

DanX for comfort ventilation

User manual for control panel Excel 50



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0. TABLE OF CONTENTS

1. General

1.0 Introduction	2
1.1 DanX control panel	2
1.2 Excel 50 controller	4
1.3 Excel 50 display	5
1.4 Missing program	5
1.5 Frequency inverter for fans	6

2. Time programs

2.0 Time program TP01 and TP02	7
2.1 Password	8
2.2 System time	8
2.2.1 Date / Time	8
2.2.2 Daylight saving	9
2.3 Daily	9
2.3.1 Daily Modify TP01	10
2.3.2 Daily Modify TP02	12
2.3.3 Daily with more then one set point	13
2.3.4 Daily New	14
2.4 Weekly	15
2.5 Annual	15
2.6 Temporary changes to the running time program	16

3. Data points and parameter

3.0 Data points and parameters	17
3.1 Analog input and outputs	17
3.2 Digital input and outputs	17
3.3 Pseudo analog and digital	17
3.4 Manual operation	18

4. Alarms

4.0 Alarms	19
4.1 Alarm buffer	19
4.2 Points in alarm	19
4.3 Non critical alarm	19
4.4 Critical alarm	20
4.5 How to solve alarms	21

5. Functional description

5.0 Functional description	22
5.1 Temperature control with heat pump (RWP)	22
5.2 Temperature control with heat pump (XWP)	22
5.3 Evaporator de-icing	23
5.4 Heat pump pressure control MTZ compressor	23
5.5 Heat pump pressure control VTZ compressor	23
5.6 Summer night cooling	23

6. Appendix

6.1 Data points and parameters RWP	24
6.2 Data points and parameters XWP	25

1.0 Introduction

A complete DanX ventilation system for comfort ventilation requires a control system that corresponds to the actual unit configuration in the most energy efficient way as possible. Dantherm offer various options depending on the unit configuration, all are individually tested before delivery and are therefore giving the most reliable and energy efficient operation possible. The electronic control system with contactors, main switch and function switch etc. is built into a separate control cabinet, normally mounted near the ventilation unit. This manual gives you an introduction how to set up the control system.

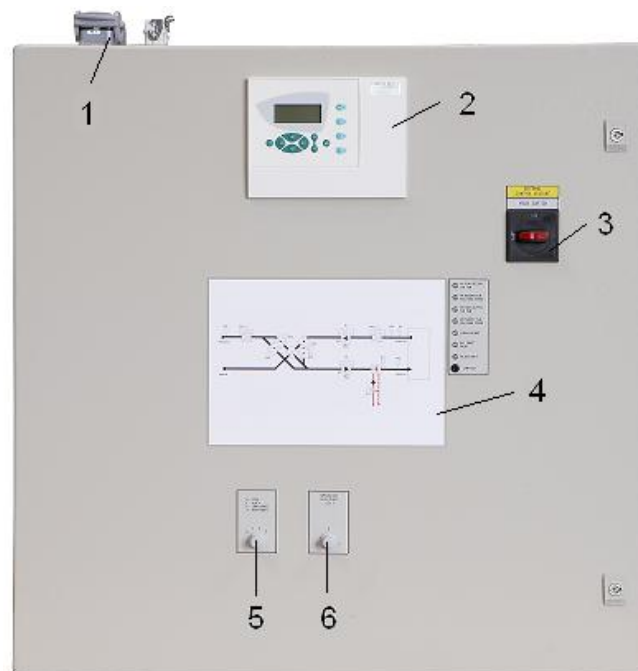
For the exact connection of DanX unit and the el. panel, please refer to the separate electrical diagrams.



The installation of the DanX control panel should only be carried out by trained electricians! When working on the electric panel, always switch off the electric power before opening the panel door!

1.1 DanX control panel

The components on the electric panel can be different from panel to panel depending on the ordered specification, but in general the panel will look like the following.



- 1) Plug for electrical connection between unit and el panel (accessory).
There can be up to 4 different plugs for control and running current. If there are no plugs, the electrical components from the unit must be connected directly to the terminal strips inside the el panel.
- 2) Excel 50 controller.



- 3) Main service breaker. Disconnects all power to the unit and control panel, so no safety function like frost thermostat is active any longer! Do not stop the unit with this switch! Always stop the unit with the function switch!
- 4) Flow diagram (accessory).
The red, yellow and green LED lights indicate if the functions in the DanX unit are working correctly. If a function shows a red or yellow light you will also see an alarm in the Excel 50 control display.
- 5) Function switch.
This switch has 3 steps. Normally the setting will be 1-AUTO.
 - 0 - Stop: Unit is stopped, but all safety devices are still active.
 - 1 - Auto: Unit runs with the Excel 50 program settings in time program TP01/TP02.
 - 2 - Constant: Fans running constantly and the program settings in time program TP02.

