

DanX for swimming pools

Transport, installation, commissioning
and service manual

EN

No. 961403 • rev. 1.0 • 01.10.2010



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

1.1 Introduction	3
1.2 Foundation for the unit	3
1.3 Minimum distances	3

2. Transportation

2.1 Unloading	4
2.2 Lifting with a forklift	4
2.3 Lifting with a crane	5
2.4 Storage	5

3. Installation

3.1 Introduction	6
3.1.1 Unit construction DanX – XWPS	6
3.1.2 Unit construction DanX – XKS	7
3.1.3 Unit construction DanX – XK	7
3.2 Installation of modules	8
3.2.1 Modules side by side	9
3.2.2 Modules above each other	10
3.2.3 Half height hanging filter module	10
3.2.4 Duct mounting	11
3.2.5 Outdoor unit	11
3.3 Installation and connection of components	12
3.3.1 XWPS drop bridge	12
3.3.2 Condensed water outlet	13
3.3.3 Damper motors	13
3.3.4 Filter gauges	13
3.3.5 Flow gauges for centrifugal fans	14
3.3.6 Temperature sensors	14
3.3.7 Humidity sensor	14
3.3.8 Frequency converter for plug fans	15
3.3.9 Water cooled condenser	16
3.3.10 LPHW coil	17
3.3.11 Frost thermostat for LPHW coil	17

4. Commissioning

4.1 Introduction	18
4.1.1 Unit function DanX – XWPS	18
4.1.2 Unit function DanX – XKS	19
4.1.3 Unit function DanX – XK	19
4.2 Centrifugal fan	20
4.2.1 Air volume measuring and setting	20

0. TABLE OF CONTENTS

4.3 Plug fan	22
4.3.1 Frequency converter setup	22
4.3.1.1 Display mode	23
4.3.1.2 Quick menu	23
4.3.2 Air volume measurement and setting	23
4.3.3 Pressure transducer	24
4.4 XWPS section	26
4.4.1 Cooling circuit	26
4.4.2 Dampers	27
4.5 XK/XKS section	27
4.5.1 Internal mixing box XKS	28
4.5.2 Dampers XK	29
4.6 Frost thermostat	29
4.7 Filter pressure transmitter	29
5. Maintenance	
5.1 Introduction	30
5.2 Maintenance plan	30
5.3 Cabinet	30
5.4 Fans	31
5.4.1 Centrifugal fans	31
5.4.2 Plug fans	31
5.5 Filter	32
5.6 Heating coils	32
5.7 Cross flow heat exchanger	32
5.8 Dampers	33
5.9 Cooling circuit XWPS	33
5.10 Drop catcher	33
6. Faultfinding	
6.1 Introduction	34
6.2 Faultfinding	34
7. Disposal	
7.1 Disposal of unit	36
8. Appendix	
8.1 VLT 2800 parameter settings	37

1. GENERAL

1.1 Introduction

The DanX type XWPS, XKS and XK equipment is designed for the use for ventilation, humidity and temperature control in private and public swimming pool areas. The use of the unit includes the required inspection and maintenance for these units, which is described in the back of this manual.



Unloading, transportation, assembly, connecting of the DanX modules should only be carried out by trained specialists or by people supervised by authorized staff. It is the responsibility of the fitter to read and understand this guide and other given information.

1.2 Foundation for the unit

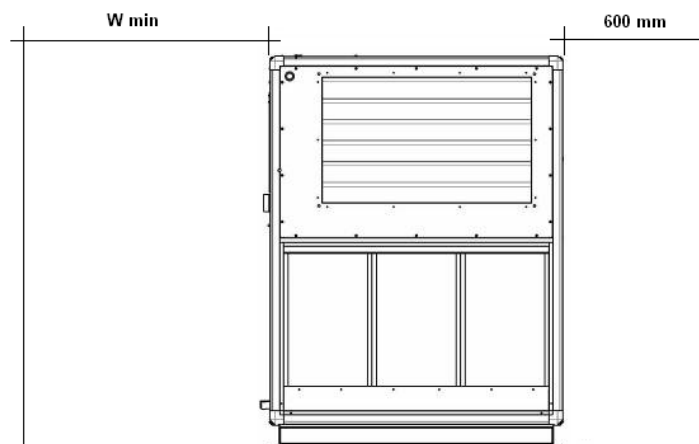
The DanX unit must be installed in a location that meets the following requirements:



- The supporting structure must be level, stable and vibration-free.
- The supporting structure must be able to bear the weight of the unit.
- The deflection of the substructure should be max. 1 mm/m.
- For the connection of the condensate drain, it is necessary that the height between condense outlet of the unit and the substructure is at least the required height for the water trap.
- If the unit is mounted on a roof, the bearing ability of the roof and its support structure must be examined.

1.3 Minimum distances

For the operation, maintenance and servicing of parts as heating coils, dampers and others a minimum clearance between inspection side of the unit and the wall should be the width of the unit. It is also recommended to have a minimum clearance of 600 mm between the wall and the rear of the unit for service and installation purposes.



Model	W min [mm]
DanX 2/4	900
DanX 3/6	900
DanX 5/10	1400
DanX 7/14	1900

Model	W min [mm]
DanX 9/18	1800
DanX 12/24	2200
DanX16/32	2200

2. TRANSPORTATION

2.1 Unloading

The unit is normally delivered in separate modules placed on wooden cross beams or a wooden pallet. Each part is wrapped in protective packing. The following steps should be taken when unloading the modules:



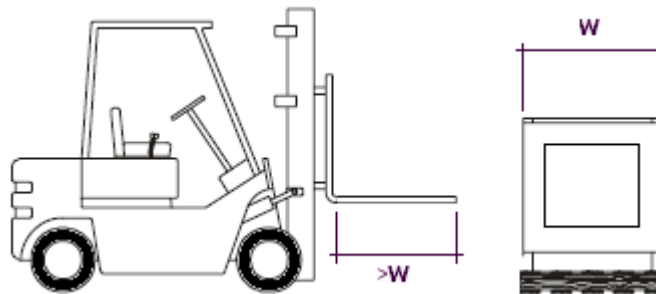
- Find a suitable place for unloading as modules can be very heavy (up to 2500 kg).
- Unload the modules with a forklift or crane (see instructions below).
- Do not tilt or lay down modules with integrated refrigeration system (compressor).
- Check the packing and modules for transport damage and report immediately any damage to the driver and to Dantherm Air Handling.
- Retain the packing until the sections/modules are placed on the mounting location to avoid damages on cabinet parts or connecting pieces that overhang.
- If the unit is delivered with a separate control panel, it should be handled with special caution and stored in a safe and dry location until the installation is carried out.

2.2 Lifting with a forklift



If a fork-lift is being used it must be ensured that the forks are long enough to reach all through under the unit so that the bottom of the cabinet is not damaged. Rough and incorrect handling can damage the unit and hereby result in glitch.

Make sure that the modules centre of gravity is always in the centre of the two forks, so the module can be transported stable. Be extra careful when transporting short but high and wide units.



Depending if the module is short or long there are two ways to lift. Long modules with a base frame and wooden cross beams or without a base frame on a pallet, should always be lifted from the inspection or backside of the unit, never in the longitudinal direction, as the base frame or pallet is not designed for this.

Short modules (475 up to 600 mm) with or without a base frame will always stand on a pallet and can only be lifted in the longitudinal direction as they are too short for lifting from the inspection or back side.

2.3 Lifting with a crane



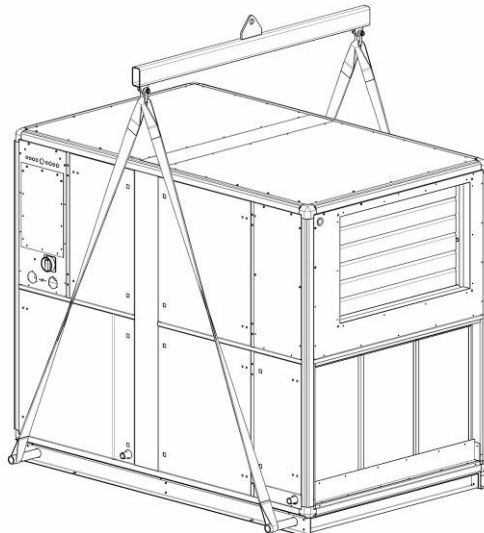
Never walk under a module when it is lifted with a crane. There is always a risk that the crane or helping material may break and cause serious injuries or death.

Please be aware of the following general points:

- Only use a hoist that can manage the weight of the module!
- Never use a hoist which is damaged!
- Use soft straps!
- Lift the module cautiously, without jerky movements!
- Do not touch down hard!

Lifting is done in the following way:

- Insert 2 bars of round iron (min. 1 ½") in the holes of the base frame and secure them.
- Use four soft straps, push them over the iron bars and put them together in the crane hook.



2.4 Storage

If the unit is not installed at once but should be stored, note the permissible storage conditions:



- Do not leave the unit standing outside, but in a building.
- Do not remove the original packaging.
- Protect the unit until the installation from dust, dirt and damage.
- The air temperature in storage should be between 5 °C to 40 °C.
- The storage should be in a non-condensing atmosphere.

If the unit is delivered with a separate control panel, it should be handled with special caution and stored in a safe and dry location until the installation is carried out.

3.1 Introduction

There are three basic models of DanX units for swimming pool ventilation. Your DanX unit may differ a little from these. If you are in doubt how to assemble the modules, please ask your supplier for an exact drawing of the unit. Please refer to the type plate on the inspection side of the unit to find out if it is a XWPS or XK(S) unit you are about to install.



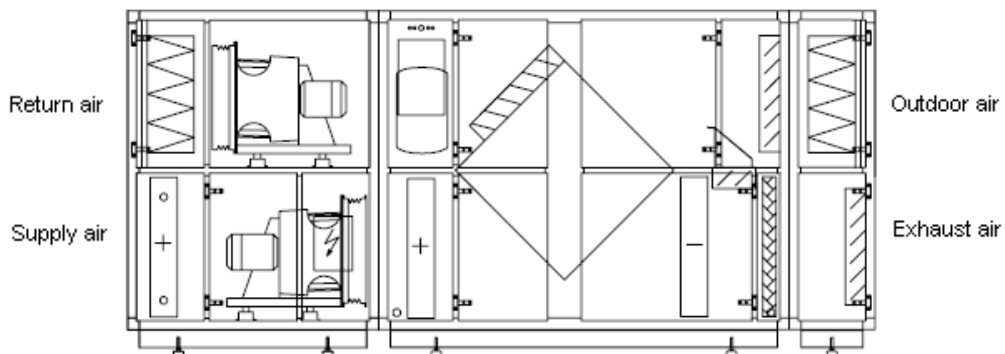
The units shown in the drawings in this manual are all left hand units, with the outdoor air coming from the right hand side. If you have a right hand unit all components of the unit are the other way around.



