

# DanX for swimming pools

User manual for control panel Excel 50  
XWPS / XKS / XK



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## 1.0 Introduction

A complete DanX ventilation system for swimming pools 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 the control system for your swimming pool.

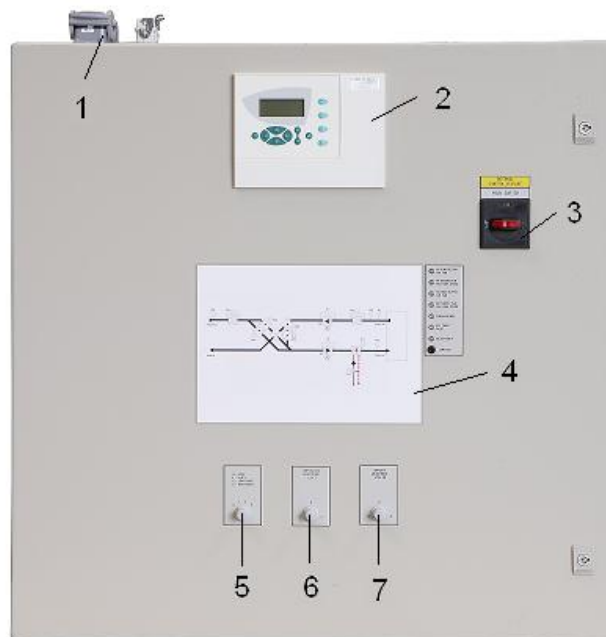
For the exact connection of DanX unit and the el. panel, please refer to the separate electrical diagrams.



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 4 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 - Low constant: Fans running constantly on low speed and the program settings in time program TP02. The fan speed can sometimes switch over to full speed (see section 5.5 fan control)
  - 3 - High constant: Fans running constantly on high speed and the program settings in time program TP02.

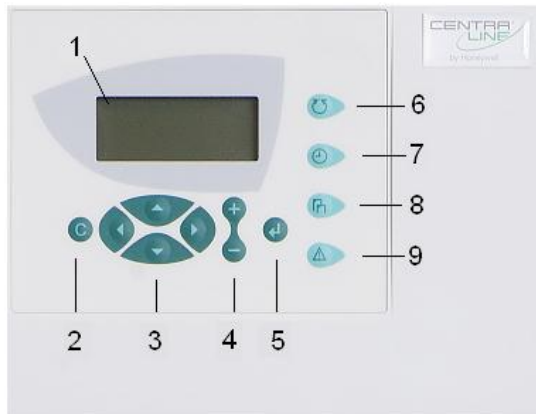


If a fault has stopped the unit you have to set the function switch to 0 – Stop before correcting and acknowledging the fault on the Excel 50 controls (see 5. Alarms).

- 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.
- 7) Humidity adjustment (accessory).  
With this potentiometer it is possible to adjust manually the pool room humidity by  $\pm 5\%$  r.h. in comparison to the Excel 50 set point, without entering the Excel control panel.

1.2 Excel 50 controller

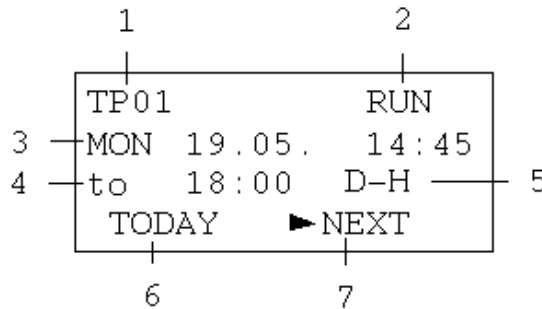
The DanX control system is based on a Honeywell Excel 50 controller, with a software program by Dantherm to perform control strategies and functions in the most energy efficient way.



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

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.