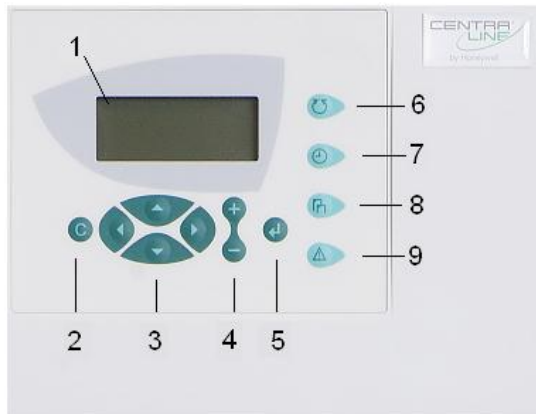


If a fault has stopped the unit you have to set the function switch to 0 – Stop before correcting and acknowledging the fault on the Excel 50 controls (see 5. Alarms).

- 6) Temperature adjustment (accessory).
With this potentiometer it is possible to adjust manually the pool room temperature by $\pm 2^{\circ}\text{C}$ in comparison to the Excel 50 set point, without entering the Excel control panel.

1.2 Excel 50 controller

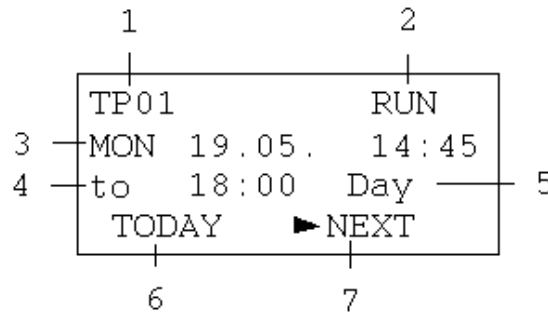
The DanX control system is based on a Honeywell Excel 50 controller, with a software program by Dantherm to perform control strategies and functions in the most energy efficient way.



Part no.	Part	Function
1	Display	<ul style="list-style-type: none"> • See 1.4 Excel 50 display
2	CANCEL key	<ul style="list-style-type: none"> • Go back to last display picture • Delete an incorrect data input • Acknowledge alarm information
3	CURSER keys	<ul style="list-style-type: none"> • Moves the cursor in the display
4	+/- keys	<ul style="list-style-type: none"> • In / decrease numerical data values
5	ENTER key	<ul style="list-style-type: none"> • Change between time program TP01 (Time setting) and TP02 (Set points) • Goes to next picture • Press BEFORE and AFTER data changes
6	PLANT key	<ul style="list-style-type: none"> • Press to go back to the start display
7	TIME PROGRAM key	<ul style="list-style-type: none"> • Enters time program TP01 (Time setting) • Enters time program TP02 (Set points)
8	DATA/PARAMETER POINT key	<ul style="list-style-type: none"> • Shows and change data point
9	ALARM key	<ul style="list-style-type: none"> • Shows current and historical points in alarm

1.3 Excel 50 display

When no keys are pressed the display will show the following information. For easier reading press the **ENTER** key to light up the display.

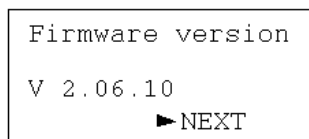


- 1) Shows the name of the actual time program TP01 (Time setting) or TP02 (Set points). To change between time program 01 and 02 you have to press the **ENTER** key.
- 2) Shows if the actual time program is active (RUN) or inactive (STOP).
- 3) Shows the actual day, month and time.
- 4) Shows when the next time program step starts.
- 5) Shows in time program “TP01” the actual fan speed of the unit for day or night. Shows in time program “TP02” the set point of the room temperature.
- 6) By moving the cursor to “TODAY” and pressing the **ENTER** key you can do temporary changes to the running time program.
- 7) By moving the cursor to “NEXT” and pressing the **ENTER** key you can change from time program TP01 to program TP02 and back again.

1.4 Missing program



If the start display, shown in section 1.3 is not present, but looks like the following the software has disappeared from the Excel 50 controllers RAM.



There can be two reasons that the software is no longer stored in the RAM. Normally long time storage without power supply can make the software disappearing from the RAM. In this case see the instructions below on how to reload the software from the Excel 50 flash memory into the RAM.

To reload the program from the flash memory into the RAM of the Excel 50 do the following.

Press the **ENTER** key to switch to see the following display.

```
Date: 16.01.1994
Time: 21:06
Ctr. No: 2
      ►NEXT
```

Press the **ENTER** key again

```
Modem Part:
inactive
Appl. Mem. Size:
128 KB      ►NEXT
```

Press the **ENTER** key again

```
Contr. Setup
► Select Applic.
  Requ. Download
  DP Wiring Check
```

Now select "Select Applic." and press the **ENTER** key.

```
Choose Applic.
► C102 16.01.94  ↑
                  1
                  ↓
```

Now select the application. If there is more than one, select the application with the newest date. Press the **ENTER** key and the software will be reloaded into the RAM and you will now see the standard display shown in section 1.4.

If for any reason the software has been deleted in the flash memory of the Excel 50, your local Honeywell dealer has to reload the software program with the help of the Honeywell Care program. The program file (.pjt file) for your unit can be found on the CD ROM inside the panel door.

