of manual running mode.

From the main menu the sub menu *Adjustm. / clock* is selected. Select the sub menu *Manual override*. After pressing **Manual** the ventilation unit will run with the following data:

```
Main menu                          Monday 12:21
  ⌷ Adjustm. / clock
    ⌷ Manual override
      ⌷ Temp set point C                    20
      ■ Ventilation m3h                  02500
      ■ Manual hours                        02

        ▼
```

Temperature, air volume and manual-time are displayed. Settings are adjusted by pressing the push buttons + and −.

Select the data point *Manual hours* for setting the running time (setting in whole hours from 1 to 24 hours) in manual. After this time has elapsed the ventilation unit reverts to the settings in the week program.

After inputting the settings press **Enter** to save.

2.6   Setting a week program.

From the main menu the sub menu ***Adjustm. / clock*** is selected. Select the sub menu ***Program step***:

```
Main menu                        Monday 12:21
  📁  Adjustm / clock
     📁  Program step
        📁  Program step no              01
        ■  Ventilation m3h            02500
        ■  Day(s)                    Monday
        ■  Time                        08:00
        ■  Temp set point C              20
        ■  Night cooling                 No

          ▼
```
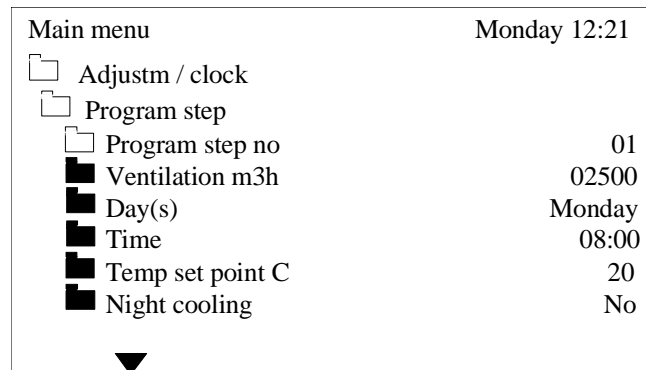
Pick a specific data point with the push buttons ⬦ and ♦.

In the data point *Program step no* the program step is selected (**maximum 20 steps**), which is going to be changed.

Individual days can be selected such as Monday, Tuesday, Wednesday etc., workdays can be selected (Monday to Friday), weekends can be selected (Saturday and Sunday) and a full week (Sunday to Monday).

Time (24 hour clock), temperature and air volume are selected by the push buttons + and −.

After inputting the settings in a program step press **Enter** to save. The next program step can be selected in the data point *Program step no*.

In any unused program steps up to 20, the data point *Time* has the setting --: --. The control system will then jump to the next program step.
The data point setting *Time* has the default factory setting --: --.

Setting for mixing section
If the ventilation unit is equipped with damper motors in a mixing section, fresh air setting can be chosen from 0 (closed) to 100 (fully open).

2.6.1 Example of setting a week program.

The following shows an example of a week program including cooling at summer nights (*See chapter 3.2.3 Cooling at summer nights*). For further information see chapter *2.6 Setting a week program.*

Program step no. 01 and 02:
The week program begins by turning the ventilation unit on, on workdays at 08.00 and ventilation unit is turned off at 16.00.
   The room/return temperature set point is 20°C.

Program step no. 03:
The ventilation unit runs providing free cooling on summer nights on workdays, early in the morning from 04.00.
   Free cooling on summer nights:
   The most suitable period to use the function free cooling on summer nights is at night or early in the morning. A quick cooling of the room is achieved.

Program step no. 04:
The ventilation unit is turned off at the weekend.

Program step no.: 01.

Main menu	Monday 12:21
📁 Adjustm / clock	
📁 Program step	
📁 Program step no	01
⬛ Ventilation m3h	02500
⬛ Day(s)	Workd.
⬛ Time	08:00
⬛ Temp set point C	20
⬛ Night cooling	No
▼	

Program step no.: 02.

Main menu	Monday 12:25
📁 Adjustm / clock	
📁 Program step	
📁 Program step no	02
⬛ Ventilation m3h	OFF
⬛ Day(s)	Workd.
⬛ Time	16:00
⬛ Temp set point C	20
⬛ Night cooling	No
▼	

The room/return temperature has a default factory setting of *20 °C*. When the ventilation unit is turned off, the room will not be supplied with heating.

Program step no.: 03.

