MVC80 Control Panel AF Pool

User Manual

Rev. 1.0 - 086780

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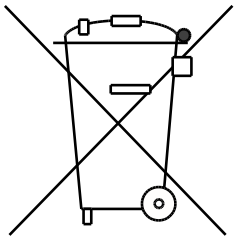


Der tages forbehold for trykfejl og ændringer
Dantherm can accept no responsibility for possible errors and changes
Irrtümer und Änderungen vorbehalten
Dantherm n’assume aucune responsabilité pour erreurs et modifications éventuelles

0. TABLE OF CONTENTS

1. General

1.0 Introduction 2
1.1 DanX control panel 2
1.2 MVC 80 controller 4

2. Quick access menu

2.0 Quick access menu 6
2.1 Password handling 6
2.2 Start display 8
2.3 Set Point menu 9
2.3.1 Set Point change 9
2.4 Unit Status menu 10

3. Service menu

3.0 Service menu 11
3.1 Set point change in Unit Time program 11
3.1.1 Modify a daily program 12
3.1.2 Add a daily program 14
3.2 Time program Unit Configuration 16
3.2.1 Heating Coil 16
3.2.2 Wake up function 16
3.2.3 BMS Set point Control 16
3.3 Interface Configuration (Modbus) 17
3.4 System data 17
3.4.1 Date / Time change 18
3.4.2 Day light saving 18

4. Alarms

4.0 Alarms 19
4.1 Alarm menu 19
4.1.1 Alarm buffer 19
4.1.2 Points in alarm 20
4.1.3 Critical alarm 20
4.1.4 Non critical alarm 20
4.2 How to solve alarms 21

5. Appendix

5.1 Parameter and Data list AF 22

1.0 Introduction

A complete DanX AF 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 of 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) MVC 80 controller.

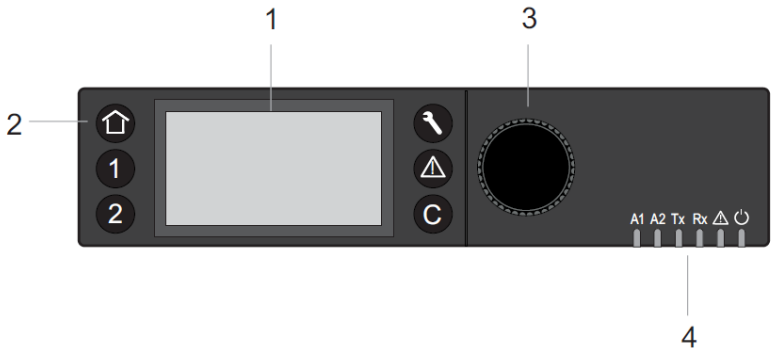
3) Main service breaker.
Disconnects all power to the unit and control panel, so no safety function like frost thermostat is active any longer! Do not stop the unit with this switch! Always stop the unit with the function switch!

4) Function switch.
This switch has 2 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 MVC 80 program settings in the Unit Time Program.

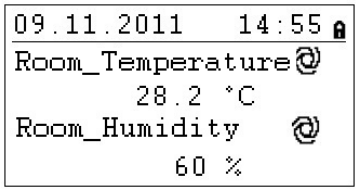
1.2 MVC 80 controller

The DanX control system is based on a Honeywell MVC 80 controller, with a software program by Dantherm to perform control strategies and functions in the most energy efficient way.



(1) LCD display.

Generally, when the display has not been in use, the display will show the following information. For easier reading press any button to light up the display.



You will now see the actual day, month, year and time at the top and the actual pool hall condition (Temperature and Humidity) below. For a more exact explanation see 2.0 Quick access menu.

(2) Operating keys. These keys provide the following functions:

Home key calls up the Home menu, which provides information about the unit status. The Home menu is displayed by default if no operating key has been pressed for 10 minutes.

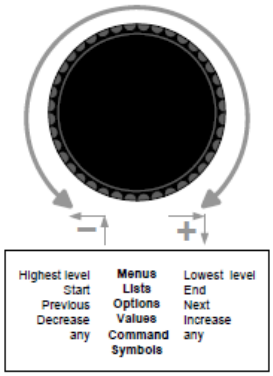
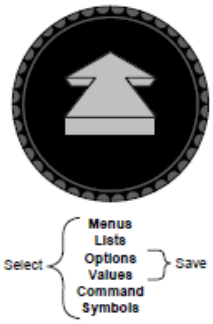
Application keys 1 and 2, not used in this unit.