1.5 Frequency inverter for plug fans

Information about the frequency inverter parameter settings can be found in the DanX installation and service manual.

2.0 Time program TP01 and TP02



There are two time programs in the Excel 50, one for the time/fan settings (TP01) and one for the set points (TP02).

In TP01 you can set the following:

- Start / Stop time for day or night time
- Fan runs (Day)
- Fan stopped (Night)

In TP02 you can set the following:

- Air volume supply air (SP_VSUP)
- Air volume return air (SP_VRET)
- Minimum supply air temperature (SP_MIN)
- Maximum supply air temperature (SP_MAX)
- Air temperature room (SP_RM)


If you want to view or modify one of these two programs you have to activate the right program first. Normally the display always shows program “TP01” as below.

```
TP01          RUN
MON 19.05.   14:45
to 18:00 Day
TODAY      ►NEXT
```

If you want to activate program TP02, you have first to press the **ENTER** key to switch between TP01 and TP02. You will then see the following display.

```
TP02          RUN
MON 19.05.   14:45
to >24h     30°C
TODAY      ►NEXT
```

Go back to time program TP01 by pressing **ENTER** again.

To view or modify the chosen time program you now have to press the  **TIME PROGRAM** key on the right side of the display and you will now be asked for a password.

2.1 Password

When you are asked for a password you will see normally the following display:

```
Please enter
your password
****
▶NEXT
```

Without entering any password (access level 1) you can only view data. As a user you have the following password (access level 2) for making changes to the time programs.

2222

Press **ENTER** to enter the password and press **ENTER** again. Now you will see the following display.

```
▶ System time
Daily
Weekly
Annual
```

2.2 System Time

The first thing you should do before making any other changes is to set the actual system time. For that set the cursor to "System Time" and press the **ENTER** key. You will now see the following display.

```
System time
▶ Date / Time
Daylight Saving
```

2.2.1 Day / Time

By pressing the **ENTER** key you now enter the "Date/Time" display.

```
System time
Date: 19.05.2010
Time: 14:45
▶ Back
```

To change the values move the cursor with the **CURSOR** keys to "Date" or "Time", press the **ENTER** key. Change the values by pressing the **+** or **-** keys. After you have made the change press the **ENTER** key again for acceptance for the change. After that you will see the following display.

```
19.05.      14:45

Manual time sync
```

Wait a few seconds until the Excel 50 has synchronised all time programs and then press the **CANCEL** key to return to the “Date/Time” display. When you have finished the settings you can go back to the start display by pressing the **PLANT** key, or move the cursor to “Back” and press the **ENTER** key to come back to the “System time” display to make changes to the daylight saving.

2.2.2 Daylight Saving

Normally the Excel 50 runs in winter time mode. If you have in your country summer time you can set the start datum and the end datum for the summer time period under Daylight Saving. When moving the cursor to “Daylight Saving” and pressing the **ENTER** key you will see the following display.

```
Daylight Saving
Start: 00.00
End:   00.00
      ►Back
```

You can now enter the dates for summer time start and end, press **ENTER** key to accept the values and return to the start display by press the **PLANT** key, or go back to the “Time / Date” display.

2.3 Daily

When entering the “Daily” menu under the “System Time” you will find the following display.

```
TP01      Daily
►Modify   New
Delete   Copy
```

Depending on which Time Program you will change you will see “TP01” or “TP02” in the left upper corner of the display. Under Daily you have the following possibilities:

- Modify an existing Time Program
- Delete an existing Time Program
- Make a new Time Program
- Copy a Time Program

Normally you only need to modify the time program which Dantherm already has implemented in the Excel 50 controls. Therefore we will only describe here how to “Modify” the program. After pressing the **ENTER** key you will enter the display for modifying the time program.

2.3.1 Daily Modify TP01

In the daily time program for “TP01” the start times for day and night, as well as the fan speeds for day and night are set. When entering the “Daily” TP01 Time Program you will see the following display.

```
TP01      Modify ↑
▶ D1      1
  D2
  D3      ↓
```

The up / down arrows on the right hand side of the display are indicating, that you can scroll down in the display with the cursor to see more lines. When scrolling down, you will see 7 separate daily programs (D1 – D7), one for each day in the week, plus a combination of all 7 days (D1-7). As you will see in the next section 2.4 weekly, each daily program is connected to one day, D1 to Monday, D2 to Tuesday and so on. This means the start / stop time and fan setting you are doing in the daily program D1 will be connected with Monday through the Weekly program. Pressing the **ENTER** key with the cursor in front of “D1” you will see the following display.

```
TP01      ▶ NEW
07:00 1TP_STAT
18:00 1TP_STAT
```

You now see two time lines; the first is the start time for the day and the second the start time for the night. Move the cursor from “NEW” to the first line and press the **ENTER** key and you will see to following display.

```
TP01      1TP_STAT
▶ 07:00 Day
  Opt: *****
  DELETE
```

In the first line you can now set the start time for “Day”, which means the fans are running. The second line “Opt:” is not activated in this program.