Main menu	Monday 12:28
🗁 Adjustm / clock	
🗁 Program step	
🗀 Program step no	03
■ Ventilation m3h	OFF
■ Day(s)	Workd.
■ Time	04:00
■ Temp set point C	20
■ Night cooling	Yes
▼	

Program step no.: 04.

Main menu	Monday 12:35
🗁 Adjustm / clock	
🗁 Program step	
🗀 Program step no	04
■ Ventilation m3h	OFF
■ Day(s)	Weekend
■ Time	00:01
■ Temp set point C	20
■ Night cooling	No
▼	

2.7   Alarms.

If the ventilation unit does not work properly, an alarm is shown on the display and the indication
LED shifts colour from green to yellow or red.

	Monday 12:21
Dantherm®	
Alarm	
Fail preheat	
Actual room temp C	+20,7
Supply m3h	02500
Actual prog no 01	▼
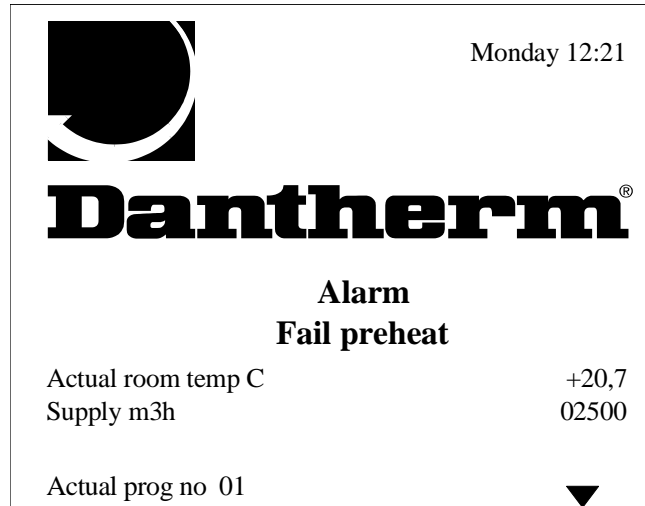
The indication LED lights yellow as a warning. A non-critical failure has appeared. The ventilation
unit does not stop, but only needs inspection:
- **"Filter exhaust"**
- **"Filter supply"**

The indication LED shifts to red. A critical failure has appeared. The ventilation unit is stopped (not
Heat wheel):
- **"Fail preheat"**
- **"Fail reheat"**
- **"Fire supply"**
- **"Fire exhaust"**
- **"Fan supply"**
- **"Fan exhaust"**
- **"Flow supply"**
- **"Flow exhaust"**
- **"Supply sensor"**
- **"Return sensor"**
- **"Ambient sensor"**
- **"Preheat sensor"**
- **"Heat wheel"**

A critical failure must be manually reset so that the ventilation unit can be re-started.

If the connection to the STXC2 control circuit board is not present, the following communication
failure appears on the display:

- **"No STXC Detected"**

The indication LED is in this case switched off.
 To get information about the alarms select the menu *Alarms* in the main menu:

```
┌─────────────────────────────────────────────┐
│                                               │
│  📁  Adjustm. / clock                          │
│  ■  Ventilation / climate                     │
│  ■  Alarms                                    │
│  ■  Technical data                            │
│                    ▼                          │
└─────────────────────────────────────────────┘
```
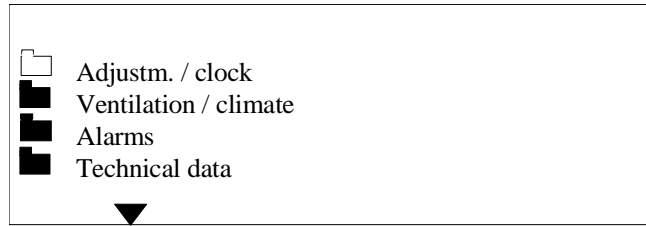
Two sub menus gives information about the actual alarms and alarms listed in a "alarm history" that have occurred since the last power failure:

```
┌─────────────────────────────────────────────┐
│  Main menu                    Monday 12:21    │
│  📁 Alarms                                     │
│     📁 Actual                                  │
│        ■ History                              │
│                    ▼                          │
└─────────────────────────────────────────────┘
```