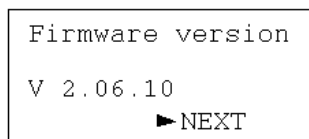


- 1) Shows the name of the actual time program TP01 (Time setting) or TP02 (Set points). To change between time program 01 and 02 you have to press the **ENTER** key.
- 2) Shows if the actual time program is active (RUN) or inactive (STOP).
- 3) Shows the actual day, month and time.
- 4) Shows when the 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 pool 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 speed day high (D-H)
- Fan speed day low (D-L)
- Fan speed night high (N-H)
- Fan speed night low (N-L)
- Fan stopped (STOP)

In the Excel 50 control the air volume is only defined as high or low. The real air volume for high and low is set either through the frequency inverter for the plug fan or through the transmission on the belt driven centrifugal fan, see the DanX installation and service manual.

In TP02 you can set the following:

- Minimum fresh air percentage daytime (1SP\_FR%)
- Minimum supply air temperature (1SP\_MIN)
- Relative humidity pool hall (1SP\_RH)
- Air temperature pool hall (1SP\_RM)
- Wake up function for fans when temperature to low (1W\_Temp)
- Wake up function for fans when humidity to high (1W\_RH)


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 D-H
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 D-L
Opt: *****
DELETE
```

In the first line you can now set the day start time for the swimming pool and with which fan speed the fan should run. For the fan speed in day time you have two possibilities, daytime high speed “D-H” or daytime low speed “D-L”. The second line “Opt:” is not activated in this program.

We would recommend setting the fan speed in public pools in daytime to “D\_H” and for private or hotel pools to “D-L”.

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 the night and the night fan speed.

```
TP01      1TP_STAT
▶ 20:00 N-L
Opt: *****
DELETE
```

Make the changes as described under day time and save them by pressing the **ENTER** key. In night time you can set the fan speed either to high speed "N\_H", low speed "N\_L" or stop the fans "STOP".

We would recommend setting the fan speed in night time for all type of pools to low speed "N\_L" and only for pools with a pool cover to stop "STOP".



NB!

If you set the unit on "STOP" in night time you have to use a room humidity and temperature sensor instead of the duct / unit mounted sensors, as otherwise the controls will get wrong humidity and temperature measurements with the result that the DanX unit will not start automatically from stand still.

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:

- Minimum fresh air percentage daytime (1SP\_FR%)
- Minimum supply air temperature (1SP\_MIN)
- Relative humidity pool hall (1SP\_RH)
- Air temperature pool hall (1SP\_RM)
- Wake up function for fans when temperature to low (1W\_Temp)
- Wake up function for fans when humidity to high (1W\_RH)

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 normally the settings in a swimming pool 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 1SP_FR%  1
00:00 1SP_MIN
00:00 1SP_RH  ↓
    
```

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 4 set points. As start time you will always see “00:00” as the set points normally are not changing between day and night (MIN – RH – RM), or are controlled over the day and night fan setting (FR%).

Move the cursor in front of “1SP\_FR%” and you will see the following display.

```

TP02      1SP_FR%
▶ 00:00   30%
Opt: *****
DELETE
    
```

Do not change the time as normally the set point for day and night in a swimming pool is the same. Even if the fresh air volume is only needed in day time and should be 0% in night time, no time is set under this set point, as the difference between day and night is automatically controlled over the fan setting in time program TP01. It is not possible to change the set point of 0% in night time.

Move instead the cursor to the set point, press the **ENTER** key and change the set point.

Be aware that the set point for the fresh air volume shows how much the fresh air / exhaust air damper should stand open. As the opening of a damper is not linear with the air volume, 30% opening of the damper do not mean exactly 30% of the total air volume. If you want to set the air volume 100% correct you have to measure the air volume and set the damper accordingly to your measurements.

As a guide line we recommend the following settings for a swimming pool.

- Minimum fresh air percentage daytime (1SP\_FR%) about 30%
- Minimum supply air temperature (1SP\_MIN) about 6°C below pool hall temperature.
- Relative humidity pool hall (1SP\_RH) normally between 50 – 60%, depending of the insulation of the pool hall (the better, the higher the relative humidity set point)
- Air temperature pool hall (1SP\_RM) about 2°C above pool water temperature.
- Wake up function for temperature (1W\_Temp) should be set to YES if you want to stop the fans night time.
- Wake up function for humidity (1W\_RH) should be set to YES if you want to stop the fans in night time.