When finished the settings and pressed the **ENTER** key to accepted the changes, go back to the last display by pressing the **CANCEL** key. You now can go down with the cursor to the second line and press the **ENTER** key. Now you will see the display for the start time for “Night”, which means that the fans are stopped.

```
TP01      1TP_STAT
▶ 20:00 Night
  Opt: *****
  DELETE
```

Make the changes as described under day time and save them by pressing the **ENTER** key.

If you want to have more than one start / stop time for a day, go back to the last display by pressing the **CANCEL** key.

```
TP01      ►NEW
          07:00 1TP_STAT
          18:00 1TP_STAT
```

Then set the cursor to “NEW” and press the **ENTER** key.

```
TP01      D1
          ►1TP_STATUS
```

Press **ENTER** again and you now can make a second new start or stop time for the day.

```
TP01      1TP_STAT
          ►14:00 Day
          Opt:  *****
          DELETE
```

When you have finished the first day program “D1” you have to do the same with the other day programs “D2” – “D7”.

2.3.2 Daily Modify TP02

In the daily time program for TP02 the following set point for the unit can be set:

- Air volume supply air (SP_VSUP) [m3/h]
- Air volume return air (SP_VRET) [m3/h]
- Minimum supply air temperature (SP_MIN) [°C]
- Maximum supply air temperature (SP_MAX) [°C]
- Air temperature room (SP_RM) [°C]
- Summer night cooling (1NIPU) [Yes/No]

When entering the Daily TP02 Time Program you will see the following display.

```
TP02      Modify
▶ D1-7
```

Compared to TP01 only one line “D1-7” is shown, as often the settings are not changing over the week. Therefore only a day program for all 7 days of the week is shown. If you want to have different settings for each day (like in TP01) you have to create a new day program, which is shown in the next section.

Pressing the **ENTER** key with the cursor in front of “D1-7” you will see the following display.

```
TP02      ▶NEW  ↑
00:00 SP_VSUP  |
00:00 SP_VRET  | 1
00:00 SP_MAX   ↓
```

The up / down arrows on the right hand side of the display are indicating, that you can scroll down in the display with the cursor to see more lines. When scrolling down, you will see in total 6 set points. As start time you will always see “00:00” as the set points normally are not changing between running to unit or stopping and night.

Move the cursor in front of “SP_VSUP” and you will see the following display.

```
TP02      SP_VSUP
▶ 00:00 10000m3/h
Opt: *****
DELETE
```

Do not change the time if you want to run with the same set point the whole day or week. Move instead the cursor to the set point, press the **ENTER** key and change the set point, in this case the supply air volume.

If you want to run with different set points over the day please refer to chapter 2.3.3 how to set up the time program.

The set point for summer night cooling is only yes or no. The start and stop time is automatically set by the Excel control, see chapter 5.6.

2.3.3 Daily with more then one set point

If you for example wish to have different air volumes or temperature set points over one day you have to add these settings in the daily program. To do so enter the Daily TP02 Time Program you will see the following display.

```
TP02      Modifiy
▶ D1-7
```

Press the **ENTER** key and you will see the following display.

```
TP02      ▶NEW
00:00 SP_VSUP
00:00 SP_VRET
00:00 SP_MAX
```

With the cursor standing in front of “NEW” press **ENTER** again.

```
TP02      D1-7
▶ SP_VSUP
SP_VRET
SP_MAX
```

Choose now for example “SP_VSUP” to change the supply air volume and press **ENTER**.

```
TP02      SP_VSUP
▶ 00:01 10000m3/h
Opt: *****
OK
```

Now you can set a start time for the new air volume and a different air volume by changing the values and then moving the cursor to “OK” and press **ENTER**. Now you will see a second time with a different air volume in point D1_7.

```
TP02      ▶NEW
00:00 SP_VSUP
00:00 SP_VRET
12:00 SP_VSUP
```

As this is possible with the air volume it is of course also possible with all the other set points of the unit.

2.3.4 Daily New

If you want to make different settings for the set points over the week in for example TP02, then you have to make some new daily programs by going to "TP02", "Daily" and "New".

```
TP02      Daily
Modify    ►New
Delete    Copy
```

Press the **ENTER** key and you will see the following display.

```
TP02
New daily prog.
DP_1
MODIFY ►BACK
```

Press the **ENTER** key with the cursor standing on "BACK" and you will come back to the display "System Time". You have now created a new Daily program "DP_1".

```
►System time
Daily
Weekly
Annual
```

Chose "Daily" and in the next display "Modify" and you will now also see the daily program "DP_1" in the display.

```
TP02      Modify
D1-7
►DP_1
```

Press the **ENTER** key on "DP_1" and you will see the following display.

```
TP02      ►NEW
```

Press the **ENTER** key on "NEW" and you now can chose the different set point as described under 2.3.2 Daily.