Actual alarms:
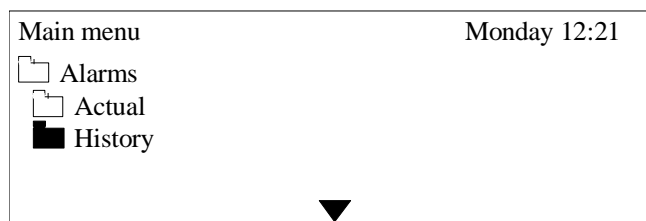
```
┌─────────────────────────────────────────────┐
│  Main menu                    Monday 12:21    │
│  📁 Alarms                                     │
│     📁 Actual                                  │
│        ■ No failures                          │
│                    ▼                          │
└─────────────────────────────────────────────┘
```
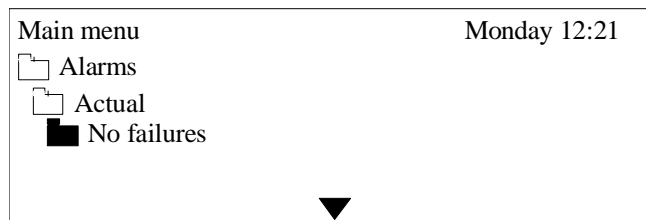
Alarms since
last power failure:

```
┌─────────────────────────────────────────────┐
│  Main menu                    Monday 12:21    │
│  📁 Alarms                                     │
│     📁 History                                 │
│        ■ Power failure                        │
│        ■ 15:34 02-10-00                       │
│                    ▼                          │
└─────────────────────────────────────────────┘
```

Alarms listed in the "alarm history" disappear at power failure or if the connection between the control circuit board STXC2 and the MMI STCU has been disconnected.

2.7.1 Critical failure reset.

If the ventilation unit is stopped due to a <u>critical failure</u>, then follow these instructions:

Frost thermostat has sensed a frost condition
The frost thermostat has a manual reset. The failure is reset on the frost thermostat.

Fire thermostat has sensed a fire condition
The fire thermostat has a manual reset. The failure is reset on the fire thermostat.

Overheating thermostat - OT
The overheating thermostat mounted on the electrical heating coil and is a manual reset. The failure is reset on the overheating thermostat.

Stopped fan motor
Switching off the mains power supply for a few minutes resets a fan failure. The mains isolator is located on the ventilation unit.
If this doesn't solve the problem, it is necessary for further information; this can be obtained by opening the cover on the fan motor. Under the cover a green and a red LED indicate the fan motor condition.
See service engineer's guide chapter *7. Indicator lights and fault signal output* for further information.

Missing airflow
Missing airflow through the ventilation unit is reset by pressing buttons ♦ and ♦ at the same time and hold for a few seconds.
Another possibility is turning the function switch on the ventilation unit in position **OFF** and then turn it back to the desired position.

Temperature sensor failure
A temperature sensor failure appears due to a short circuit or a missing connection to the sensor.
The failure is corrected at the sensor connection or at the wiring.

Communication failure
On the MMI the text appears "No STXC Detected". This is due to a broken connection in the wiring between the control circuit board STXC2 and the MMI STCU.

Heat wheel failure
See service engineer's guide chapter *8. Finding errors on frequency converter for heat wheel* for further information.

2.8   Reading the actual conditions.

From the main menu the sub menu *Ventilation / climate* is selected. Other sub menus appear:

```
Main menu                        Monday 12:21
⌐ Ventilation / climate
    ⌐ Room conditions
    ■ Ambients
    ■ Ventilation
        ▼
```
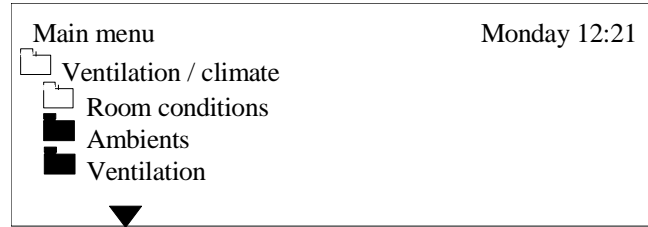
The sub menu *Room conditions* is selected:

```
Main menu                        Monday 12:21
⌐ Ventilation / climate
    ⌐ Room conditions
        ■ Supply temp. C              +21,2
        ■ Return temp. C              +20,7
            ▼
```
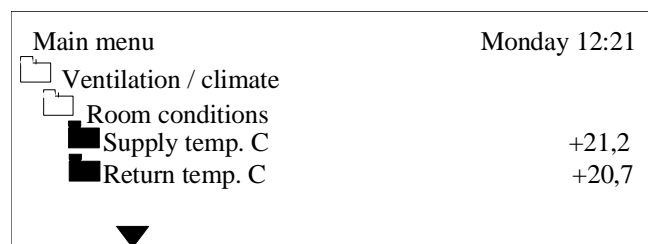
Here the actual values for the supply air and return air temperatures are indicated.