Assembly of the DanX modules should only be carried out by trained specialists or by people supervised by authorized staff. It is the responsibility of the fitter to read and understand this guide and other given information.

3.1.1 Unit construction DanX – XWPS

The DanX – XWPS consist of a cross flow heat exchanger in combination with a compressor driven heat pump in the same module. The cooling circuit is mounted in the XWPS module, filled with refrigerant and do not need any extra installation.



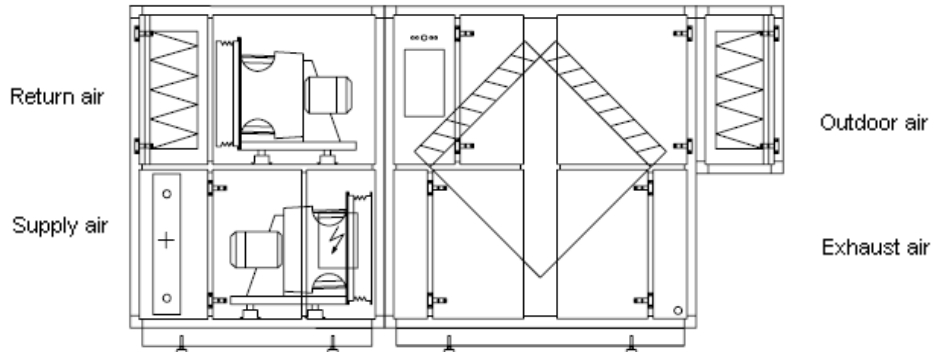
From left to right the unit consists of the following components/modules:

- 1) Heating coil with supply air fan below*.
- 2) Return air fan and return air filter above.
- 3) Cross flow heat exchanger with heat pump.
- 4) Exhaust air damper with outdoor filter above.

*If the unit is equipped with centrifugal fans instead of plug fan then the LPHW heating coil is placed before the supply air fan!

3.1.2 Unit construction DanX – XKS with integrated mixing box

The DanX – XKS consist of a cross flow heat exchanger with an integrated mixing box.



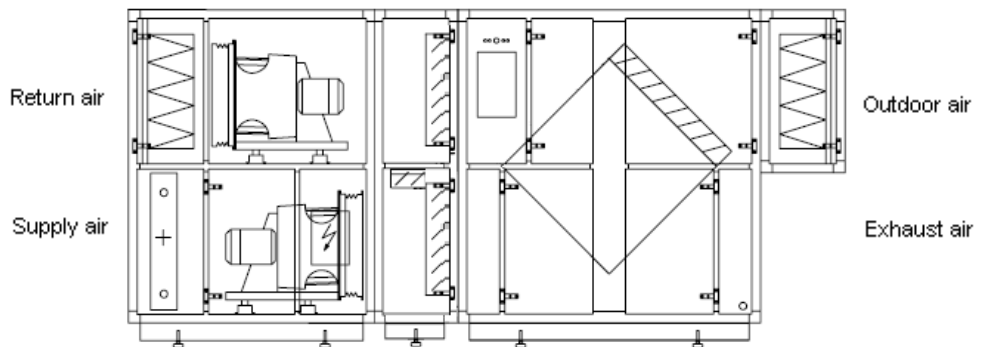
From left to right the unit consists of the following components/modules:

- 1) Heating coil with supply air fan below*.
- 2) Return air fan and return air filter above.
- 3) Cross flow heat exchanger.
- 4) Outdoor air filter above.

*If the unit is equipped with centrifugal fans instead of plug fan then the LPHW heating coil is placed before the supply air fan!

3.1.3 Unit construction DanX – XK with separate mixing module

The DanX – XK consist of a cross flow heat exchanger with a separate mixing box.



From left to right the unit consists of the following components/modules:

- 1) Heating coil with supply air fan below*.
- 2) Return air fan and return air filter above.
- 3) Mixing module.
- 4) Cross flow heat exchanger.
- 5) Outdoor air filter above.

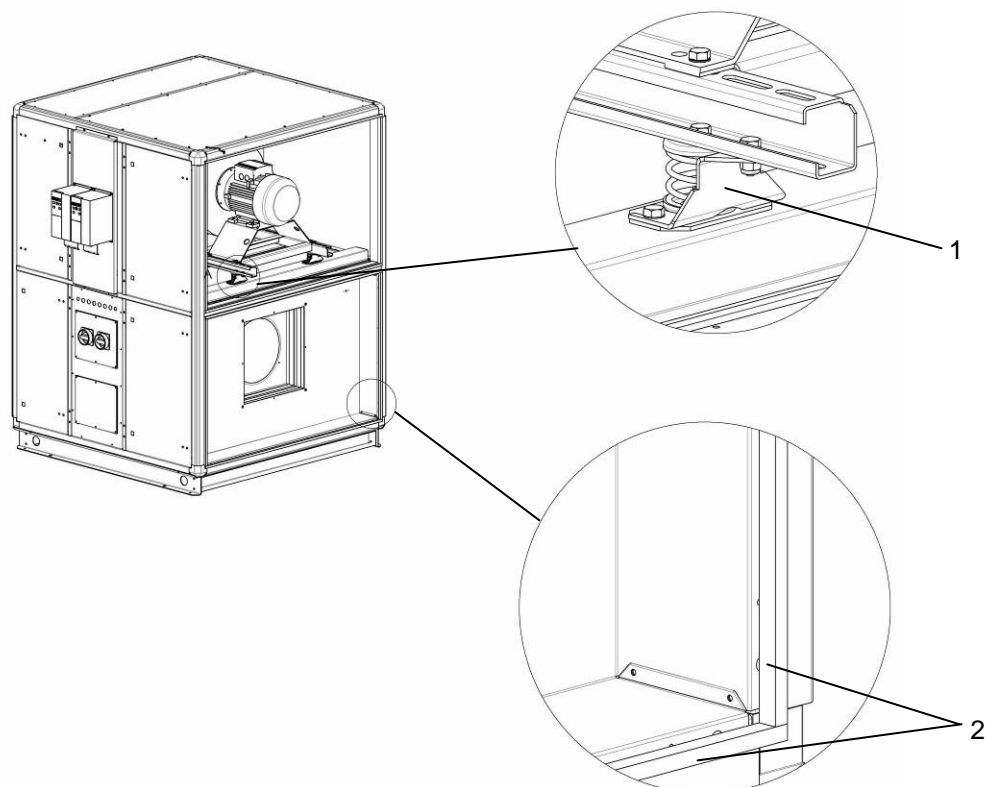
*If the unit is equipped with centrifugal fans instead of plug fan then the LPHW heating coil is placed before the supply air fan!

3.2 Installation of modules

Before placing the single modules in the right order, accordingly to chapter 3.1 the wooden crossbeams or pallets have to be removed and the separate delivered feet mounted on the base frame. To do so the following has to be done:



- Unwrap the module, open the inspection door and take out the separate box with the feet and the assembly rails for the unit.
- On the fan modules remove the transport brackets (1) which are holding the fan (spring vibration dampers only) as it is easier now then after the unit has been assembled (see drawing).



- Check the rubber gaskets (2) at the end of each module that they are not damaged or loose. This is important, as it is impossible to replace the gaskets after the modules have been assembled!
- Lift the unit with a fork lift or pallet lift and unscrew the wooden cross beams.
- Screw the feet on the base frame (see drawing) and place the modules as close as possible together where they should be installed. When the feet are mounted it is only possible to move the modules a few millimetres, otherwise the feet can bend or break. If you have to move the modules more, then use a fork lift or pallet lift.

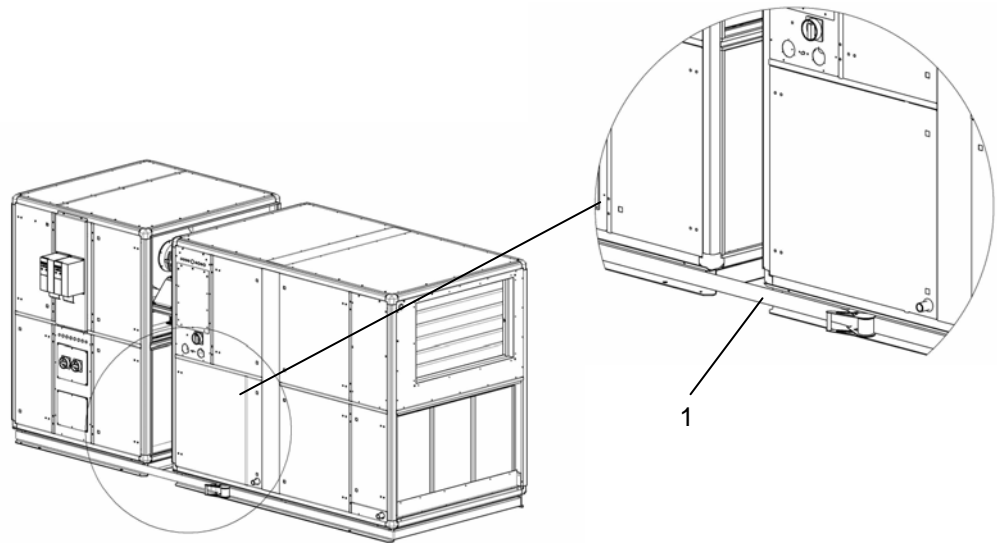
3.2.1 Modules side by side

After placing all bottom modules in the right order on the floor, the modules must be assembled. If the unit includes half height modules, install the bottom modules **before** the top modules.