2.4 Weekly

Under “Weekly” the daily programs are connected to the different weekdays. Again this has been done from the factory for Time Program TP01 and TP02.

```
TP02      Weekly ↑
▶ MON D1-7  1
  TUE D1-7  ↓
  WED D1-7
```

If you have done a new Daily program (see 2.3.3) and want that new Daily program is connected to a weekday you have to do the following.

Press the **ENTER** key with the cursor in front of the weekday you want to change and you will get the following display.

```
TP02      MON
  D1-7
▶ DP_1
```

You see now for “Monday” the old Daily Program “D1-7” and the new Daily Program “DP_1” you have created (see 2.3.3). Press the **ENTER** key with the cursor in front of the new Daily Program “DP_1” and you will see the following display.

```
TP02      MON
  Realy assign
  DP_1    ?
▶ YES     NO
```

Press the **ENTER** key with the cursor in front of “YES” you are now connecting the Daily Program DP_1 to Monday and you will see the following display.

```
TP02      Weekly ↑
▶ MON DP_1  1
  TUE D1-7  ↓
  WED D1-7
```

2.5 Annual

An annual or year program indicates a period of time to which a separate day program is connected. This function is normally used for holiday periods. As this is normally not the case in a swimming pool, you should not use this program. In stead of, if the pool is closing for some time, you should switch of the unit by using the function switch (see section 1.2).

2.6 Temporary changes to the running time program

This function is merely used to make temporary changes in the operating program, for example if you want to open the swimming pool earlier one day or close it later. Temporary changes are possible in TP01 and TP02. To make a temporary change move the cursor to "TODAY" in the start up display of the wanted time program.

```
TP01          RUN
MON 19.05.   06:00
to  07:30   Night
▶TODAY      NEXT
```

Press the **ENTER** key and you will be asked for your password. After entering the password set the cursor to "NEXT" and press the **ENTER** key. You will now see the following display:

```
TP01          TODAY
▶ 1TP_STATUS  ↑
                                     1
                                     ↓
```

Press the **ENTER** key again and the following display will come up:

```
1TP_STATUS
 06:01 to 06:01
Status: ▶ xxxxxxxx
SELECT      BACK
```

Move the cursor to "xxxxxx" and press the **ENTER** key. You have now the possibility to select the wanted fan speed for day or night. Finish with pressing the **Enter** key and move the cursor to the finishing time. Enter the finishing time, press the **Enter** key and move the cursor to "SELECT".

```
1TP_STATUS
 06:01 to 07:00
Status: Day
▶SELECT     BACK
```

Press the **ENTER** key and you now have temporarily changed the time program TP01. When the internal clock reaches the finishing time the normal time program will automatically take over again.

In the same way temporary changes can be done to the time program TP02.

3.0 Data points and parameters



As a user it is only possible to view the data points and parameters. It does not matter if you use access level 1 or 2 (no password or 2222). To be able to make changes (manual operation) you have to be an educated service engineers with a special password for access level 3. Normally you will use these data points in case of a malfunction of the DanX, as the Data points can give you an indication if all sensors and connected output functions are working correctly.

You will find two types of data points here. The first are the physical data points (analog/digital in- and outputs), which are inputs and outputs directly connected to the Excel 50 such as sensors or actuators. The second are the pseudo data points (analog/digital) which are generated in the Excel 50 software. They are not connected to any hardware device.

Depending on if you have a DanX with heat pump and cross flow heat exchanger (XWP) or a DanX with heat pump and rotary heat exchanger (RWP) there can be different data points and parameters in the Excel 50 software. To get a complete overview of the data points and parameters for each unit, please see section 6. Appendix.

3.1 Analog input and outputs

Under analog inputs you can see the actual temperature and humidity readings for the different sensors connected from the DanX unit to the Excel control. Here you can check if all sensors are giving a sensible reading or if a sensor gives a wrong signal, for example a too high or low value.

Under analog outputs you can see what signal the Excel control gives to the different damper motors and coil actuators of the unit. Her you can check if the output is correct. If for example the temperature in the pool hall is below the set point you can check if the coil actuator is getting a signal from the Excel 50 software. If there is a signal you can now check the valve actuator.

3.2 Digital input and outputs

Under digital inputs you can see the connected safety sensors for the DanX unit, if they are ON or OFF. If a sensor is OFF you will see that as an alarm in the display.

Under digital outputs you can see the signal which is send from the Excel 50 control to fan motors (high or low speed), compressor or coil pump. Her you can check if the output is correct. For example if the compressor is not running, you can check if the Excel is giving the start signal or not. If the signal is given then there must be a mechanical or electrical problem with the compressor.

3.3 Pseudo analog and digital

Pseudo analog and digital data points are calculated data points or set points. For example is the supply air temperature depending on the return air temperature and the set point of the pool hall temperature. Depending how big the gab between these two temperatures is the right supply air temperature is calculated. Normally only a service engineer will use these data points.

3.4 Manual operation

As a service engineer with a special password you have the possibility to set data points in "MANUAL", which means that you have the possibility to override a sensor by setting a different value than the actual one, to see if the unit is reacting correctly. For example by overriding the actual room temperature with a lower temperature, you are able to see if for example the valve of the heating coil starts to open.