Service key calls up the Service menu including user service functions and Installer Service submenu.

Alarm key calls up the Alarm menu, which provides information about alarm history, critical and non-critical alarms and acknowledges alarms.

Cancel key returns to the previous screen, discards current inputs and confirms alarm messages

(3) **Rotate & Push button**, which works as follows:

Turning the button	Navigate – Highlight - Adjust
• **Navigates** through menus and lists • **Highlights** items (menu, list, option, value, command symbol) • **Adjust** options (On, Off, etc.) and values (temperature, humidity, etc.)	
Pushing the button	**Select - Save**
• **Selects** items (menu, list, option, value, command symbol) • **Saves** options and values	

(4) **LED´s**, which indicate the operational status of the controller. In the DanX application only the Power LED and the Alarm LED are in function.

Power LED (Green)

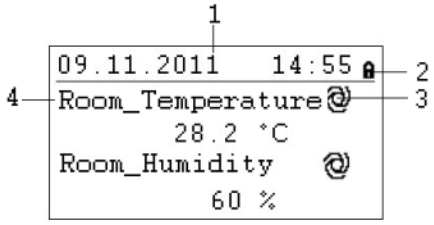
	Power LED behaviour	Reason
1	ON	Normal operation
2	OFF	Power supply not OK

Alarm LED (red)

	Alarm LED behaviour	Reason
1	OFF after power up	Normal operation
2	Lit continuously after power up	Controller has encountered a hardware problem.
3	Flashes continuously 4 x ON/OFF followed by pause	Sensor failure of analog input

2.0 Quick access menu

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



1) Shows the actual day, month, year and time.
2) Shows if the program is secured by a password.
3) Shows if the actual shown point is running in AUTO mode or MANUAL mode .
4) Shows the actual pool hall conditions.

As the user of the unit you should normally not change a point from Auto mode into Manual mode. This should only be done by professional service technicians!

2.1 Password handling

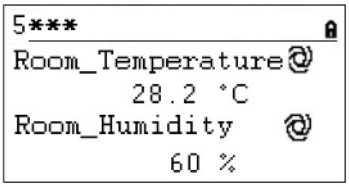
There are three different access levels in the program. In Level 1 values can be changed used without a password. This is possible in the Time Program.

To change set points in the Set Point menu, you have to use the level 2 password to get access. All other points are on access level 3 and can only be changed by entering a service password, which your Dantherm service technician has*.

Icon	Access level	Password	Points which can be changed
	1	Non	Time Program
	2	2222	Set Point menu
	3	*	All service points for the unit

It is possible to change the password under the service menu, but it is not recommended by Dantherm, as new software has to be uploaded to the controller if the password has been forgotten.

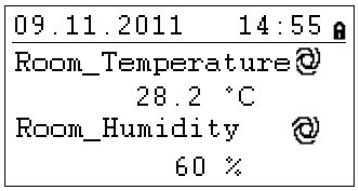
To access level 2 or 3 highlight the 🔒 icon in the top right of the start display by rotating the **Rotate button**. Press the **Rotate button** and you now have the possibility to enter your password.



Find the right number by rotating the **Rotate button** and then press the **Rotate button** to accept. Do so with all 4 numbers. After having accepted the last one, the password icon will change either to 🔓 or ✘, depending on the password you have entered.

2.2 Start display

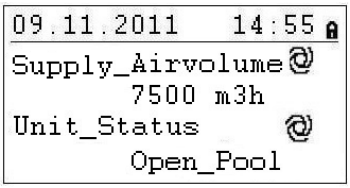
(1) The start display will show the actual pool hall conditions:



Room_Temperature. This point shows the actual pool hall temperature.

Room_Humidity. This point shows the actual pool hall humidity.

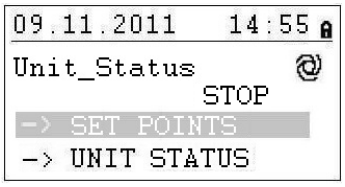
(2) Rotate the **Rotate button** and the start display will show you:



Supply_Airvolume. This point is showing the actual return air volume.