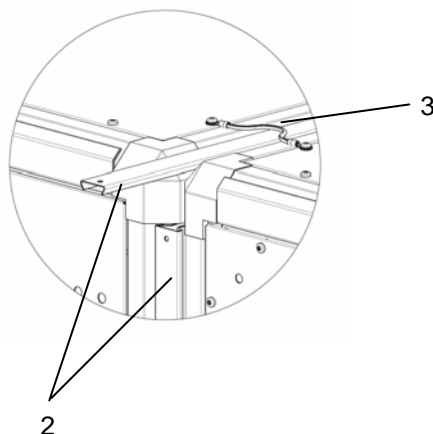
Follow these steps for mounting the modules:



- Adjust the height of the modules with the adjustable feet, so that all modules are in level and in same height.
- Use straps (1) to move the modules the last few millimetres. Straps should only be mounted at the bottom or/and top of the modules.



- Connect neighbour modules by pushing assembly rails (2) from the top over the outside of the frame profile all the way around the unit. The assembly rail can at difficult accessible space be divided into smaller pieces, which are then mounted in the same way.



- To finish the installation all modules must be connected with the green/yellow earth connection (3) at the top of the modules.

3.2.2 Modules above each other

After the installation of the bottom modules (see chapter 3.2.1) the half height top modules can be placed above the bottom modules in the following way.

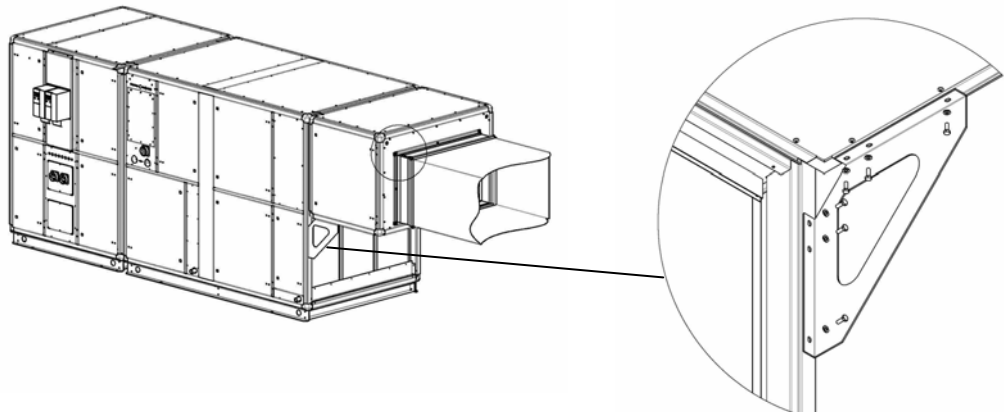
- Lift the module with a fork lift and push the module from the wooden pallet onto the bottom module.
- Use a strap to get the modules as close together as possible. Straps should only be mounted at the bottom or/and top of the modules
- Use the assembly rails as described in chapter 3.2.1, not only vertical but also horizontal to connect the upper module with the module below.

3.2.3 Half height hanging filter modules

Half height hanging filter modules are mounted on a set of support brackets (to be found in a box inside the module).

Follow these steps for mounting the modules:

- Screw the two brackets into the end frame of the DanX unit, by using the bolts delivered with the brackets.
- Lift the filter module onto the brackets
- Fasten the filter module with the assembly rails to the top and side of the DanX. The assembly rails can only be used on three sides and not beneath the module.
- Use the self cutting screws to fasten the filter module to the support brackets.



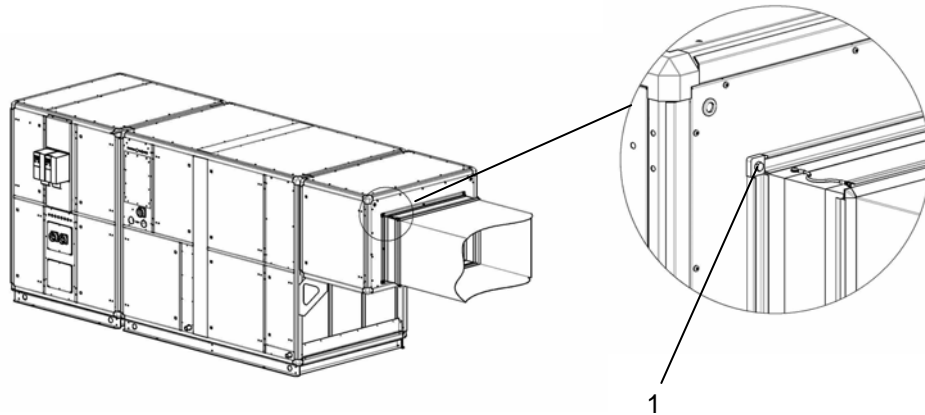
Important:

If the module is longer than 880 mm or contains other functions than a filter, the module must be supported at the free end of the module, to avoid that the module sinks. This supporting is not included in the delivery.

3.2.4 Duct mounting

The ducts connected to the AHU must be suspended or underpinned with support elements as the duct connection panel of the unit is not strong enough to hold the duct work.

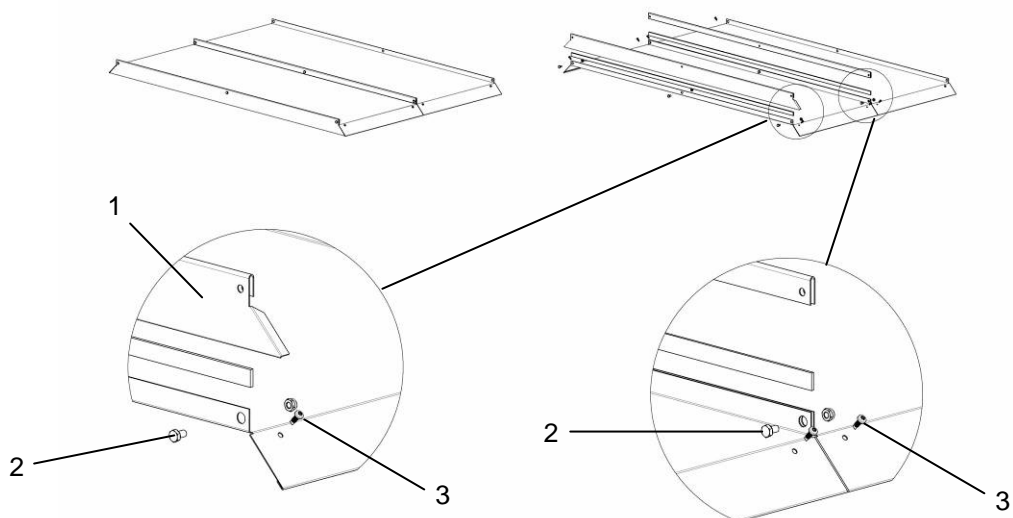
The ducts can be connected to the DanX with flexible connections (optional accessory) to suppress vibrations of the unit. Flexible connections are equipped with flanges and can be fastened to the unit with four bolts (1), one on each corner. It is important that the flexible connection is not totally stretched to work properly. When a flexible connection is used an earth connection must be mounted between unit and duct work.



3.2.5 Outdoor unit

Installation of outdoor and indoor units are done in the same way, however, outdoor units often come completely assembled on one base frame, ready to be lifted onto the roof in one piece. Outdoor units must have a roof cover, which is delivered separately together with the unit. Depending on the length of the unit, the roof cover consists of two gable ends (1) and one or more middle parts.

- Assemble the roof panels with the rails and bolts (2) delivered with the roof as shown in the drawing.
- Finish the installation by securing the assembled roof with self cutting screws (3) to the upper frame of the units as shown in the drawing.



3.3 Installation and connection of components

All components and duct work of the air handling unit must be installed correctly before starting up and commissioning the DanX unit.

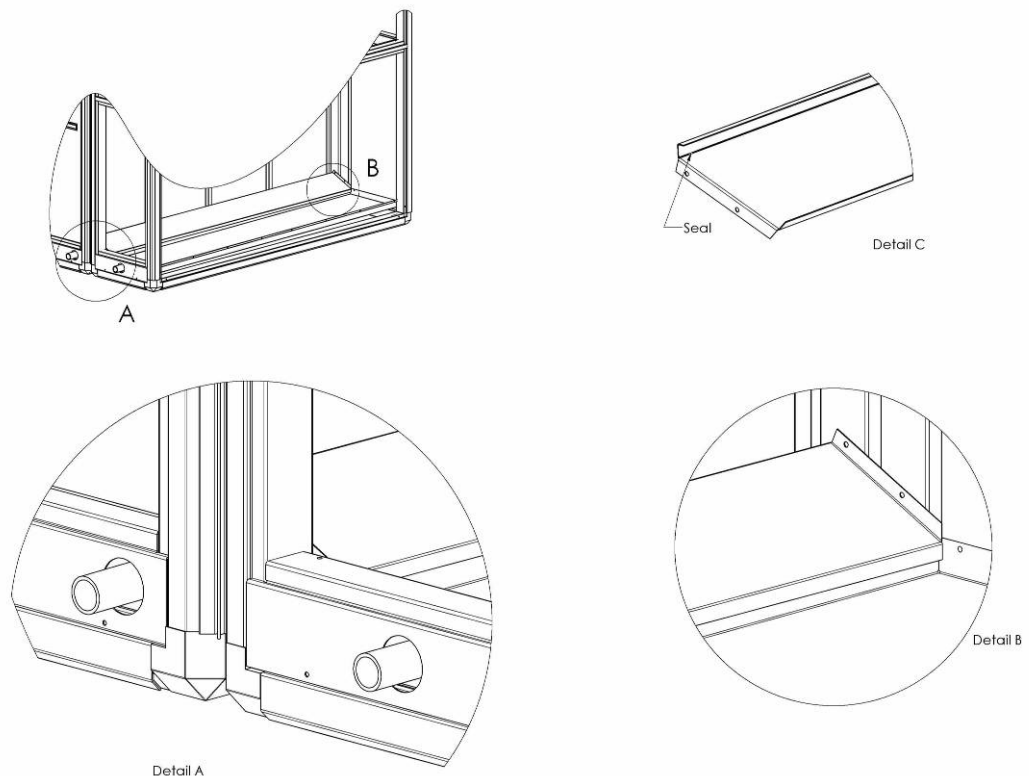


Installation and connection work should only be carried out by trained specialists or by people supervised by authorized staff. It is the responsibility of the fitter to read and understand this guide and other given information.