4.0 Alarms



Activating the alarm function (no password needed) gives access to historical and current alarms. If there is a current alarm and the unit has stopped, the actual alarm will be shown in the display like this frost alarm.

```
19.05.      14:45
1B1.1_frost
Alarm
Alarm
```

When the unit has stop, because of a critical fault you have to do the following.



- Set the function switch to 0-STOP.
- Locate the fault and correct it (see DanX instruction manual for help).
- Acknowledge the point in alarm by pressing the **CANCEL** key.
- When the normal display appears again you can set the function switch to 1-Auto to get the unit running again.

It is important that the function switch at least is 15 sec. in the 0-Stop position, before you can acknowledge the point in alarm and get the unit running again.

4.1 Alarm buffer

In the alarm buffer you can find the last 99 alarms, with the last one on top. By pressing the **ENTER** key on the alarm a new display opens and you can see at which day and at what time the alarm has appeared.

```
19.05.      14:45

Power failure
```

4.2 Points in alarm

Here all current critical and non critical alarms can be read. The first one will be identically with the alarm in the normal display, but there can be more alarms at the same time, which then only can be read in this point.

4.3 Non critical alarm

Here all current non critical alarms can be read. A non critical alarm will not stop the unit, but it is a reminder to check the part in alarm. Non critical alarms are:

Alarm point	Description
1B14/B15_filter	Outdoor or exhaust air filter dirty / Filter should be changed*
*1HeatExchFailure	Rotary heat exchanger failure (only on RWP)
1B25_recup_frost	Ice on cross flow heat exchanger (only XWP) / unit defrosts automatically*

N

*Not installed on all units

4.4 Critical alarm

Here all current critical alarms can be read. A critical alarm will stop either the total unit (heat pump and fans) or only the heat pump. The unit can first be started up again when the alarm has been acknowledged. Critical alarms are:

Alarm point	Description
1B1.1_frost	Frost danger for LPHW coil
1B12/B13_fire	Fire thermostat has switched off *
1B16/17_flow_therm	No air flow, fan thermo relay overload or frequency inverter fault.
1B5.ABC_HP/LP	HP/LP pressure compressor alarm
1Thermo_comp	Compressor thermo relay overload

* Not installed on all units

4. ALARMS

4.5 How to solve alarms

Alarm	Problem	Cause	Action
Frost	Valve not opening	<ul style="list-style-type: none"> Defect actuator Valve stuck 	<ul style="list-style-type: none"> Change/Repair actuator Change/Repair valve
	No hot water	<ul style="list-style-type: none"> Pump not working Boiler problem 	<ul style="list-style-type: none"> Change/Repair pump See boiler manual
Fire	Return air temperature > 40°C	<ul style="list-style-type: none"> Fire in the building 	
	Supply air temperature > 70°C	<ul style="list-style-type: none"> After heating coil not working correct at low air volume Fire in the unit 	<ul style="list-style-type: none"> Check heating coil controls
Filter	Filter is dirty	<ul style="list-style-type: none"> Filter blocked 	<ul style="list-style-type: none"> Change filter
Rotor	Rotary heat exchanger failure	<ul style="list-style-type: none"> Exchanger blocked Belt broken Motor defect 	<ul style="list-style-type: none"> Check rotary exchanger Change belt Change motor
Flow	Flow error	<ul style="list-style-type: none"> Fan belt broken Fan motor broken Damper not open 	<ul style="list-style-type: none"> Change belt Change/repair motor Check damper/motor
	Thermo relay switched off	<ul style="list-style-type: none"> Fan motor broken Phase missing Fan belt broken Thermo relay broken 	<ul style="list-style-type: none"> Change/Repair motor Connect all phases correct Change belt Change thermo relay
	Frequency inverter switched off	<ul style="list-style-type: none"> Fan motor overload Fan motor broken Phase missing 	<ul style="list-style-type: none"> Check air volume/pressure Change/Repair motor Connect all phases correct
HP/ LP	HP pressure over 24 bar	<ul style="list-style-type: none"> Air volume too small Blockage in cooling circuit Outside temperature too high 	<ul style="list-style-type: none"> Check air volume Check/Repair cooling circuit Reset pressure switch
	LP pressure under 1.5 bar	<ul style="list-style-type: none"> Leakage in the cooling circuit Evaporator iced up 	<ul style="list-style-type: none"> Repair cooling circuit Deice evaporator/Check de-icing function
Compressor	Thermo relay switched off	<ul style="list-style-type: none"> Compressor broken Phase missing Thermo relay broken 	<ul style="list-style-type: none"> Change compressor Connect all phases correct Change thermo relay

For more detailed explanations see the Service Manual for DanX units for swimming pools.

5.0 Functional description

The control strategy for a ventilation unit with heat pump is quite complex, therefore this user manual will only describe the basic functions of the control system.