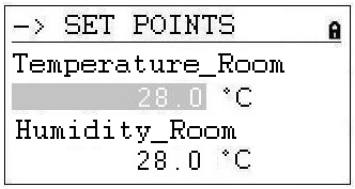
Unit_Status. This point shows which current status the unit has. It can be either Open / Closed or Stop, depending on the Time Program and the setting of the function switch point. This point can only be switched if you have a service technician password.

(3) If you rotate the **Rotate button** further on, the start display will change again, now to the following picture with two different menus; Set Points and Unit Status. These menus are explained on the next page.



2.3 Set Point menu

When the Set Point menu is highlighted, press the **Rotate button** and the following display will appear:



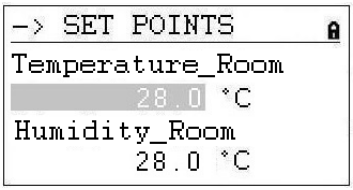
Here you will find the following set points (if you cannot see them please scroll down by rotating the **Rotate button**):

- Temperature_Room (Setpoint temperature in the pool hall)
- Humidity_Room (Setpoint humidity in the pool hall)
- Supply_Fan_Low (Setpoint low air volume)
- Supply_Fan_High (Setpoint high air volume)
- Min_Supply_Temp (Setpoint minimum supply air temperature)
- Max_Supply_Temp (Setpoint maximum supply air temperature)

2.3.1 Set Point change

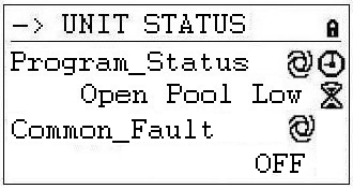
Before changing the set points, you need to enter the password for access level 2, see chapter 4.3.1. For Min/Max supply temperature level 3 password is needed.

To change one of the set points, move to the set point you wish to change. Push the **Rotate button** and you can now change the value by turning the **Rotate button** and then push the button again. Now the set point is changed.



2.4 Unit Status menu

When the Unit Status menu is highlighted, press the **Rotate button** to see following display:



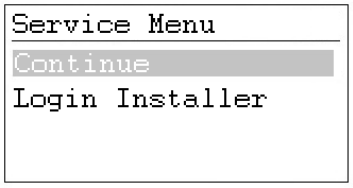
Here you will find the following unit status points (Scroll down with the **Rotate button**):

- Program_Status (Actual status of the Unit Time Program)
- Common Fault (Actual fault status)
- Supply_Air_Temp (Actual supply air temperature)
- Heating_Signal (Actual position of heating coil actuator, signal to electrical heating coil)
- Heating_Coil_Pump (Actual status if pump is running)
- Damper_Outdoor (Actual outdoor damper position)
- Damper_Return (Actual return air damper position)
- Compressor A (Compressor A running or not)
- Compressor B (Compressor B running or not)
- External_Fan_Start (External fan running or not)
- WCC_Pump (Pump water cooled condenser running or not)
- Heat_Demand (Actual demand for heating in %. A demand < 50% means cooling demand, > 50% means heating demand)
- Room_Temp_CALC (Actual room temperature set point)
- Room_Humidity_CALC (Actual room humidity set point

The points under Unit Status give an overall view of the actual running situation of the unit. All points are read only for the user and can only be set into manual with the service password.

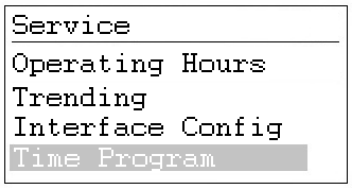
3.0 Service menu

To enter the service menu you have to press the **Service Button** and the following display will appear.



If you want to make changes in the Service menu, you can either “Continue” without a password to make changes in the two Time programs, or you have to first enter your password “Login Installer” to use the other service points.

When “Continue” is highlighted, press the **Rotate button** and you will enter the following display:

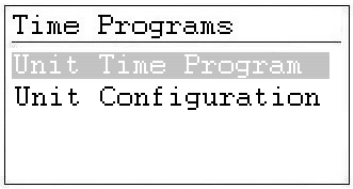


Here you will find the following unit status points (if you cannot see them please scroll down by rotating the **Rotate button**):

- Operating Hours (For service use only)
- Trending (For service use only)
- Interface Config (See chapter 3.3)
- Time Program (See chapter 3.1 / 3.2)
- Point Data (For service use only)
- System Data (See chapter 3.4)

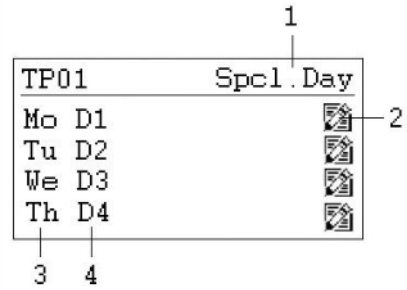
3.1 Set point change in Unit Time program

When pressing the **Rotate button** with “Time Program” highlighted you will enter the following display.