3.3.1 XWPS drop bridge

To avoid condensate leaving the unit through the module joint, a bridge must be mounted between the two drip trays of the modules. This bridge is delivered separately and should be mounted when the modules are in place.

- Place a strip of sealing on the backside of the bridge (Detail C)
- Turn over the bridge and place it between the two drip trays with the sealed side facing the drop catcher.
- If the sealing should not be enough to keep the bridge in place, it is possible to fasten the two ends of the bridge to the module frame with two rived nuts (Detail B).



It is important that the drop bridge is installed and sealed correctly, to avoid uncontrollable discharge of condensed water and water damage of the building!

3.3.2 Condensed water outlet

Drainage from the condensate tray is taking place through a connection in front of the inspection side through the cover panel. On a XWPS unit will be three condense outlets, two on the exhaust side (negative pressure) and on the supply side (positive pressure). On XKS and XK units we will see one outlet, both on the exhaust side (negative pressure). There are two different types of water traps available.

Drain tap with ball valve

This drain trap should only be installed where there is negative pressure in the drain system as the ball valve will open on positive pressure. The inserted float ball prevents the intake of air under dry operation, where in a traditional drain trap you have to refill water to avoid air been sagged into the unit. At the same time you need less space in height than on a traditional drain pipe. This drain trap can be used up to -900 Pa.

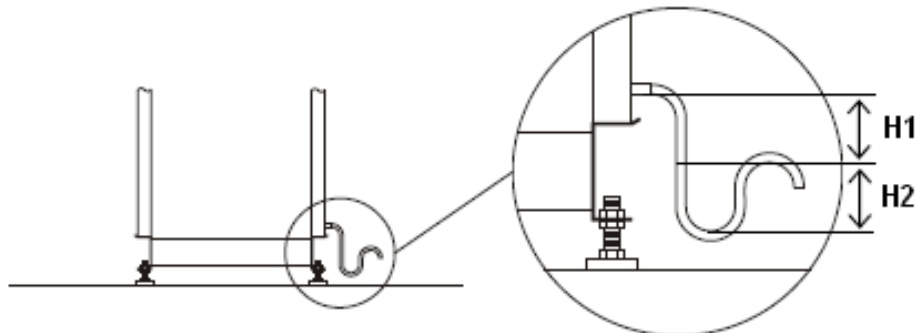
Normal drain pipe

The normal drain pipe with screw cap for filling with water and check can be used for negative and positive pressure. The length of the pipe can be calculated the following way.



Positive pressure : $H1 = 50 \text{ mm}$ $H2 = \Delta p + 50 \text{ mm}$
 Negative pressure : $H1 = \Delta p + 50 \text{ mm}$ $H2 = \Delta p / 2 + 50 \text{ mm}$

Δp = pressure in mm WS (100 Pa = 10 mm WS)



3.3.3 Damper motors

All damper motors, except in the mixing module, are installed, prewired and connected to the terminal strip of the XWPS, XKS or XK. The prewired damper motors in the mixing module must be connected to the terminal strip of the XK module after the installation of the unit. You will find the 3 pole wiring cable inside the mixing module. For further information see the electrical diagram of the unit.

3.3.4 Filter gauges

The filter gauges for outside and return air are mounted at the front of the XWPS, XKS or XK module and prewired to the terminal strip.

After assembling the unit the pressure tubes have to be connected to the probes in the filter section. You find the pressure tubes, which are marked – and +, inside the main section. Run the pressure tubes inside the cable channel to the filter section and connect the + tube to the probe behind the filter and the – tube to the probe before the filter.

3. INSTALLATION

3.3.5 Flow gauges for centrifugal fans

The flow gauges for centrifugal fans are mounted at the front of the XWPS, XKS or XK module and prewired to the terminal strip of the module.

After assembling the unit the pressure tubes have to be connected to the probes in the fan section. You find one pressure tube for each fan inside the main section.

Run the pressure tube inside the cable channel to the fan section and connect the tube to the probe on the low pressure side of the fan.

3.3.6 Temperature sensors

All temperature sensors in the unit are mounted and prewired to the terminal strip of the XWPS, XKS or XK module.

Only the supply air duct sensor has to be installed after assembling the DanX unit. You find the coiled up duct sensor near the connection panel of the XWPS, XKS or XK module.

The supply air duct sensor is installed in the supply air duct after the heating coil in the following way.

- Drill an 8 mm hole in the supply air duct about 1.5 m from the unit.
- Place the sensor in the hole.
- Fasten the sensor housing to the duct with two screws.

3.3.7 Humidity sensor

The humidity sensor is a room or duct mounted sensor, depending on what has been ordered. You find the humidity sensor separately wrapped inside the electrical panel.

The duct humidistat is installed in the following way:

- Drill a 15 mm hole in the return air duct about 1.5 m from the unit.
- Fasten the sensor housing to the duct with two screws.
- Connect the sensor directly to the electrical panel.

The room humidistat is installed in the following way:

- Find a suitable place for the sensor in the swimming pool hall. Avoid placing the sensor in direct sun light or near the supply air duct.
- Place the humidistat in a height of about 2.5 m to avoid direct influence from wet people passing the sensor.
- Fasten the sensor housing to the wall with two screws.
- Connect the sensor directly to the electrical panel.

3.3.8 Frequency converter for plug fans



The voltage of the frequency converter is dangerous whenever the equipment is connected to mains. Incorrect installation of motor or frequency converter may cause damage to the equipment, serious injury or death. Touching the electrical parts may be fatal - even after the equipment has been disconnected from mains: Wait at least 4 minutes for current dissipates. Installation must comply with the instructions in this manual and the separate manual for the frequency converter as well as national and local legislation and safety regulations.



NB!

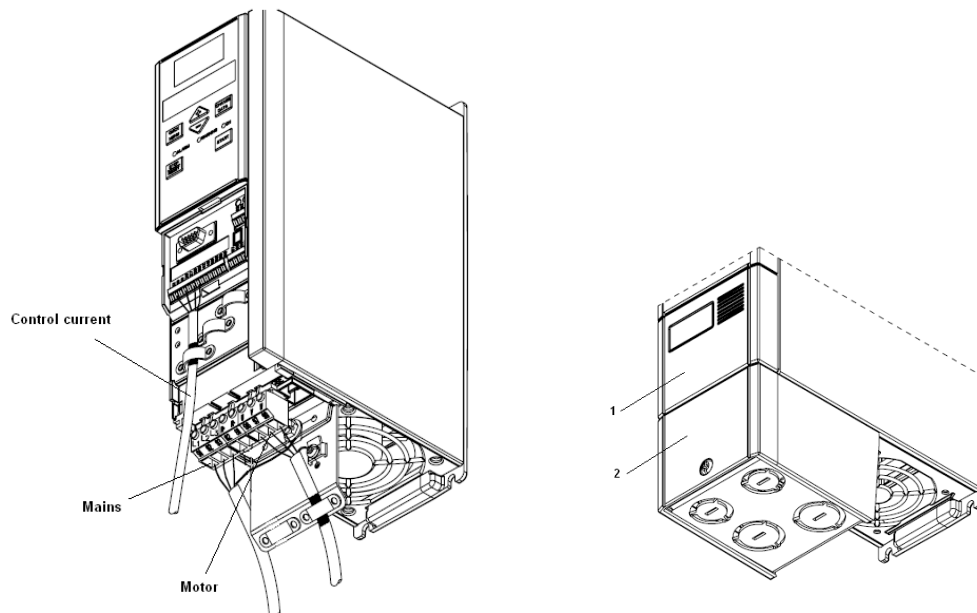
It is the responsibility of the user or installer to ensure correct earthing and protection in accordance with national and local standards.

Frequency converters delivered by Dantherm Air Handling are found in the fan section, where they are stored under transport.

Unpack the frequency converters and mount them either on a special framework on the fan section or in another place next to the DanX unit, depending on what has been ordered.

If the frequency converters are mounted on the fan section, all cabling in the DanX unit has been done from the factory and only the following steps should be done to finish the installation:

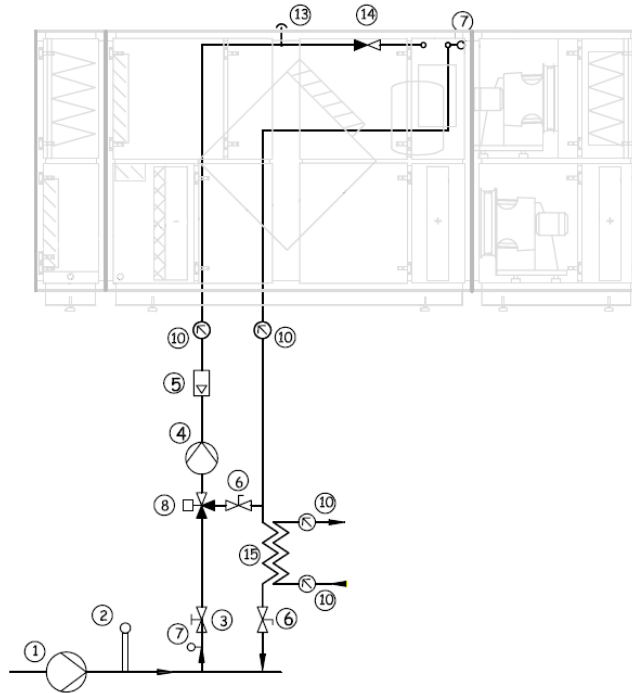
- Remove the upper plastic protection (1) for the frequency converter.
- Connected the control current cable (without plug) to the frequency converters terminals accordingly to the DanX wiring diagram.
- Remove the lower plastic protection (2)
- Plug the prewired cables for mains and motor into the converter.
- Replace the upper plastic protection (1).
- Replace the lower plastic protection (2).



If the frequency converters are mounted separately from the DanX unit all cabling has to be done according to the wiring diagrams and the converters handbook supplied with the DanX unit.

3.3.9 Water cooled condenser

The heat pump in a DanX XWPS swimming pool unit may be fitted with a water-cooled condenser for transfer of surplus heat, which is not used for heating the return/supply air, to the pool or sanitary water. The drawing below shows Dantherm's suggestion on how to connect the water cooled condenser to the swimming pools water supply.