The sub menu *Ambients* is selected:

```
Main menu                        Monday 12:21
⌐ Ventilation / climate
    ⌐ Ambients
        ■ Ambient temp. C              +24,3
        ■ Preheat temp. C              None
            ▼
```
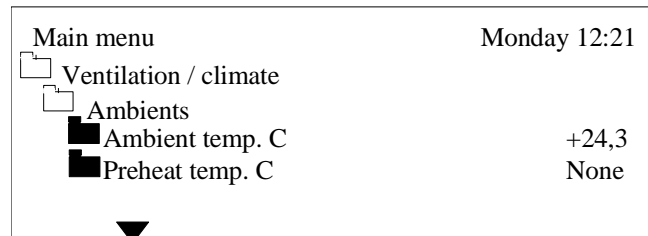
Here the actual values for the ambient air and the preheat air temperatures are indicated. If in this case a preheat air sensor is not mounted, the display shows *None*.

The sub menu *Ventilation* is selected:

```
Main menu                        Monday 12:21
⌐ Ventilation / climate
    ⌐ Ventilation
        ■ Supply air %                025
        ■ Supply press Pa             0118
        ■ Supply m3h                  01320
        ■ Return air %                027
        ■ Return press Pa             0128
        ■ Return m3h                  01620
            ▼
```
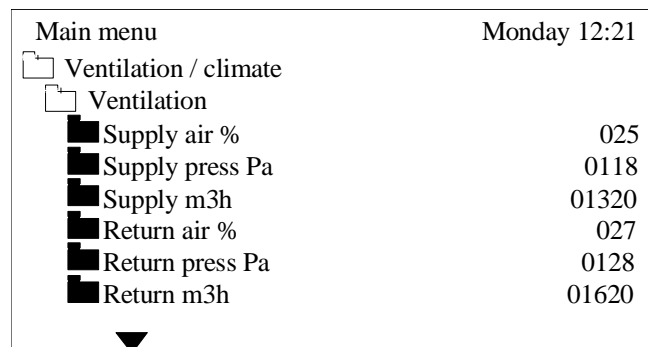
Here the actual values for the ventilation are indicated:

Supply air % / Return air %
Output voltage (control signal) to the fan motors.
0% = 0V and 100% = 10V.

Supply press Pa / Return press Pa
The measured differential pressure across the fans. The value is used for calculating the air volume.

Supply m3h / Return m3h
The air volume being produced by the fans.

2.9   Reading technical data.

In the main menu the sub menu *Technical data* is selected:

```
Main menu                        Monday 12:21
📁 Technical data
    📁 Sensor inputs
    ▪ Control outputs
    ▪ On/off inputs
    ▪ Function switch
    ▪ On/off outputs
    ▪ Override set points
    ▪ Filter configuration
    ▪ Processor
    ▪ STIO Data
    ▪ Language
         ▼
```
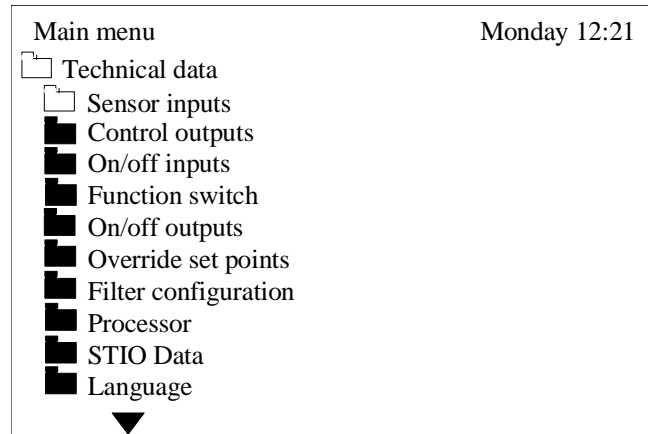
When the sub menu *Sensor inputs* is selected:

```
Main menu                        Monday 12:21
📁  Technical data
    📁  Sensor inputs
    ▪ Supply sensor C              +21,7
    ▪ Return sensor C              +20,3
    ▪ Ambient sensor C             +24,3
    ▪ Preheat sensor C              None
    ▪ Fan override %                 000
    ▪ Humidity %                     062
    ▪ Temp.displacement             -2,3
    ▪ Supply press Pa               1280
    ▪ Return press Pa               1262
         ▼
```
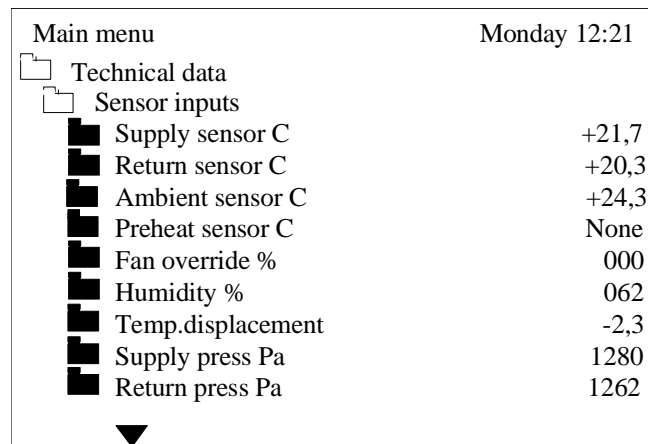
Here the actual values for temperatures, humidity, external fan speed override, temperature displacement and differential pressure across the fans are indicated.