There are two time programs in the controller, one for open / closed pool and fan speed settings (Unit Time Program) and one for the unit configuration (Unit configuration).

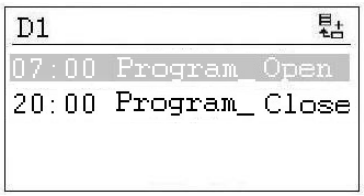
To enter one of the time programs, highlight it and press the **Rotate button**. You will enter the following display for the Unit Time Program:



1) Gateway to the special day programs
2) Icon for editing the day time program
3) Shows the different days of the week (scroll down by rotating the **Rotate button** to see the other days)
4) Shows which daily program (D1,D2,...) is connected to each day

3.1.1 Modify a daily program

If you want to modify the day program for Monday (D1), highlight the icon and press the **Rotate button**. You will now see the following display:



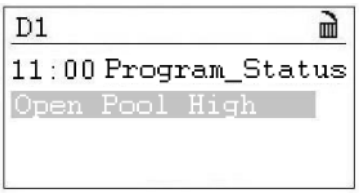
All seven daily programs (D1-D7) are built up in the same way and contain a starting time switch point (Program_Status Open) when the pool opens and a closing time switch point (Program_Status Close) when the pool shuts down. If you want for example to change the opening time, highlight the switch point (Program_Status Open) and press the **Rotate button**. You will now see the following display:

You now see in the first line the start time and in the second the status of the pool and unit which can be either:

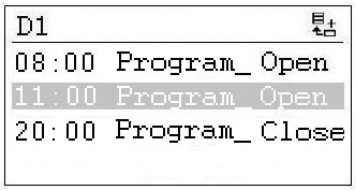
- Open pool with fans in low speed
- Open pool with fans in high speed
- Closed pool with fans in low speed
- Closed pool with fans in high speed
- Unit stopped

To either change the time or the unit status, highlight the point you want to change and press the **Rotate button**. Rotate the **Rotate button** until you have found the right value and then press the button again to accept. Go back to the last menu by pressing the **Cancel** key.

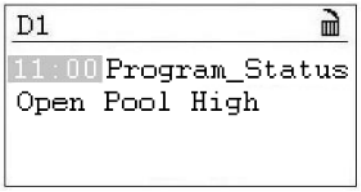
If you want to have more than one start and stop time switch point for one day, you have to add a new switch point to the daily program by highlighting the icon and press the **Rotate button**. You will enter the following display.



If for example you want to change the fan speed for the open pool at 11:00 am you set the time and unit status as before and go back to the last menu by pressing the **Cancel** key. You will now see that you have added a third line into your D1 daily program.



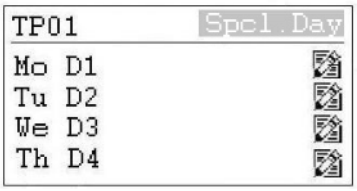
If you want to delete this switch point again, highlight the line and press the **Rotate button**. You will see the following display:



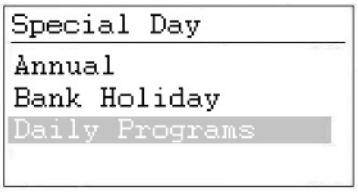
Highlight now the icon and press the **Rotate button**. You will now be asked if you want to delete this switch point. Press yes and the switch point disappears.

3.1.2 Add a daily program

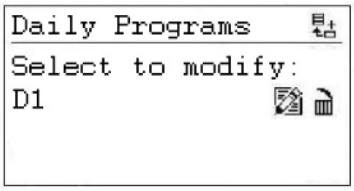
Normally in Time Program TP01 you only need to add a new daily time program if you want to include bank holidays or other special days, where opening and closing times are different from the usual days of the week. Open the TP01 time program and highlight Spcl. Day, as shown below.