NB!



If you set the wake up function to YES you should use a room humidity sensor, otherwise the humidity will not be measured correctly when the fans are stopped.

If you do not have a room humidity sensor, the wake up function for both humidity and temperature has to be set to NO!

### 2.3.3 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      Modifiy
  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   N-L
▶TODAY      NEXT
```

Press the **ENTER** key and you will be ask 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: D_H
▶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 temporally 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 (XWPS) or a DanX with only a cross flow heat exchanger (XKS and XK) 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 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

## 4. ALARMS

### 4.4 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*

\* Not installed on all units

### 4.5 How to solve alarms

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

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

### 5.1 Functional description XWPS

The control strategy for a swimming pool unit is quite complex, therefore this user manual will only describe the basic functions of the control system. In general, the humidity control has always the highest preference, before the temperature control.

#### 5.1.1 Humidity control

Humidity level in the pool hall is lower or equals the set point:

- The compressor will be stopped. If the compressor runs, the temperature control has taken over.
- The outdoor / exhaust air dampers are partly open in day time (set point Fresh air percentage -1SP\_FR%) and will be closed in night time.

Humidity level in the swimming pool hall is higher than the set point:

- The compressor will start to dehumidify\*.
- If the dehumidification capacity of the compressor is not efficient enough, the outdoor / exhaust air dampers will open more to get more dry outdoor air to the pool hall (overriding the set point Fresh Air Percentage – 1SP\_FR%).

If in summertime the outdoor air temperature is higher than 23°C, condense in the pool hall is no longer an issue. Therefore the humidity set point will be moved upwards with 1% for each °C above 23°C outside, but maximum by 5%. This means with a set point of 55% R.H. the maximum possible relative humidity is 60% at an outdoor temperature of 28°C.

#### \* IMPORTANT

If the compressor does not start even if the humidity in the pool hall is above the set point there can be the following reasons:

- The outdoor / exhaust air damper is open >90% (normally in summertime).
- If the outdoor temperature is >18°C.

#### 5.1.2 Temperature control

Temperature level in the swimming pool hall equals the set point:

- The compressor will be stopped. If the compressor runs, the humidity control, or a built-in water cooled condenser has taken over.
- The heating coil will be stopped.
- The outdoor / exhaust air dampers are partly open in day time (set point Fresh air percentage -1SP\_FR%) and will be closed in night time.

Temperature level in the pool hall is lower than the set point:

- The compressor will be running\*.
- The heating coil is running, if the compressor capacity is not large enough or the compressor is not running (normally night time).
- The outdoor / exhaust air dampers are partly open in day time (set point Fresh air percentage -1SP\_FR%) and will be closed in night time.

**\* IMPORTANT**

If the compressor does not start even if the humidity in the pool hall is above the set point there can be the following reasons:

- The unit runs in night mode (N\_H / N\_L or STOP)
- The outdoor / exhaust air damper setting (1SP\_FR%) is <90%.

Temperature level in the swimming pool hall is higher than the set point:

- The compressor will be stopped. If the compressor runs, the humidity control, or a build in water cooled condenser has taken over.
- The heating coil will be stopped.
- The outdoor / exhaust air dampers will open more to get more cooled outdoor air to the pool hall (overriding the set point Fresh Air Percentage – 1SP\_FR%). If a by pass damper is installed the by pass will slowly open to avoided heating the outdoor air in the heat exchanger.