When the sub menu *Control outputs* is selected:

```
┌──────────────────────────────────────────────┐
│ Main menu                     Monday 12:21     │
│ ▢ Technical data                               │
│    ▢ Control outputs                           │
│    ▣ Reheat %                          100     │
│    ▣ Preheat %                        None     │
│    ▣ Heat recovery %                   100     │
│    ▣ Damper %                          000     │
│    ▣ Supply fan %                      000     │
│    ▣ Exhaust fan %                     000     │
│    ▣ Extra cooling %                   000     │
│    ▣ Analog output 1 %                 000     │
│    ▣ Analog output 2 %                 000     │
│      ▼                                         │
└──────────────────────────────────────────────┘
```

Here the actual values for output signals 0-100% is indicated.

When the sub menu *On/off inputs* is selected:

```
┌──────────────────────────────────────────────┐
│ Main menu                     Monday 12:21     │
│ ▢ Technical data                               │
│    ▢ On/off inputs                             │
│    ▣ Fail preheat                    Alarm     │
│    ▣ Fail reheat                        Ok     │
│    ▣ Fire supply                        Ok     │
│    ▣ Fire exhaust                       Ok     │
│    ▣ Fan fail supply                    Ok     │
│    ▣ Fan fail exhaust                   Ok     │
│    ▣ Flow supply                        Ok     │
│    ▣ Flow exhaust                       Ok     │
│    ▣ Filter supply                      Ok     │
│    ▣ Filter exhaust                     Ok     │
│    ▣ Heat wheel                         Ok     │
│    ▣ De-ice bypass                     Off     │
└──────────────────────────────────────────────┘
```

Here the actual status for failure inputs and de-icing the heat exchanger (*De-ice bypass*) are indicated. If the ventilation unit is working correctly the status will show **Ok**. If a data point is in alarm, status will show **Alarm** (*See chapter 2.7.1 Critical failure reset*).
The heat exchanger de-icing status is shown as **Off** (no icing up) or **On** (icing up).

When the sub menu *Function switch* is selected:

```
┌─────────────────────────────────────────────┐
│ Main menu                     Monday 12:21    │
│ ┌┐                                            │
│ └┘ Technical data                             │
│   ┌┐                                          │
│   └┘ Function switch                          │
│    ■ Function auto                    On      │
│    ■ Function low                     Off     │
│    ■ Function high                    Off     │
│       ▼                                       │
└─────────────────────────────────────────────┘
```
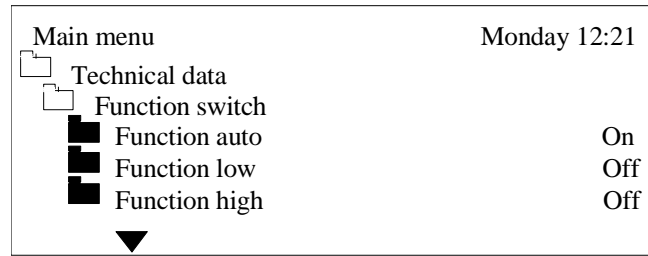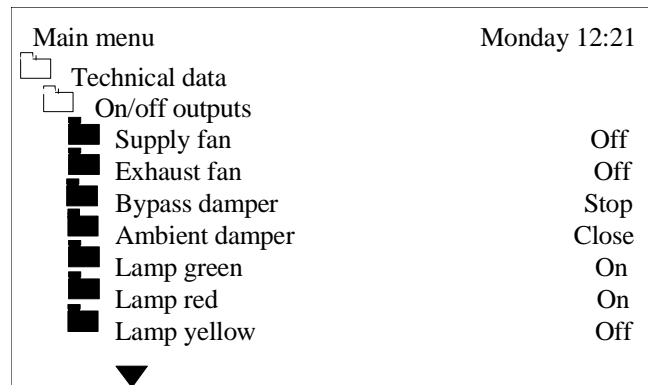
Here the function switch position is indicated. A selected position is shown as **On**, the other positions are shown as **Off**.
If every data point is shown as **Off**, the function switch is in position OFF and the ventilation unit is stopped.