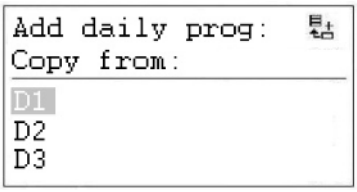
Now press the **Rotate button** and the following display appears:



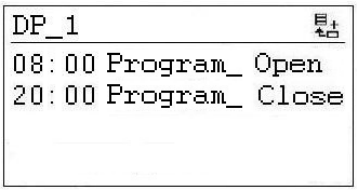
Highlight the line with Daily Programs and press the **Rotate button** again and the following display appears:



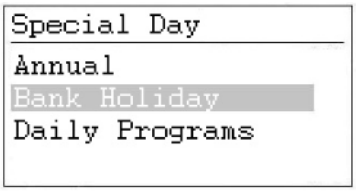
Under this Daily Program it is possible to modify or delete the selected daily program (here D1) as described in chapter 3.1.1, but also to add a new daily program for a bank holiday or another special day. To add a new daily program you have to highlight the icon on the right top of the screen and press the **Rotate button**. You will now see the following display:



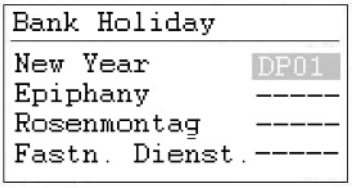
You can now add a new daily program by making a copy of an old one, like for example D1 in this case. But you can of course choose any existing program to make a copy of it. By highlighting D1 and again pressing the **Rotate button** you have now made a copy of the daily program D1. The new program is called DP_1 and is shown below.



From here you can now modify the new daily program DP_1 as described in chapter 3.1.1. After the modifications have been done, you can now go back to the start screen “Special days” by pressing the **Cancel** key four times.



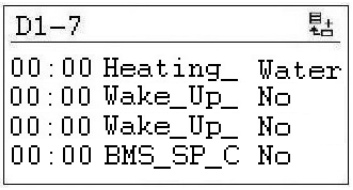
If you now want to connect the new daily program DP_1 to New Year you have to highlight the Bank Holiday line and press the **Rotate button**. In the new display highlight the line to the right of New Year and press again the **Rotate button**. You now can choose the daily program that you want to connect to the New Year by turning the **Rotate button**. When you come to DP01 press the **Rotate button** and you now have connected the daily program to the New Year.



If you want to connect the daily program DP01 to one or more normal days you have to select Annual instead of. Here you can now select the start and end day and connect the wanted daily program to these dates.

3.2 Time program Unit Configuration

When entering time program Unit Configuration you will see the following start display in the program D1-7:



Here you will find the following unit configuration points:

- Heating Coil (see 3.2.1)
- Wake_Up_Temp (see 3.2.2)
- Wake_Up_Humid (see 3.2.2)
- BMS_SP_Control (see 3.2.3)

3.2.1 Heating Coil

Under the point Heating Coil you can configure if your unit is equipped either with water or electrical heating coil.

3.2.2 Wake up function

If using the Wake Up function it is essential that the standard humidity and temperature duct sensor is being placed directly after the return air duct grill to be able to measure the humidity and temperature in the room without any air movement (fans stopped). If this is not possible, the duct sensor has to be placed directly in the room or replaced by a room humidistat / temperature sensor.

With the wake up function you can choose if the unit should start up automatically at too high humidity or too low temperature, if you have set the unit to be stopped in the time program. If you have chosen YES, the unit will run as long as it takes to reach the wanted set point. When the set point is reached the unit will then automatically stop again. If you choose NO the unit will not start up, even if the room conditions not correspond to the wanted set points.

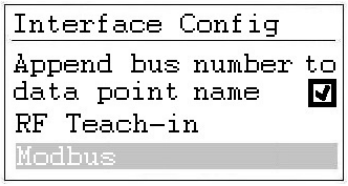
3.2.3 BMS Set point Control

If you connected the DanX to a BMS system via Modbus communication, you can choose if you want to control the set points over the BMS system or the MVC 80 controller. This means if you only want to read values over the Modbus you leave this point in **OFF**. This is also the case if you want to use the external stop function. If you want to control the set points over the BMS system, you have to set this point to **ON**.