1. Main pump for pool water
2. Temperature sensor pool water (separate water temperature control)
3. Manual shut down valve
4. Pump for water cooled condenser (control signal from DanX control panel)
5. Water consumption gauge
6. Regulation valve
7. Temperature sensor (separate water temperature control with on/off signal to DanX control panel)
8. 3 way valve (separate water temperature control)
10. Temperature gauge
13. Air realise valve
14. Non return valve
15. Separate heat exchanger for pre heating sanitary water



NB!

Piping material must be suitable for chlorine water.

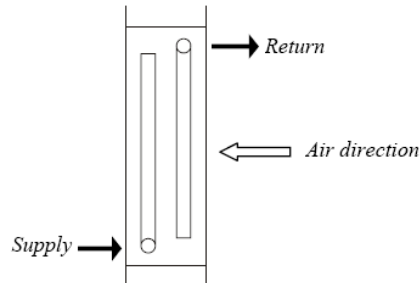
Please be aware of the specified max. water volume (see table below), as a too high water velocity can destroy the water cooled condenser and cooling circuit of the DanX unit.

XWPS	2/4	3/6	5/10	7/14	9/18	12/24	16/32
Max water L/h	800	1250	1900	2750	2750	5300	5300

3. INSTALLATION

3.3.10 LPHW coil

The supply is always connect to the bottom of 1 and 2 row LPHW coils, as this makes it easy to bleed the coil for air.
If the coil is larger than 2 rows, the water and air flow must be counter flow to obtain the calculated heat capacity.



NB!
When connecting the heat exchanger, counter hold with a suitable tool in order to avoid any damage to the pipes. Mount the connections in a way that it is possible to access the heat exchanger for maintenance afterwards.

3.3.11 Frost thermostat for LPHW coil

The frost thermostat is normally placed in the compartment above the LPHW heating coil, with the capillary tube mounted on the heating coil. The thermostat is prewired and the wire only has to be connected to the main terminal strip of the unit (see wiring diagram).

4.1 Introduction



When servicing on air handling units always turn off the electricity on the main switch *and* the repair switch (complete shut down) *and* secure for reconnection from unauthorized persons. Only open the inspection doors when the unit is totally stopped and the fans have come to a stop. After switching off the unit the fan impeller will run for about 1 to 3 minutes before stopping totally. The fan wheel must never be stopped by hand or with an object.

Commissioning, maintenance and repair work should only be carried out by trained specialists or by people supervised by authorized staff. It is the responsibility of the fitter to read and understand this guide and other given information.

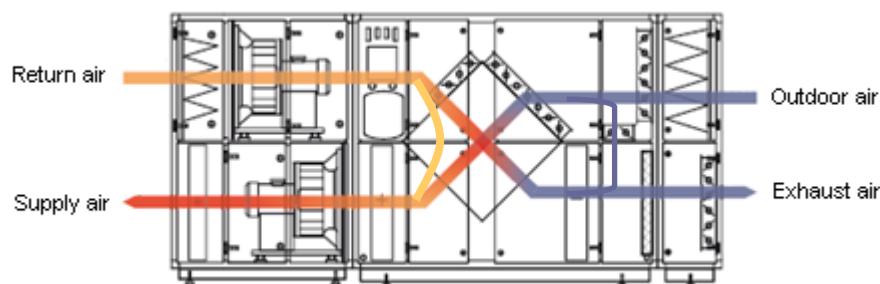
4.1.1 Unit function DanX – XWPS

The DanX – XWPS consist of a cross flow heat exchanger in combination with a compressor driven heat pump in the same module.

The DanX XWPS is using a minimum of outdoor air which is required for hygienic reasons in the pool hall. To keep pressure drop low and have a high dehumidification capacity in the heat pump, only a part of the wet swimming pool air is run through the heat exchanger and evaporator.

Part of the exhaust air is leaving the unit and part of the exhaust air is re-circulated to join the outdoor air. These two airstreams are then preheated in the cross flow heat exchanger and afterwards heated in the heat pump condenser. If the supply air temperature is too low the re-heater is activated. In this operation mode the dehumidification is obtained with the dry outdoor air and heat pump. If the dehumidification capacity is not sufficient the amount of dry outdoor air automatically increases.

For further explanations about the controls of this unit, please refer to the manual of the control panel.



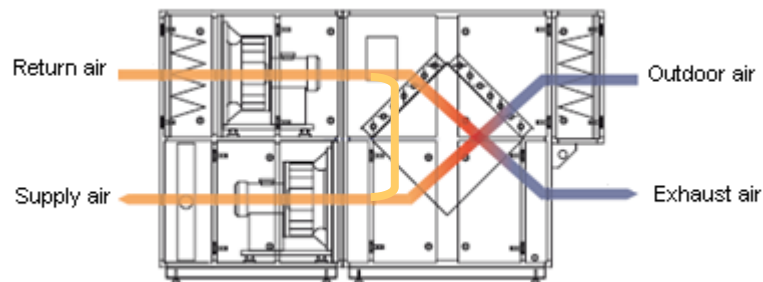
4.1.2 Unit function DanX – XKS with integrated mixing

The DanX – XKS consist of a cross flow heat exchanger with integrated mixing.

The DanX XKS is using a minimum outdoor air which is required for hygienic reasons in the pool hall.

To keep pressure drops low, only part of the return air is run through the heat exchanger. The rest is re-circulated and heated in the re-heater. If the dehumidification capacity is not sufficient the amount of dry outdoor air automatically increases.

For further explanations about the controls of this unit, please refer to the manual of the control panel.



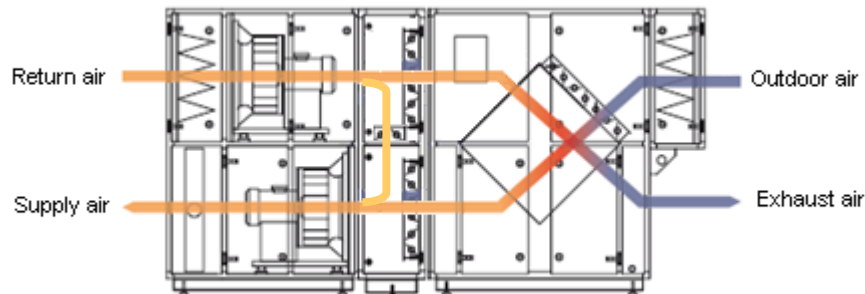
4.1.3 Unit function DanX – XK with separate mixing module

The DanX – XK consist of a cross flow heat exchanger with a separate mixing module.

The DanX XK is using a minimum outdoor air which is required for hygienic reasons in the pool hall.

To keep pressure drops low, only part of the outdoor air is run through the heat exchanger. The rest is re-circulated and heated in the re-heater. If the dehumidification capacity is not sufficient the amount of dry outdoor air automatically increases.

For further explanations about the controls of this unit, please refer to the manual of the control panel.



4.2 Centrifugal fan



To commission the centrifugal fans for the first time, the following actions have to be taken:

- Check if the transportation brackets have been removed.
- Check by hand if the fan wheel is turning freely.
- Check that all dampers in the duct system are open.
- Check if the duct system is clean and not blocked by any parts
- Start up the fan for a few seconds and check if the fan wheel turns in the right direction (see arrow on fan casing). If this is not the case stop the unit, switch off the main current and change two phases of the fan on the terminal strip.
- Close all inspection doors start up the fans and measure the running current of the motors. If the running current is higher than specified on the type plate of the motors stop the unit and check the air volume.

4.2.1 Air volume measurement and setting



If your centrifugal fan is equipped with a measuring probe (accessory), installed at the spider arm of the fan, the air volume can be measured the following way:

In the electrical connection panel of the fan section you will find two measuring probes (+/-). The differential pressure you can measure at these two points will show you indirectly the air volume which is moved by the fan. To calculate the air volume from the found pressure loss you have to use the following formulas:

DanX 2/4 to DanX 7/14:

$$V = k * p^N * 3600$$

where p is the measured pressure difference and k and N from the table below.

Model	K	N
DanX 2/4	0,063837	0,546547
DanX 3/6	0,083982	0,523426
DanX 5/10	0,132280	0,558588
DanX 7/14	0,208982	0,501027

DanX 9/18 to DanX 16/32:

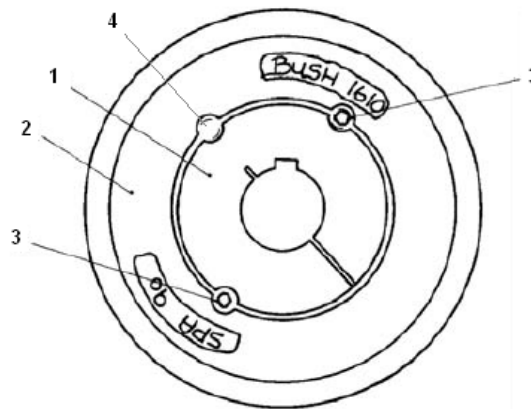
$$V = k * \sqrt{DP_w}$$

where p is the measured pressure difference and k from the table below.

Model	K
DanX 9/18	634
DanX 12/24	875
DanX 16/32	1091

If the measured air volume does not correspond to the type plate data, or when the measured running current of the motor is too high, the fan transmission has to be changed. After calculating the right pulley sizes the pulleys can be changed in the following way.

- Unscrew the two Allen screws (3) and pull off the pulley (2) by screwing one Allen screw into the thread (4)
- Remove the bush (1) from the fan shaft if the new pulley needs a different bush
- Refit the new pulley
- Check if both pulleys are in line and tighten the belt.



4.3 Plug fan



To commission the plug fans for the first time, the following actions have to be taken:

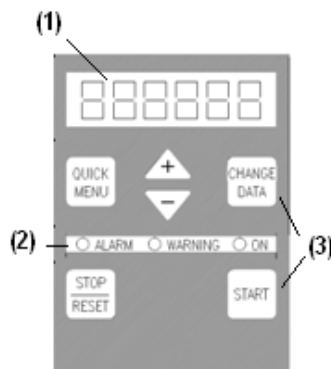
- Check that the four measuring probes below the pressure transmitter are blanked.
- Check if the transportation brackets have been removed.
- Check by hand if the fan wheel is turning freely.
- Check that all dampers in the duct system are open.
- Check if the duct system is clean and not blocked by any parts.
- Start up the fan for a few seconds and check if the fan wheel turns in the right direction (see arrow on fan casing). If this is not the case stop the unit, switch off the main current and change two phases of the fan on the terminal strip.