When the sub menu *On/off outputs* is selected:

```
┌─────────────────────────────────────────────┐
│ Main menu                     Monday 12:21    │
│ ┌┐                                            │
│ └┘ Technical data                             │
│   ┌┐                                          │
│   └┘ On/off outputs                           │
│    ■ Supply fan                       Off     │
│    ■ Exhaust fan                      Off     │
│    ■ Bypass damper                    Stop    │
│    ■ Ambient damper                   Close   │
│    ■ Lamp green                       On      │
│    ■ Lamp red                         On      │
│    ■ Lamp yellow                      Off     │
│       ▼                                       │
└─────────────────────────────────────────────┘
```

Here the status for the outputs is indicated.

Supply fan:	**On** (fan runs) and **Off** (fan is stopped).
Exhaust fan:	**On** (fan runs) and **Off** (fan is stopped).
Bypass damper:	**Open** (damper opens), **Close** (damper closes) and
	Stop (damper motor is stopped).
Ambient damper:	**Open** (damper opens), **Close** (damper closes).
Lamp green:	**On** - voltage on the ventilation unit.
Lamp red:	**On** - a critical failure on the ventilation unit. **Off** - no critical failure.
Lamp yellow:	**On** - a filter is dirty. **Off** - no dirty filter.

When the sub menu ***Override set points*** is selected:

```
┌─────────────────────────────────────────────┐
│ Main menu                      Monday 12:21   │
│ 📁 Technical data                             │
│    📁 Override set points                     │
│       ■ Humidity %                    63      │
│       ■ Min. supply                   16      │
│       ■ Fan override                  10      │
│       ■ Max air volume              1700      │
│            ▼                                  │
└─────────────────────────────────────────────┘
```

Override set points for humidity, minimum supply temperature and fan speed are selected in this menu.

Humidity %:   This menu item is only visible if "YES" is choosen in the "Humidity sensor" menu in the controller configuration menu. For further information, please see the service manual, section 5.
When the measured humidity rises above the set point (**40 - 70%**), the fan speed increases to 100%. See chapter *3.5 Humidity override* for further information.

Min. supply: The minimum supply temperature (**5 - 40°C**).

Fan override: The set point **0 - 100%** defined by a sensor output signal 0 - 10V (0 - max.value).
When the measured input value rises above the set point, the fan speed increases to 100%. See chapter *3.6 Fan override* for further information.

Max. air volume:
Key in the maximum allowed air volume at override (humidity or fan override)

When the sub menu ***Processor*** is selected:

```
┌─────────────────────────────────────────────┐
│ Main menu                      Monday 12:21   │
│ 📁 Technical data                             │
│    📁 Processor                               │
│       ■ Run time                   00023      │
│       ■ Comm error %                 034      │
│       ■ STCU CpuVer                  017      │
│       ■ STXC CpuVer                  015      │
│       ■ STPT CpuVer                  011      │
│       ■ STHP CpuVer                           │
│       ■ STIO CpuVer                           │
│       ■ Mode                           9      │
│       ■ Com Retry                  00726      │
└─────────────────────────────────────────────┘
```

Here the data for the control system are listed.

Run time: The total running time (hours) for the ventilation unit.
Comm error % and rest of the data points: Data used by Dantherm Air Handling AS/.

When the sub menu **STIO Data** is selected:

Main menu	Monday 12:21
📁 Technical data	
📁 STIO Data	
◼ Humidity %	063
◼ Fan override %	020
◼ Temp set point C	21
◼ Ventilation m3h	02500
◼ Exhaust volume	100
◼ Fresh air %	
◼ Temp. Ctr. sensor	R
◼ Night cooling	Off
◼ Auto	On
◼ Manuel	Off
◼ Cooling	Off

Here the data from the STIO communication module can be read.

3.   Control strategy.

3.1   Ventilation.

When all the safety components (frost, fire and fan failures) are in ON-position and the ventilation unit is turned ON, the fresh air damper and the exhaust air damper opens. After 30 seconds the fans start. The fans will then run with the settings input in the control system.