5.1 Temperature control with heat pump (RWP)

Heat demand:

- The rotary heat exchanger will start to run. Depending on the heat demand the rotor will run between 1-10 rpm/min.
- If the rotor is running on full speed and there is still a heat demand the compressor will start running. Depending on the heat demand the compressor runs between 30 and 90Hz (VTZ) or compressor 1 and two (MTZ). If in this situation the temperature behind the evaporator (B32) is lower than the outdoor temperature (B30 or B24) the rotor will stop. But this will normally not happen below +10°C outdoor temperature, in which case the heat pump will normally switch off anyway, as the heat demand at that outdoor temperature is not very high.
- If there is still a heat demand with the rotor and heat pump running the heating coil will start up if installed.

Cooling demand:

- Depending on the outdoor conditions the rotor stands still (free cooling) or runs if the return air is colder than the outdoor air.
- If there is a larger cooling demand the heat pump starts in cooling mode and runs either between 30 and 90Hz (VTZ) or with one or two compressors (MTZ). At the same time the rotor will be stopped.

5.2 Temperature control with heat pump (XWP)

Heat demand:

- The by pass will be closed and all outdoor air will flow over the heat exchanger.
- If there is still a heat demand the compressor will start running. Depending on the heat demand the compressor runs between 30 and 90Hz (VTZ) or compressor 1 and two (MTZ). If in this situation the temperature behind the cross flow heat exchanger and before the evaporator (B28) is lower than +1°C the heat pump will stop. But this will normally not happen below -15°C outdoor temperature.
- If there is still a heat demand the heating coil will start up.

Cooling demand:

- Depending on the outdoor conditions the by pass will open for more or less outdoor air (free cooling).
- If there is a larger cooling demand the heat pump starts in cooling mode and runs either between 30 and 90Hz (VTZ) or with one or two compressors (MTZ).

5.3 Evaporator de-icing

If the evaporator sensor (B26) is measuring a surface temperature $<+5^{\circ}\text{C}$ for more than 20 minutes the 4 way valve will reverse to cooling mode and by that leave hot gas into the evaporator for a quick de-icing. When the evaporator sensor (B26) temperature has reached $>+5^{\circ}\text{C}$ all functions are going back to normal again. This de-icing function will normally only be used on the XWP units, as the change that the evaporator surface temperature on a RWP evaporator will fall below $+5^{\circ}\text{C}$ is normally not existing.

5.4 Heat pump pressure control MTZ compressor

If MTZ compressors are used the heat pump pressure controls (B5.1) is digital. If in case of high outside temperatures the condensing temperature is rising above 20 bar the pressure control will switch of one compressor to avoid that the heat pump will switch of on the HP pressure switch. If the HP pressures falls again below 17bar the pressure control will allow the second compressor to start up again.

5.5 Heat pump pressure control VTZ compressor

If a VTZ compressor is used the heat pump pressure controls (B5.1) is analog. If in case of high outside temperatures the condensing temperature is rising above 20 bar the pressure control will take over the control of the compressor and slowly reduce the frequency so the HP will always stay below the switch point of the HP pressure switch. If the HP pressures falls again below 20bar and there is still a full cooling demand the temperature control will take over again and will rise the frequency of the compressor slowly again.

5.6 Summer night cooling

If the room temperature at 03:00 am is above the set point and the outdoor temperature at the same time is $>+12^{\circ}\text{C}$ and minimum 4K below the actual room temperature the summer night cooling will be started. In this case free cooling is used without starting the heat pump in cooling mode. When the room temperature has reached a temperature 2K below the set point or the same temperature as the outdoor temperature the unit will be stopped again.