4.3.1 Frequency converter setup



All frequency converter parameters are set by the factory. For a list of parameters please refer to 8. Appendix. For change of settings of the most important parameters, please refer to 4.3.1.2 Quick Menu. For change of settings of any other parameter, please refer to the separate Danfoss VLT 2800 manual in the quick menu.

The control panel on the front of the frequency converter is used to set up the frequency converter. All displays of data are in the form of a six-digit LED display (1) capable of showing one item of operating data continuously during normal operation (see 4.3.1.1). As a supplement to the display, there are three indicator lamps (2) for indication of mains connection (ON), warning (WARNING) and alarm (ALARM) and six control keys (3). The control keys have the following functions.



[QUICK MENU] allows access to the parameters used for the Quick menu

[CHANGE DATA] is used for changing a setting. The **[CHANGE DATA]** key is also used for confirming a change of parameter settings.

[+] / [-] are used for selecting parameters and for changing parameter values. These keys are also used in Display mode for selecting the display of an operating value.

[QUICK MENU] + [+] keys must be pressed at the same time to give access to all parameters. Please refer to the separate Danfoss VLT 2800 manual.

[STOP/RESET] is used for stopping the connected motor or for resetting the frequency converter after a trip.

In Display mode, the display will flash if the stop function is activated.

[START] is used for starting the frequency converter. It is always active, but the **[START]** key cannot override a stop command.

4.3.1.1 Display mode

In normal operation, one item of operating data can be displayed continuously at the operator's own choice. By means of the [+/-] keys the following options can be selected in Display mode:

- Output frequency [Hz]
- Air volume set point [%]
- Output current [A]
- Output power [kW]

4.3.1.2 Quick menu

Using the **[QUICK MENU]** key, it is possible to access the 14 most important parameters of the frequency converter. When the **[QUICK MENU]** key is activated in Display mode, the Quick menu will start. Scroll through the quick menu using the **[+/-]** keys and change the data values by first pressing **[CHANGE DATA]**, then change the parameter value with the **[+/-]** keys and save the new value by pressing **[CHANGE DATA]**. The Quick menu parameters are:

- Parameter 215 Air volume min set point - (How to change the parameter see 4.3.2)
- Parameter 216 Air volume max set point - (How to change the parameter see 4.3.2)
- Parameter 102 Motor power - (See motor type plate – do not change!)
- Parameter 103 Motor voltage - (See motor type plate – do not change!)
- Parameter 104 Motor frequency - (See motor type plate – do not change!)
- Parameter 105 Motor current - (See motor type plate – do not change!)
- Parameter 106 Rated motor speed - (See motor type plate – do not change!)
- Parameter 202 Max motor frequency - (Factory set – do not change!)
- Parameter 204 Min reference Pa - (Min pressure transducer setting see 4.3.3)
- Parameter 205 Max reference Pa - (Max pressure transducer setting see 4.3.3)
- Parameter 414 Min feedback Pa - (Min pressure transducer setting see 4.3.3)
- Parameter 415 Max feedback Pa - (Max pressure transducer setting see 4.3.3)

4.3.2 Air volume measurement and setting



If you want to check the air volume of the unit the two measuring probes (+/-), which are located beneath the pressure transducer, can be used. The differential pressure, measured at these two points, compares the static pressure in front of the inlet ring with the static pressure in the inlet ring of the narrowest point. The differential pressure between the static pressures is related to the air volume via the energy conservation rate as follows:

$$V = k * \sqrt{DP_w}$$

Where k takes into account the specific ring characteristics.

Model	K nozzle coefficient	Model	K nozzle coefficient
DanX 2/4	121	DanX 9/18	381
DanX 3/6	154	DanX 12/24	490
DanX 5/10	197	DanX16/32	620
DanX 7/14	308		

EXAMPLE: If you have measured a static pressure difference of 700 Pa for a DanX 5/10 then the air volume will be:

$$V = 197 * \sqrt{700} = 5212 \text{ m}^3/\text{h}$$

If you want to lower the air volume to 4000 m³/h you have to change parameter 215 (air volume min set point) in the frequency converter. The calculation for the value is done with the following formula:

$$Value = ((V / k)^2 / Par205) * 100$$

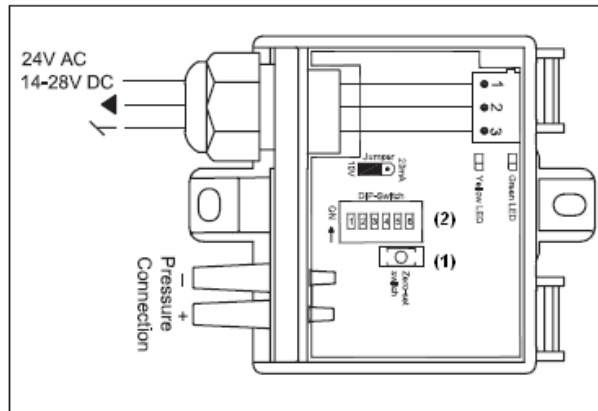
Where Par205 is parameter 205 (Max pressure transducer setting, see 4.3.3) and k the nozzle coefficient.

$$Value = ((4000/197)^2 / 2500) * 100 = 16.5\%$$

You now have to give in 16.5 for parameter 215 to set the low air volume to 4000 m³/h. If you want to change the high air volume setting of the unit, you have to reset parameter 216 (air volume max set point). The calculation for this value is done accordingly to the low volume calculation.

4.3.3 Pressure transducer

The pressure transducers for the supply and exhaust fan are installed in a separate box below the electrical connection box for the fan motors. The transducer factory settings should normally not be changed.



After installing the unit and before the first start, it is recommended to zero-set the transducer. After the power supply is established (green LED on) press the zero-set button (1) and the yellow LED will flash for 3 seconds. After this the pressure transducer is reset.

There are two LED lamps on the printed circuit board, which are indicating the following:

LED	On	Flashing	Off
Green	OK	Pressure outside set range	No power supply
Yellow	>50Pa	Zero setting in progress	<50Pa

If the yellow LED is ON when the fans are stopped, please check if the tubes to the fans are bended or pressed. The yellow LED must be OFF when the fans are stopped to have the pressure transducer work properly!

If the green LED is flashing you have to change the pressure range setting. Change of setting can be done with the DIP switch 1-3 (2). This can be the case if you run with a higher or lower air volume than first designed. The pressure range depending on the DIP switch setting can be seen below.

Pressure range	DIP 1	DIP 2	DIP 3
0..+300 Pa	OFF	OFF	ON
0..+500 Pa	ON	ON	OFF
0..+1000 Pa	OFF	ON	OFF
0..+1600 Pa	ON	OFF	OFF
0..+2500 Pa	OFF	OFF	OFF

Another reason for the green LED flashing could be that the + and – tube have been switched when connecting to the pressure transducer.

The rest of the DIP switches are factory set as follows and should not been changed:

DIP 1 / 2 / 3	DIP 4	DIP 5	DIP 6
See above table	OFF (No function)	OFF (Damping 2s)	OFF (0-10V signal)



IMPORTANT

When changing the DIP switch setting for the pressure rang, the settings for parameter 205 and 415 in the frequency converter must be changed as well.

4.4 XWPS section



To commission the XWPS section for the first time, the following actions have to be taken:

- Check if the drop bridge between the two modules has been installed (see 3.3.1)
- Check if the drain pipes have been installed correctly (see 3.3.2) and if the drip trays inside the unit are clean.
- Check that all loss parts/accessories have been removed from the inside of the unit.
- Check the control panel if all the right set points are set in the controller (see separate instruction manual controls)

4.4.1 Cooling circuit

When starting up the compressor of the cooling circuit for the first time it is very important to check if the rotation direction of the compressor is correct!

Check this in the following way:

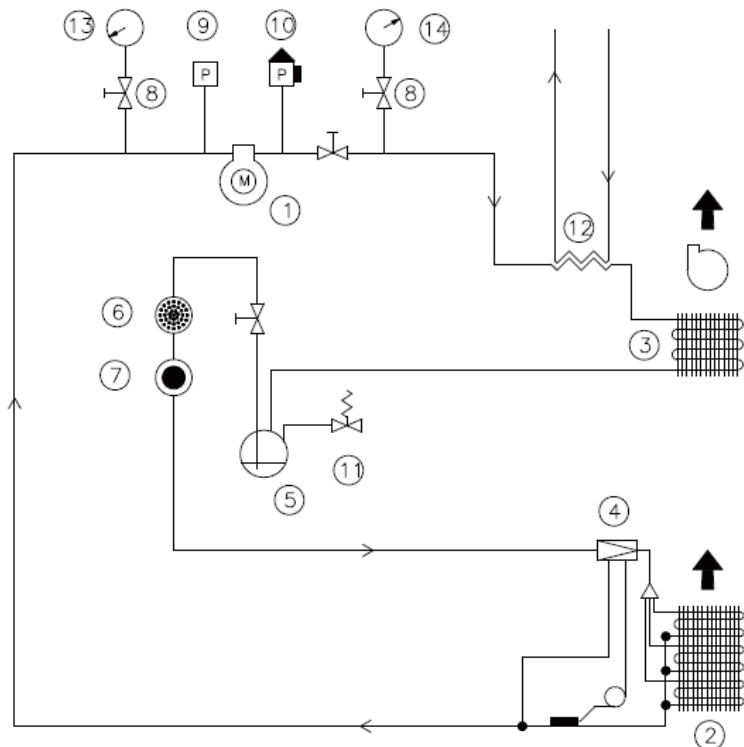
- Start up the compressor and watch the HP gauge. If there is no pressure rise shown on the HP gauge stop the compressor at once.
- Change the two phases of the compressor on the terminal strip.
- Start up the compressor again and check if the HP and LP gauge now are showing reasonable temperatures.
- Check the sight glass of the cooling circuit if there is enough refrigerant in the unit. If refrigerant is missing stop the compressor at once and check for a leakage.



NB!

If the compressor runs with the wrong rotation direction for a longer time, this will damage the compressor!