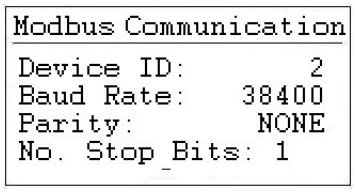
It is very important, if you use the Modbus communication with set points, that **ALL** set points are set over the BMS system and not only some!

3.3 Interface Configuration (Modbus)

If you connected the DanX 2/3 to a BMS system via Modbus communication, you can change the general Modbus settings under Interface Config. Scroll down to the point Modbus and press the **Rotate button.**



You can now change the following settings:

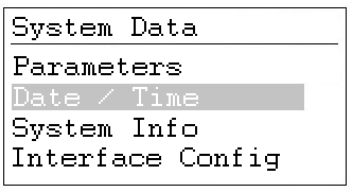


- Device ID (Set point for the number given to the unit)
- Baud Rate (Set point baud rate)
- Parity (Set point for parity)
- No. Stop Bits (Set point for number of stop bits)

To make changes to the Modbus communication you have to be logged in as installer (service password).

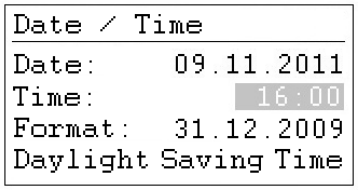
3.4 System data

If the controller does not show the right time or date, you can change that under System data.



All points beside Date / Time are for service use only and therefore not explained in this manual. Highlight Date / Time and press the **Rotate button** and you will see the following display.

3.4.1 Date / Time change



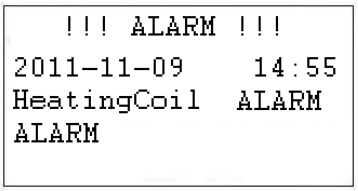
Rotate the **Rotate button** and highlight the line you will change. Press the **Rotate button**, change the value and press the **Rotate button** again to accept the value.

3.4.2 Day light saving

Normally the controller runs in winter time mode. If in your country you have summer-time, you can set the start datum and the end datum for the summer time period under Daylight Saving Time. Highlight “Daylight Saving Time” and pressing the **Rotate button**, you can set now the start and stop days for summer / wintertime, so the controller automatically changes from winter- to summertime and the other way around.

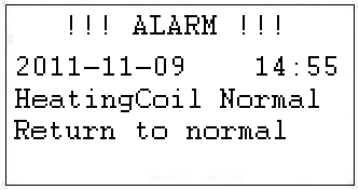
4.0 Alarms

If there is a current alarm and the unit has stopped, the actual alarm will be shown in the display like this frost alarm.



When the unit has stopped, because of a critical fault you have to do the following:

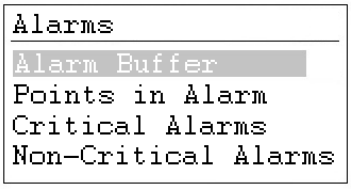
- Switch off the unit at the repair breaker.
- Locate the fault and correct it (see chapter 4.2).
- Switch on the unit again and you will find the following information on the screen.



Press the C **Cancel key** button and you will see the standard display again.

4.1 Alarm menu

Activating the alarm menu (no password needed) gives access to historical and current alarms.



4.1.1 Alarm buffer

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

4.1.2 Points in alarm

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

4.1.3 Critical alarm

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

Alarm point	Description
Heating_Coil	Frost danger for LPHW coil, or OT for electrical heating coil
Fire_Alarm	Fire thermostat on supply or return air side has switched off
Fan_Alarm	Return or supply fan overload
Comp_Overload	Thermo relay for compressor has switched off (Only units with HP)
HP_LP_Alarm	HP/LP pressure compressor alarm (Only units with HP)

4.1.4 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 (filter) which is in alarm. Non critical alarms are:

Alarm point	Description
Filter_Dirty	Outdoor or exhaust air filter should be checked