### 5.1.3 Evaporator de-icing

If the evaporator sensor (B26) is measuring a temperature  $<+2^{\circ}\text{C}$  for more than 20 minutes the compressor will be stopped and the outdoor / exhaust air dampers closed. At the same time the fan speed goes up to full speed. When the evaporator has been de-iced, all functions are going back to normal.

### 5.1.4 Fan control

Normally the fans are running at the speed set in the Time Program TP01, but if the speed is set to low speed (D\_L or N\_L) there can be the following reasons why the unit is running still on full speed. The same will happen if the function switch is set to 2 (constant low speed).

- If the calculated dehumidification demand is  $>50\%$ , which means there is a larger difference between the actual humidity and the set point, the fans will go to full speed, until the calculated dehumidification is again  $<50\%$ .
- If there is a demand for free cooling (Outside air temp.  $<$  inside air temp) the fans will go over to full speed until the set point temperature has been reached again.
- If there is a larger difference between the actual hall temperature and the set point than  $2^{\circ}\text{C}$  the fans will go to high speed, until the difference is lower then  $2^{\circ}\text{C}$ .
- If the evaporator is been de-iced. The de-icing stops when the evaporator temperature (1B26EvapTemp) is  $>+2^{\circ}\text{C}$ .

### 5.2 Functional description XKS or XK

The control strategy for a swimming pool unit is quite complex, therefore this user manual will only describe the basic functions of the control system. In general, the humidity control has always the highest preference, before the temperature control.

#### 5.2.1 Humidity control

Humidity level in the pool hall is lower or equals the set point:

- The outdoor / exhaust air dampers are partly open in day time (set point Fresh air percentage -1SP\_FR%) and will be closed in night time.

Humidity level in the swimming pool hall is higher than the set point:

- The outdoor / exhaust air dampers will open more to get more dry outdoor air to the pool hall (overriding the set point Fresh Air Percentage – 1SP\_FR%).

If in summertime the outdoor air temperature is higher than 23°C, condense in the pool hall is no longer an issue. Therefore the humidity set point will be moved upwards with 1% for each °C above 23°C outside, but maximum by 5%. This means with a set point of 55% R.H. the maximum possible relative humidity is 60% at an outdoor temperature of 28°C.

#### 5.2.2 Temperature control

Temperature level in the swimming pool hall equals the set point:

- The heating coil will be stopped.
- The outdoor / exhaust air dampers are partly open in day time (set point Fresh air percentage -1SP\_FR%) and will be closed in night time.

Temperature level in the pool hall is lower than the set point:

- The heating coil is running.
- The outdoor / exhaust air dampers are partly open in day time (set point Fresh air percentage -1SP\_FR%) and will be closed in night time.

Temperature level in the swimming pool hall is higher than the set point:

- The heating coil will be stopped.
- The outdoor / exhaust air dampers will open more to get more cooled outdoor air to the pool hall (overriding the set point Fresh Air Percentage – 1SP\_FR%). If a by pass damper is installed the by pass will slowly open to avoid heating the outdoor air in the heat exchanger.

### 5.2.3 Fan control

Normally the fans are running at the speed set in the Time Program TP01, but if the speed is set to low speed (D\_L or N\_L) there can be the following reasons why the unit is running still on full speed. The same will happen if the function switch is set to 2 (constant low speed).

- If the calculated dehumidification demand is >5%, the fans will go to full speed, until the calculated dehumidification demand is again <5%.
- If there is a demand for free cooling (Outside air temp. < inside air temp) the fans will go over to full speed until the set point temperature has been reached again.