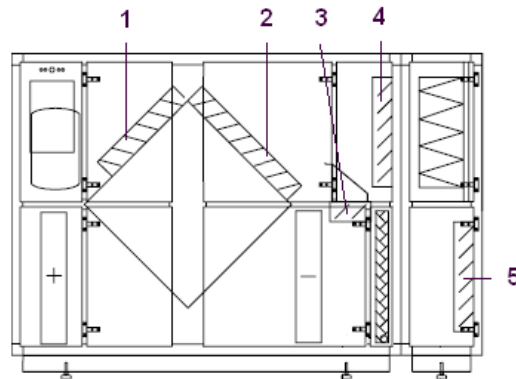
1. Compressor
2. Evaporator
3. Condenser
4. Expansion valve
5. Receiver
6. Dry filter
7. Sight glass
8. Schrader valve
9. LP Pressostat
10. HP Pressostat
11. Safety valve
12. Water cooled cond.
13. LP gauge
14. HP gauge



4.4.2 Dampers

You will find the following 5 dampers installed in a XWPS section:

1. Dehumidification damper
2. By-pass damper
3. Recirculation damper
4. Outdoor air damper
5. Exhaust air damper



Before commissioning the unit make sure that the dampers are opening/closing in the right direction.

To check this set the controls to night time (no outdoor air) and the dampers should be in the following positions:

- Dehumidification damper (1) and recirculation damper (3) fully open.
- Outdoor damper (4) and exhaust air damper (5) fully closed.

Now change the program to daytime and see if damper 4 and 5 are starting to open and if damper 1 and 3 are starting to close. Now set the outside air to 100%, wait a few minutes and check if the dampers have taken the following positions:

- Dehumidification damper (1) and recirculation damper (3) fully closed.
- Outdoor damper (4) and exhaust air damper (5) fully open.

Now check the operation of the by-pass damper (2). Make sure that there is a temperature difference between the swimming pool hall temperature set point and the outdoor air temperature of at least 10°C, so that the unit runs in heat recovery mode. Now the larger damper over the heat exchanger should be fully open.

4.5 XK/XKS section



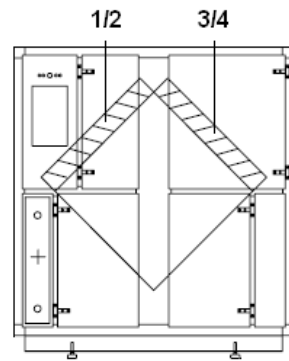
To commission the XKS/XK section for the first time, the following actions have to be taken:

- Check if the drain pipes are installed correctly (see 3.3.2) and if the drip trays inside the unit are clean.
- Check that all loss parts/accessories have been removed from the inside of the unit.

4.5.1 Internal mixing box XKS

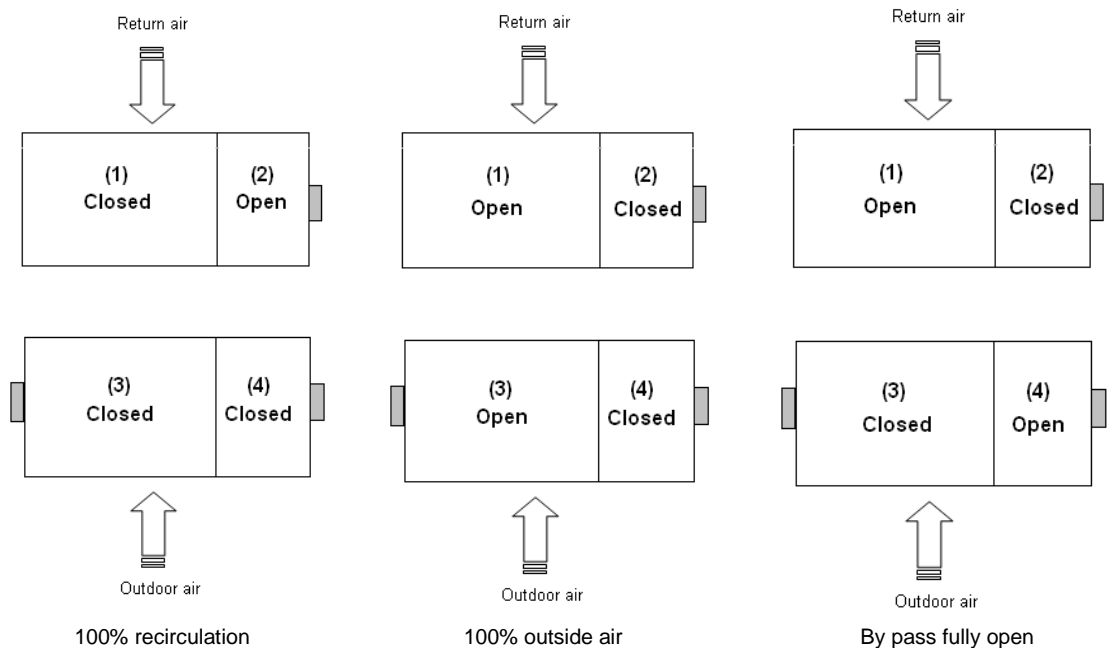
You will find the following 4 dampers installed in a XKS section:

1. Exhaust air damper
2. Recirculation damper
3. Outdoor air damper
4. By-pass damper



Before commissioning the unit make sure that the dampers are opening/closing in the right direction:

Set the controls to night time (no outdoor air) and make sure that there is a temperature difference between the swimming pool hall temperature set point and the outside air temperature of at least 10°C, so that the unit runs in heat recovery mode. Now the dampers should be in the positions shown to the left in the picture below.



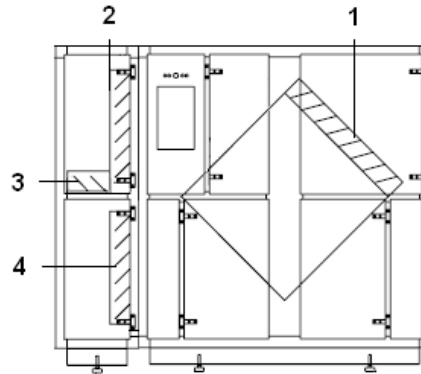
Now change the program to daytime and see if damper 1 and 3 are starting to open and if damper 2 is starting to close. Now set the outdoor air to 100%, wait a few minutes and check if the dampers are in the position shown in the middle picture.

If the unit is running in free cooling mode with the by pass damper (4) open, the dampers will be in a position as shown in the right picture above.

4.5.2 Dampers XK

You will find the following 4 dampers installed in a XK and mixing box section:

1. By-pass damper
2. Exhaust air damper
3. Recirculation damper
4. Outdoor air damper



Before commissioning the unit make sure that the dampers are opening/closing in the right direction:

Set the controls to night time (no outside air) and the dampers will be in the following positions:

- Recirculation damper (3) fully open.
- Outdoor damper (4) and exhaust air damper (2) fully closed.

Now change the controls to daytime and see if damper 4 and 2 are starting to open and if damper 3 is starting to close. Now set the outdoor air to 100%, wait a few minutes and check if the dampers are in the following positions:

- Recirculation damper (3) fully closed.
- Outdoor damper (4) and exhaust air damper (2) fully open.

Now check the operation of the by pass damper (1).

Make sure that there is a temperature difference between the swimming pool hall temperature set point and the outside air temperature of at least of 10°C, so that the unit runs in heat recovery mode.

Now the larger damper over the heat exchanger is fully open.

4.6 Frost thermostat

Check if the frost thermostat is set to the correct temperature. The factory setting is +8°C.

4.7 Filter pressure transmitter

Check if the pressure transmitters are set to the correct maximum pressure loss. The factory setting for the different filter classes are shown in the table below.

Filter type	Recommended pressure loose	Max pressure loose
G4 panel	200 Pa	200 Pa
G3 bag	250 Pa	250 Pa
F5 bag	250 Pa	400 Pa
F7 bag	250 Pa	400 Pa
F7 compact	250 Pa	400 Pa

5.1 Introduction

For optimum operation conditions and a long product life it is necessary to perform preventive maintenance on various parts within the stipulated intervals (see 5.2).



When servicing on air-handling unit always turn off the electricity on the main switch and repair switch (complete shut down) and secure for reconnection from unauthorized persons. Only open the inspection doors when the unit is stopped and the fans have come to a stand still. After switching off the unit the fan impeller will run for about 1 to 3 minutes before stopping totally. The fan wheel must never be stopped by hand or with an object.

Commissioning, maintenance and repair work should only be carried out by trained specialists or by people supervised by authorized staff. It is the responsibility of the fitter to read and understand this guide and other given information.

5.2 Maintenance plan

Component	Ref	Every 3 month	Every 6 month	Every 12 month
Cabinet	5.3			X
Centrifugal fan	5.4	X	X	X
Plug fan	5.4	X	X	X
Filter	5.5		X*	X*
Heating coil	5.6			X
Crossflow heat exchanger	5.7			X
Dampers	5.8		X	X
Cooling circuit XWPS	5.9			X
Drop catcher	5.10			X

* Or when filter alarm is shown

5.3 Cabinet

The following steps should be taken to maintain the cabinet of the unit:

- Check the inside of the cabinet for dust or dirt. If necessary, clean either dry or wet.
- Clean all drip trays, either dry or wet and check if condense water can run out freely.
- Check for paint damage and rust. Clean the damaged/rusting part and protect it with new paint.
- Check all gaskets on the service doors for leaks and damage. Replace damaged gaskets where necessary.
- Lubricate door locks and hinges.

5.4 Fans

The following general steps should be taken to maintain the fans:

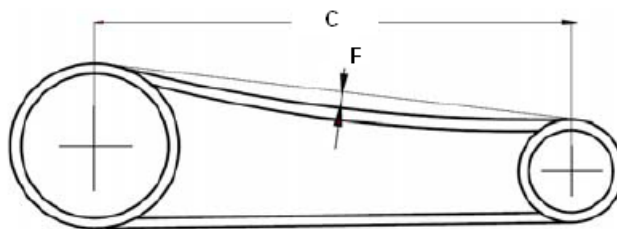
- Check the fan wheel for unbalance (every 3 month).
- Check the fan and motor bearings for unusual noise (every 3 month).
- Check vibration dampers for damage (every 3 month)
- Check the fan for dust or dirt. If necessary, clean the fan wheel, either dry or wet (every 12 month).
- Check all flexible connections for damage/leakage (every 12 month).
- Check if all mounting bolts are tight (every 12 month).