3.1.1 Fresh air reduction at low outside temperatures.

The supply fan speed is reduced gradually to 2/3rds of the set point value, when the supply temperature has reached a minimum temperature.
The function can be selected in the configuration menu.

3.1.2 Filter surveillance.

The control system has an automatic surveillance of dirty filters.

The control system accelerates the fan motors up to the selected "filter check value".
350 seconds after the fan motors are accelerated up to their maximum speed they run for a further 50 seconds. Data for the ventilation unit is then recorded.

When the control signal is increased by 10% (to reach the same air volume pressure) alarm for dirty filter is given and the indication LED on the MMI STCU shifts to yellow.

3.2   Temperature control.

On the MMI STCU the desired room or supply temperature is selected between 15 and 35°C. The control system keeps the room or supply temperature constant by controlling the reheater coil, bypass damper (air-to-air plate heat exchanger) or speed control of the heat wheel.

The heat requirement is split into 1/100 (0-100%). The temperature P-band setting (5 to 50°C) is made on the control circuit board STXC2 in the ventilation unit.
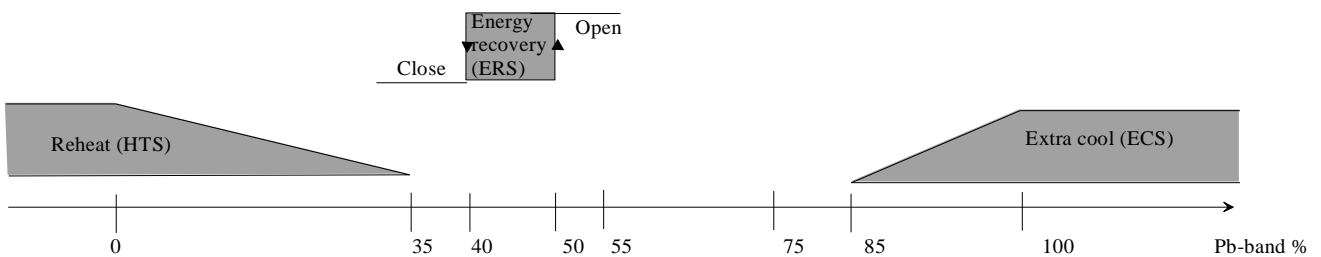
3.2.1 Heat recovery.

In an air-to-air plate heat exchanger the By-pass damper takes 10% (hysteresis) of the P-band between heating mode and cooling mode (more fresh air for cooling).

When heating is needed, the bypass damper closes by pulsing (runs slowly). When cooling is needed, the bypass damper opens by pulsing. If the outside temperature is higher than the return air temperature, the bypass damper will not open.

The heat wheel heat recovery works the same way as the bypass damper and takes 10% of the P-band between heating mode and cooling mode. The function is linear.

If more heat is required, the heat wheel speed increases (2-10V output signal rises). When the heat requirement reduces, the heat-wheel speed decreases.

3.2.2 Reheater coil.

The active part of the temperature control is a plug connection on the ventilation unit, where a re-heater coil can be connected (electrical heating coil or LPHW coil).

A reheater coil is controlled by a 2-10V signal.

3.2.3 Cooling at summer nights.

The function cooling at summer nights is used for cooling the room in the summer period.
The most suitable period to use the function cooling at summer nights is at night or early in the morning before the ventilation requirement is turned on.

When the week program permit the function cooling at summer nights, the ventilation unit starts up if there haven't been need of heating in the last running period.
The ventilation unit starts up slowly and 3 minutes later the room/return and ambient temperature is measured. If the following conditions for the function cooling at summer nights are present, the ventilation unit continues to run. Else the ventilation unit stops.

Conditions for the function cooling at summer nights:
The measured room/return temperature must be higher than the temperature set point +2°C.
The measured ambient temperature must be lower than the room/return temperature -2°C.

See example on week program using the function cooling at summer nights, chapter *2.6.1 Example of setting a week program*.