- If there is a larger difference between the actual hall temperature and the set point than 2°C the fans will go to high speed, until the difference is lower than 2°C.



## 6.1 Parameter and Data list XWPS

Analog inputs	Function	Comment
1B21ReturnAir	Return air sensor	Temperature in pool hall (sensor placed before heat exchanger inside unit)
1B23SupplyAir	Supply air duct sensor	Supply air temperature (sensor placed after heating coil)
1B24AmbientAir	Outside air sensor	Outside air temperature (sensor placed before mixing box inside unit)
1B26EvapTemp	Evaporator sensor	Temperature on evaporator coil (sensor placed in evaporator)
1Panel switch	Function switch	Function switch position on el- panel
1Q9Humidity	Humidity duct/room sensor	Humidity level in pool hall (sensor placed either in return air duct or in pool hall)
Analog outputs		
1MixDampersFresh	Outside / Exhaust air damper	Degree of outside air / exhaust air damper opening (100% means fully open/ 0% fully closed)
1RecupDamper	Damper over heat exchanger	Degree of damper opening over heat exchanger (100% means fully open over heat exchanger/ fully closed By Pass)
1Y71HeatingCoil	Actuator heating coil	Degree of heating coil valve opening (100% means fully open valve)
1Y81Cooling Coil	Actuator cooling coil	Degree of cooling coil valve opening (only visible if installed) (100% means fully open valve)
Digital inputs		
1FlowTherm	Thermo relay / flow switch	Thermo relay fan motor / frequency inverter and flow switch
1FrostDanger	Frost thermostat	Frost thermostat for LPHW coil
1HpLpComp	HP / LP pressostat	HP/LP switch for compressor
1ThermoComp	Thermo relay compressor	Thermo relay for compressor
1FilterDirty	Filter switch	Filter switch for fresh / return air filter (only visible if installed)
1FireAlarm	Fire thermostat	Temperature sensor in supply air duct and return air inside unit (only visible if installed)
1ExtWaterHeat	Ext. heat signal	External heat signal to start up the water cooled condenser (only visible if water cooled condenser installed)
Digital outputs		
1M1HighSpeed	High speed return air fan	Signal for return air fan high speed
1M1ReturnFan	Low speed return air fan	Signal for return air fan low speed
1M2HighSpeed	High speed supply air fan	Signal for supply air fan high speed
1M2SupplyFan	Low speed supply air fan	Signal for supply air fan low speed
1M3Compressor	Compressor	Signal for compressor start
1M5PumpHeatCoil	Pump heat coil	Signal for water pump heating coil (only visible if ordered)
1CommonFault	Common fault	Signal for common fault relay (only visible if ordered)
1WatChillCond	Pump water condenser	Signal for water pump water cooled condenser (only visible if ordered)
Pseudo analog		
1B21_Calc_Setp	Calculated temperature	Calculated temperature for return air (B21)
1B23_Calc_Setp	Calculated temperature	Calculated temperature for supply air (B23)
1xxxx_Demand	Calculated demand	Calculated demand for heating, cooling or dehumidification
Pseudo digital		
1DefrostEvap	Deice function	Evaporator deice function on or off
1Switch_Pos	Function switch	Shows position of function switch on panel
1TP_Status	Status time program	Shows if the unit is running in day, night or if it stopped

## 6.2 Parameter and Data list XKS

Analog inputs	Function	Comment
1B21ReturnAir	Return air sensor	Temperature in pool hall (sensor placed before heat exchanger inside unit)
1B23SupplyAir	Supply air duct sensor	Supply air temperature (sensor placed after heating coil)
1B24AmbientAir	Outside air sensor	Outside air temperature (sensor placed before mixing box inside unit)
1Panel switch	Function switch	Function switch position on el- panel
1Q9Humidity	Humidity duct/room sensor	Humidity level in pool hall (sensor placed either in return air duct or in pool hall)
<b>Analog outputs</b>		
1M16RecupDamper	Damper over By Pass (outside air side)	Degree of by pass damper opening (100% means fully opened fresh air By Pass / 0% closed By Pass)
1M18AmbientDamper	Damper over heat exchanger (outside air side)	Degree of outside air damper opening (100% means fully opened outside air damper / 0% full recirculation)
1M20ReturnDamper	Damper over return air duct (return air side)	Degree of return air damper opening (100% means fully open return air damper and fully closed exhaust air damper)