For more specific maintenance of either the centrifugal or plug fan see 5.4.1 or 5.4.2.

5.4.1 Centrifugal fans

Every 3 month the transmission of the belt driven centrifugal fans should be checked in the following way:

- Check that the pulleys are placed correctly and in line. Check if all bolts of the pulley are fastened.
- Check the belts on wear and damage. When replacing belts on a transmission with more than one belt, all belts must be changed.
- Check the belt tension by controlling the deflection (F) in the following way.



Belt profile	Centre distance C (mm)	Deflection strength (kg)	Deflection F (mm)
SPA / XPA	500 - 600	2.7	11
SPA / XPA	600 - 800	2.7	13

5.4.2 Plug fans

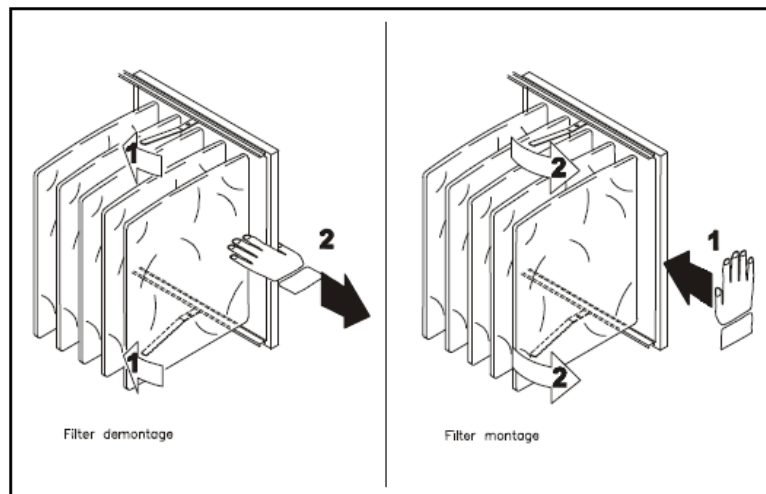
The following steps should be taken to maintain the plug fans:

- Check if all bolts of the fan wheel pulley are fastened (every 3 month).
- Check the pressure hoses from the pressure transmitter to the fan for leakage or damage (every 3 month).
- Zero the pressure transmitters. For more instructions on how to do this see 4.3.3 (every 12 month).

5.5 Filter

If the filters are equipped with a pressure transducer the control panel automatically gives an alarm when the filters have to be changed. Still every 6 month the filters should be checked for damage/leakages which will not be detected by the pressure transmitter. If no pressure transmitter is installed the following steps should be taken every 6 month:

- Check the filter for dirt and damage.
- Measure the pressure loss over the filter which should not be below 150 Pa (G3/G4) or 250 Pa (F5/F7). If the pressure loss is higher the filters have to be changed.
- Open the filter rail by the blue handles (1).
- Take out the filters (2) and check the gasket on the filter rail for damage.
- Clean the filter rail and reinstall the old/new filters.



5.6 Heating coil

The following steps should be taken to maintain the heating coil:

- Check the coils for dust or dirt. If necessary, clean the aluminium fins by a soft brush or a vacuum cleaner.
- Straighten any bent slats using appropriate tools
- Air the coil circuits through the exhaust valves of the pipe system (air in the pipe system may reduce the capacity)
- Check that the frost sensor is properly fixed.

5.7 Cross flow heat exchanger

The cross flow heat exchanger has no mechanical part, therefore only the plates should be checked and cleaned if necessary. Clean the plates with a soft brush or use high pressure cleaner with compressed air and blow against the air stream.

5.8 Dampers

The following steps should be taken to maintain the dampers of the unit. Please refer to section 4. Commissioning to see which dampers you have in your unit and what functions they have.

- Check that the damper setting is in accordance with the current operation mode (every 6 month).
- Check that the damper louvers can rotate when the damper motor is running and that they close/open completely (every 6 month).
- Check the fixing of the motor/damper shaft. To get access to the recirculation damper of the XWPS you have to remove the outer cabinet panel and the inner air guiding plate (every 12 month).
- If necessary, clean the damper louvers either dry or wet (every 12 month).
- Check the rubber gaskets for damage (every 12 month).

5.9 Cooling circuit XWPS

The following steps should be taken to maintain the evaporator and condenser coil of the cooling circuit:

- Check the coils for dust or dirt. If necessary, clean the aluminium fins by a soft brush or a vacuum cleaner. To get full access to the evaporator you may have to remove the drop catcher (see 5.10)
- Straighten any bent slats using appropriate tools.
- Check that the frost sensor is properly fixed in the evaporator coil.

The following steps should be taken to check the cooling circuit:

- Close all inspection doors and start up the unit. Wait for a few minutes and check the LP/HP gauge. The HP gauge should show between 35-50 °C and the LP gauge about 0-10°C, depending on the running and outside conditions.
- Keep the unit running, open the inspection door by the receiver and check if there is enough refrigerant in the receiver and if the sight glass of the refrigerant circuit is free of bubbles.



If you are in doubt about the condition of the cooling circuit, stop the compressor at once to avoid damage and call a cooling technician or the Dantherm service.

5.10 Drop catcher

The following steps should be taken to maintain the drop catcher:

- To get access to the drop catcher, remove the outer cabinet panel and the inner air guiding plate. Then slide out the drop catcher.
- Check for dirt and damage. Dirt can be removed by carefully washing the drop catchers.
- Check the sliding rails for dirt. If necessary, clean them and reinstall the drop catchers.

6.1 Introduction

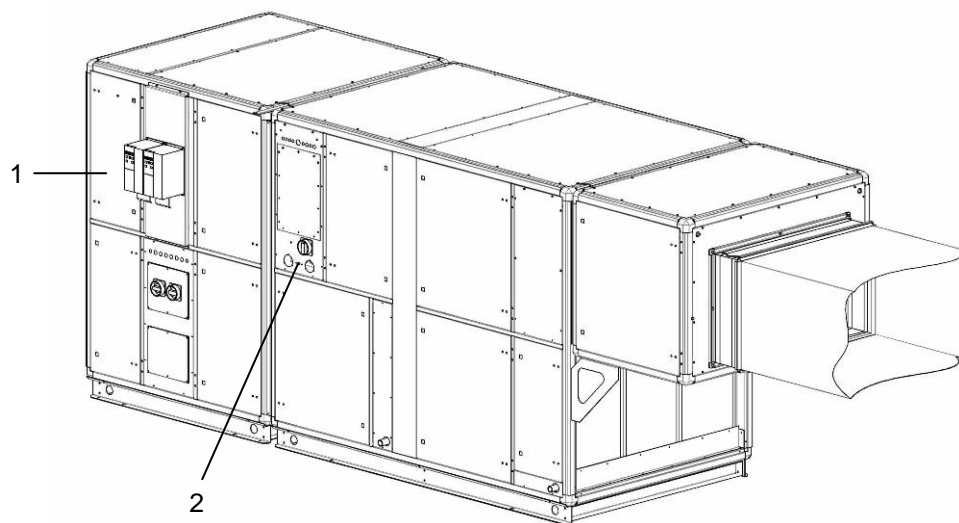
Normally an operation fault will give an alarm in the display of the control panel. The alarm messages may be named differently. For details, please refer to the manual of the control panel.

If the frequency converter for the fan is showing an alarm, please refer to the manual of the frequency converter.

6.2 Faultfinding

Alarm	Problem	Cause	Action
Frost ¹⁾	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 ²⁾	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
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 converter switched off ³⁾	<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 ⁴⁾	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 De-ice 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

- 1) If the frost thermostat is manual, it must be you have to reset before starting the unit. The thermostat is located in the compartment (1) above the LPHW heating coil.
- 2) The fire thermostat must be reset before the unit is started again. Press the red button on the thermostat to reset. The thermostats are located in the exhaust (70°C thermostat) and supply (40°C) air.
- 3) For further explanations see the manual of the frequency converter.
- 4) The HP pressostat has to be reset before the compressor can start again. The red reset button (2) is placed near the pressure manometers on the inspection side of the XWPS module.



7. DISPOSAL

7.1 Disposal of the unit



Removal and disposal of the unit may only be performed by professionals.

All supply lines like electricity and hot water must be shut down before decommissioning and dismantling the equipment. Make sure that no water-glycol mixture is leaking.

Empty the heating coil for the water-glycol mixture before removing it from the unit.

Empty the refrigerant circuit for oil and refrigerant before dismantling.

Recycle all material according to national rules and procedures to protect the environment.

8. APPENDIX

8.1 VLT 2800 parameter settings two speed with pressure transducer

Parameter	Description	Value	Function / unit	Comment
100	Configuration	3	Process closed loop	
101	Torque characteristic	3	Variable torque medium	
102	Motor power	*	kW	* See motor type plate
103	Motor voltage	400	V	
104	Motor frequency	50	Hz	
105	Motor current	*	A	* See motor type plate
106	Motor speed	*	rpm	* See motor type plate
128	Thermal motor protection	2	Thermistor trip	Motor with thermistor
“	“	4	<i>ETR trip</i>	<i>Motor without thermistor</i>
201	Output frequency low	15	Hz	
202	Output frequency high		Hz	Depending on motor/fan
204	Minimum reference	*	Pa	* Set pressure range of pressure transducer (4.3.3)
205	Maximum reference	*	Pa	* Set pressure range of pressure transducer (4.3.3)
207	Ramp up time 1	60	sec.	
208	Ramp down time 1	60	sec.	
215	Preset reference low	*	%	* Low air volume (4.3.2)
216	Preset reference high	*	%	* High air volume (4.3.2)
303	Input terminal 19	25	Thermistor	Motor with thermistor
“	“	9	<i>Reversing</i>	<i>Motor without thermistor</i>
305	Input terminal 29	22	Preset ref.	
308	Input terminal 53	2	Feedback	
323	Relay output 1-3	10	Alarm	
414	Minimum feedback	*	Pa	* See parameter 204
415	Maximum feedback	*	Pa	* See parameter 205
416	Process unit	11	Pa	
440	Process PID proportional gain	1.5	Sec.	
441	Process PID integration time	20	sec.	
444	Process PID low pass filter time	2	sec.	
All other parameters are standard Danfoss factory settings.				