6.1 Parameter and Data list RWP

Analog inputs	Function	Comment
1B21_temp_ret	Return air sensor	Temperature in room (sensor placed before heat exchanger inside unit)
1B23_temp_sup	Supply air duct sensor	Supply air temperature (sensor placed after heating coil)
1B26_evap_retu	Evaporator sensor	Temperature on evaporator coil (sensor placed in evaporator)
1B30_Outdoor	Outdoor air sensor	Outdoor air temperature (sensor placed outside)
1B32_pre_recup	Pre rotor sensor	Temperature before rotary heat exchanger on exhaust air side (sensor placed between evaporator and rotor on exhaust air side)
1DanfossAKD3001*	Pressure transducer	Value for HP (<100 > 22 bar / >100 < 22 bar)
1P1_press_retu	Pressure transducer fan	Return air fan pressure (Pressure transducer placed in fan section)
1P2_press_supp	Pressure transducer fan	Supply air fan pressure (Pressure transducer placed in fan section)
1Panel switch	Function switch	Function switch position on el- panel
* only with VTZ compressor		
Analog outputs		
1M1_Ctr	Frequency inverter fan	Return air fan frequency inverter signal
1M2_Ctr	Frequency inverter fan	Supply air fan frequency inverter signal
1M3_Ctr	Frequency inverter compressor*	Compressor frequency inverter signal
1Recup_Ctr	Frequency inverter rotary heat exchanger	Rotary heat exchanger frequency inverter signal
1Y71HeatingCoil	Actuator heating coil	Degree of heating coil valve opening (100% means fully open valve)
* only with VTZ compressor		
Digital inputs		
1B14/15_filter	Filter switch*	Filter switch for fresh / return air filter
1B16/17_flow	Thermo relay / flow switch	Thermo relay fan motor / frequency inverter and flow switch
1B5.AB_HP/LP	HP / LP pressostat	HP/LP switch for compressor
1HeatExchFailure	Rotor switch	Switch for rotor failure
1VLT_failure	Compressor failure**	Compressor or frequency inverter failure
1FrostDanger	Frost thermostat*	Frost thermostat for LPHW coil
1FireAlarm	Fire thermostat*	Temperature sensor in supply air duct and return air inside unit
* Only visible if installed / **Only with VTZ compressor		
Digital outputs		
14way_valve	4 way valve position	4 way valve in heating or cooling position
1CommonFault	Common fault signal*	Signal for a common fault relay
1M10/M14_Damper	Damper position*	Exhaust/Outdoor damper open/closed
1M1_Fan_ret	Return air fan	Return air fan on/off
1M2_Fan_sup	Supply air fan	Supply air fan on/off
1M3_Comp	Compressor	Compressor in heating mode on/off
1M5PumpHeatCoil	Pump heat coil	Signal for water pump heating coil (only visible if ordered)
* Only visible if installed		
Pseudo analog		
1B21_Calc_Setp	Calculated temperature	Calculated temperature for return air (B21)
1B23_Calc_Setp	Calculated temperature	Calculated temperature for supply air (B23)
1Heat_Demand	Calculated heat demand	Calculated demand for heating
Pseudo digital		
1B26<5gadC_20min	Deice function	Evaporator deice function on or off
1Heatdemand	Heat demand	4 way valve in heating position or not
1Cooldemand	Cooling demand	4 way valve in cooling position or not

6.2 Parameter and Data list XWP

Analog inputs	Function	Comment
1B21_temp_ret	Return air sensor	Temperature in room (sensor placed before heat exchanger inside unit)
1B23_temp_sup	Supply air duct sensor	Supply air temperature (sensor placed after heating coil)
1B26_evap_retu	Evaporator sensor	Temperature on evaporator coil (sensor placed in evaporator)
1B30_Outdoor	Outdoor air sensor	Outdoor air temperature (sensor placed outside)
1B28_pre_evap	Pre evaporator sensor	Temperature between evaporator and cross flow heat exchanger (sensor placed between evaporator and heat exchanger on exhaust air side)
1DanfossAKD3001	Pressure transducer*	Value for HP (<100 > 22 bar / >100 < 22 bar)
1P1_press_retu	Pressure transducer fan	Return air fan pressure (Pressure transducer placed in fan section)
1P2_press_supp	Pressure transducer fan	Supply air fan pressure (Pressure transducer placed in fan section)
1Panel switch	Function switch	Function switch position on el- panel
* only with VTZ compressor		
Analog outputs		
1M1_Ctr	Frequency inverter fan	Return air fan frequency inverter signal
1M2_Ctr	Frequency inverter fan	Supply air fan frequency inverter signal
1M3_Ctr	Frequency inverter compressor*	Compressor frequency inverter signal
1Y71HeatingCoil	Actuator heating coil	Degree of heating coil valve opening (100% means fully open valve)
* only with VTZ compressor		
Digital inputs		
1B14/15_filter	Filter switch*	Filter switch for fresh / return air filter
1B16/17_flow	Thermo relay / flow switch	Thermo relay fan motor / frequency inverter and flow switch
1B5.AB_HP/LP	HP / LP pressostat	HP/LP switch for compressor
1VLT_failure	Compressor failure**	Compressor or frequency inverter failure
1B25_frost	Frost heat exchanger*	Pressure switch for heat exchanger
1FrostDanger	Frost thermostat*	Frost thermostat for LPHW coil
1FireAlarm	Fire thermostat*	Temperature sensor in supply air duct and return air inside unit
* Only visible if installed / **Only with VTZ compressor		
Digital outputs		
14way_valve	4 way valve position	4 way valve in heating or cooling position
1CommonFault	Common fault signal*	Signal for a common fault relay
1M10/M14_Damper	Damper position*	Exhaust/Outdoor damper open/closed
1M1_Fan_ret	Return air fan	Return air fan on/off
1M2_Fan_sup	Supply air fan	Supply air fan on/off
1M3_Comp	Compressor	Compressor in heating mode on/off
1M5PumpHeatCoil	Pump heat coil	Signal for water pump heating coil (only visible if ordered)
* Only visible if installed		
Pseudo analog		
1B21_Calc_Setp	Calculated temperature	Calculated temperature for return air (B21)
1B23_Calc_Setp	Calculated temperature	Calculated temperature for supply air (B23)
1Heat_Demand	Calculated heat demand	Calculated demand for heating
Pseudo digital		
1B26<5gadC_20min	Deice function	Evaporator deice function on or off
1Heatdemand	Heat demand	4 way valve in heating position or not
1Cooldemand	Cooling demand	4 way valve in cooling position or not