1Y71HeatingCoil	Actuator heating coil	Degree of heating coil valve opening (100% means fully open valve)
1Y81Cooling Coil	Actuator cooling coil	Degree of cooling coil valve opening (only visible if installed) (100% means fully open valve)
<b>Digital inputs</b>		
1FlowTherm	Thermo relay / flow switch	Thermo relay fan motor / frequency inverter and flow switch
1FrostDanger	Frost thermostat	Frost thermostat for LPHW coil
1FilterDirty	Filter switch	Filter switch for fresh / return air filter (only visible if installed)
1FireAlarm	Fire thermostat	Temperature sensor in supply air duct and return air inside unit (only visible if installed)
<b>Digital outputs</b>		
1M1HighSpeed	High speed return air fan	Signal for return air fan high speed
1M1ReturnFan	Low speed return air fan	Signal for return air fan low speed
1M2HighSpeed	High speed supply air fan	Signal for supply air fan high speed
1M2SupplyFan	Low speed supply air fan	Signal for supply air fan low speed
1M5PumpHeatCoil	Pump heat coil	Signal for water pump heating coil (only visible if ordered)
1CommonFault	Common fault	Signal for common fault relay (only visible if ordered)
<b>Pseudo analog</b>		
1B21_Calc_Setp	Calculated temperature	Calculated temperature for return air (B21)
1B23_Calc_Setp	Calculated temperature	Calculated temperature for supply air (B23)
1xxxx_Demand	Calculated demand	Calculated demand for heating, cooling and dehumidification
<b>Pseudo digital</b>		
1Switch_Pos	Function switch	Shows position of function switch on panel
1TP_Status	Status time program	Shows if the unit is running in day, night or if it stopped

## 6.3 Parameters and Data list XK

Analog inputs	Function	Comment
1B21ReturnAir	Return air sensor	Temperature in pool hall (sensor placed before heat exchanger inside unit)
1B23SupplyAir	Supply air duct sensor	Supply air temperature (sensor placed after heating coil)
1B24AmbientAir	Outside air sensor	Outside air temperature (sensor placed before mixing box inside unit)
1Panel switch	Function switch	Function switch position on el- panel
1Q9Humidity	Humidity duct/room sensor	Humidity level in pool hall (sensor placed either in return air duct or in pool hall)
<b>Analog outputs</b>		
1MixDampersFresh	Outside / Exhaust air damper	Degree of outside air / exhaust air damper opening (100% means fully open/ 0% fully closed)
1RecupDamper	Damper over heat exchanger	Degree of by pass damper opening over heat exchanger (100% means fully open over heat exchanger/ fully closed By Pass)
1Y71HeatingCoil	Actuator heating coil	Degree of heating coil valve opening (100% means fully open valve)
1Y81Cooling Coil	Actuator cooling coil	Degree of cooling coil valve opening (only visible if installed) (100% means fully open valve)
<b>Digital inputs</b>		
1FlowTherm	Thermo relay / flow switch	Thermo relay fan motor / frequency inverter and flow switch
1FrostDanger	Frost thermostat	Frost thermostat for LPHW coil
1FilterDirty	Filter switch	Filter switch for fresh / return air filter (only visible if installed)
1FireAlarm	Fire thermostat	Temperature sensor in supply air duct and return air inside unit (only visible if installed)
<b>Digital outputs</b>		
1M1HighSpeed	High speed return air fan	Signal for return air fan high speed
1M1ReturnFan	Low speed return air fan	Signal for return air fan low speed
1M2HighSpeed	High speed supply air fan	Signal for supply air fan high speed
1M2SupplyFan	Low speed supply air fan	Signal for supply air fan low speed
1M5PumpHeatCoil	Pump heat coil	Signal for water pump heating coil (only visible if ordered)
1CommonFault	Common fault	Signal for common fault relay (only visible if ordered)
<b>Pseudo analog</b>		
1B21_Calc_Setp	Calculated temperature	Calculated temperature for return air (B21)
1B23_Calc_Setp	Calculated temperature	Calculated temperature for supply air (B23)
1xxxx_Demand	Calculated demand	Calculated demand for heating, cooling and dehumidification
<b>Pseudo digital</b>		
1Switch_Pos	Function switch	Shows position of function switch on panel
1TP_Status	Status time program	Shows if the unit is running in day, night or if it stopped