4.2 How to solve alarms

Alarm	Problem	Cause	Action
Frost	Valve not opening	• Defect actuator • Valve stuck	• Change/Repair actuator • Change/Repair valve
	No hot water	• Pump not working • Boiler problem	• Change/Repair pump • See boiler manual
Fire	Return air temperature > 40°C	• Fire in the building	
	Supply air temperature > 70°C	• After heating coil not working correct at low air volume • Fire in the unit	• Check heating coil controls
Filter	Filter is dirty	• Filter blocked	• Change filter
Flow	Flow error	• Fan belt broken • Fan motor broken • Damper not open	• Change belt • Change/repair motor • Check damper/motor
	Thermo relay switched off	• Fan motor broken • Phase missing • Fan belt broken • Thermo relay broken	• Change/Repair motor • Connect all phases correct • Change belt • Change thermo relay
	Frequency inverter switched off	• Fan motor overload • Fan motor broken • Phase missing	• Check air volume/pressure • Change/Repair motor • Connect all phases correct
HP/ LP	HP pressure over 24 bar	• Air volume too small • Blockage in cooling circuit • Outside temperature too high	• Check air volume • Check/Repair cooling circuit • Reset pressure switch
	LP pressure under 1.5 bar	• Leakage in the cooling circuit • Evaporator iced up	• Repair cooling circuit • Deice evaporator/Check de-icing function
Compressor	Thermo relay switched off	• Compressor broken • Phase missing • Thermo relay broken	• Change compressor • Connect all phases correct • Change thermo relay

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

5.1 Parameter and Data list AF

Analog inputs	Function	Comment
Room_Temperature	Return air sensor	Temperature in pool hall (sensor placed before heat exchanger inside unit)
Supply_Air_Temp	Supply air duct sensor	Supply air temperature (sensor placed after heating coil)
Room_Humidity	Humidity duct/room sensor	Humidity level in pool hall (sensor placed either in return air duct or in pool hall)
Pressure_SupplyFan	Pressure over supply fan	Pressure transmitter supply fan (sensor placed in fan section)
Analog outputs		
Supply_Fan_Speed	Signal supply fan	Supply fan signal for inverter
Heating_Signal	Actuator heating coil	Degree of heating coil valve opening (100% means fully open valve)
Digital inputs		
Fan_Alarm	Thermo relay / flow switch	Thermo relay fan motor / frequency inverter and flow switch (Normal/Alarm)
HeatingCoil_Alarm	Frost thermostat	Frost thermostat for LPHW coil (Normal/Alarm)
HpLp_Alarm	HP / LP pressostat switch	HP/LP switch for compressor (Normal/Alarm)
Comp_Overload	Thermo relay compressor	Thermo relay for compressor (Normal/Alarm)
Filter_Dirty	Filter switch	Filter switch for fresh / return air filter (Normal/Alarm)
Fire_Alarm	Fire thermostat	Temperature sensor in supply air duct and return air inside unit (Normal/Alarm)
WCC_Heat_Demand	External heat signal	External heat signal to start up the water cooled condenser
FunctionSwitch	Function switch	Setting function switch in panel front
Digital outputs		
Supply_Fan_Start	Supply air fan start	Signal for supply air fan start (ON/Off)
External_Fan_Start	External fan start	Signal for external fan start (On/Off)
Compressor_A	Compressor A	Signal for compressor A start (On/Off)
Compressor_B	Compressor B	Signal for compressor B start (On/Off)
Heating_Coil_Pump	Pump heat coil	Signal for water pump heating coil (On/Off)
Common_Fault	Common fault	Signal for common fault relay (On/Off)
WCC_Pump	Pump water condenser	Signal for pump water cooled condenser (On/Off)
Damper_Return	Return air damper	Return air damper open / closed.
Damper_Outdoor	Outdoor damper	Outdoor damper open / closed.
Pseudo analog		
Return_Air_Calc	Calculated temperature	Calculated temperature for return air
Supply_Air_Calc	Calculated temperature	Calculated temperature for supply air
Heat_Demand	Calculated demand	Calculated demand for heating (55-100%) or cooling (45-0%)
Supply_Airvolume	Supply air volume	Actual supply air volume
Humidity_Room	Set point	Set point for humidity
Temperature_Room	Set point	Set point for temperature
Min_Supply_Temp	Set point	Set point for minimum supply air temperature
Max_Supply_Temp	Set point	Set point for maximum supply air temperature
Supply_Fan_High	Set point	Set point for minimum supply air volume
Supply_Fan_Low	Set point	Set point for maximum supply air volume
Pseudo digital		
Wake_up_Humid	Set point	Set point for wake up function humidity (On/Off)
Wake_up_Temp	Set point	Set point for wake up function temperature (On/Off)
Program_Status	Status time program	Shows if the unit is running in open or closed mode plus fan speed
Unit_Status	Status time program	Shows if pool is open or closed

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