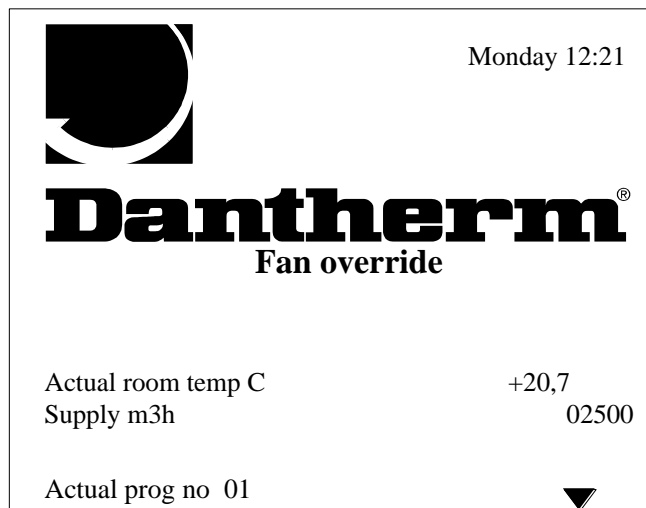### 3.3 Clean blowing function - heat wheel.

The heat wheel is rotated for 1 minute every hour if there has been no rotation during one-hour (5V control signal) to prevent a build up of particulate.

3.4 De-icing function.

If the differential pressure across the heat exchanger rises above a set point value measured by an extra mounted pressurestat (extra), then de-icing will take place.

3.5 Fan override.

When the measured input value (0-10V the same as 0-100%) on analogue input IN1 on the control circuit board STXC2 rises above the setpoint, the fan speed will increase so that the air volume gradually increases to the maximum value, keyed in under the menu "Override set points" See further information in section 2.9 Reading technical data/Override set points for setting of set points and maximum air volume.. The display shows the text **"Fan override"**.


```
                                    Monday 12:21



          Dantherm®
             Fan override



    Actual room temp C              +20,7
    Supply m3h                      02500

    Actual prog no  01          ▼
```

3.5.1 Override humidity.

The fresh air damper and the exhaust air damper (modulating damper motors) in a mixing section are overridden to open 100% if the measured humidity is between the setpoint and 10% above the setpoint. If the humidity rises further, the fan speed increases gradually to set max value.
When the humidity has fallen beneath the setpoint, the fans run for further 10 minutes at the actual speed.

A ventilation unit equipped with ON/OFF damper motors, only the fan speed increases to 100%, when the measured humidity is 10% above the setpoint.

At an outdoor temperature in the range from +10 to -10°C the humidity setpoint is gradually reduced to 10%. Settings see chapter *2.9 Reading technical data / Override set points*.

3.6 Displacement of temperature set point.

By providing an input signal (2-10V) to analogue input IN2 on the control circuit board STXC2, the temperature displacement +/-5°C, related to the setpoint, is enabled.

If the temperature input is left open (no connection) the displacement is disabled.

The temperature displacement is shown on the following graph:

Input signal

10V

6V

2V

Setpoint-5K   Setpoint   Setpoint+5K   Temp. setpoint
                 neutral
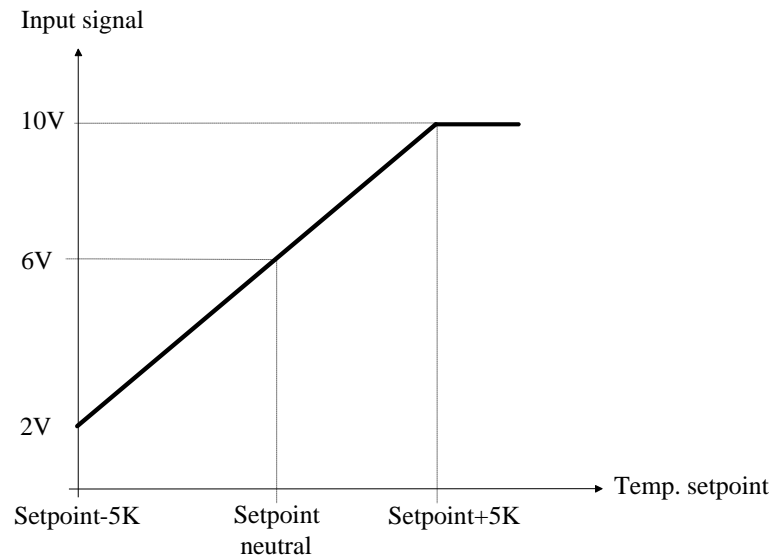
3.7 Extended operation.

By selecting the function switch on the ventilation unit to position **AUTO** it is possible to override the ventilation unit so it runs with the manual settings from the MMI STCU.

By adding a short (maximum 3 seconds) voltfree starting signal, the ventilation unit runs in the time defined in the MMI STCU in the data point *Manuel hours* (*See chapter 2.5 Setting of manual running mode*).

By adding a longer starting signal, the ventilation unit runs as long as the starting signal is present.