



**Dutch
Blower**

Professionals in Air Handling



Manual

Maintenance and operating instructions

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1. INTRODUCTION

1.1 Preface

This manual offers help at the installation and maintenance of the air handling unit.

Instructions are provided for a safe installation and proper operation of the unit. Instructions are given for storage, transport, installation, commissioning and maintenance of the air handling unit.

An outline is given of the several operator groups which are allowed operation/maintenance of the air handling unit. Operation instructions, warranty terms and conditions and the sub-components of the unit are outlined as well. Safety and hazard icons are explained.

General instructions

The instructions in this manual must be carefully observed. Any modification, adaptation or any other treatment of the unit and/or maintenance in breach of the instructions laid down in this manual, will irreversibly result in loss of warranty.

Installation, commissioning and maintenance must be performed by qualified personnel only. The scope of the air handling unit is documented in the technical specifications.

1.2 Icons

This manual explains several danger levels to focus on specific instructions. This is done to enhance the user's safety, to prevent problems and to ensure the technical reliability of the air handling unit.



DANGER

Risk of hazardous situations resulting in serious personal injury



WARNING

Risk of hazardous situations resulting in minor personal injury



CAUTION

Risk of property damage

1.3 Operator

In this manual, the term 'operator' refers to anyone who deals with the air handling unit or subcomponents under operational conditions. Three groups of operators are to be distinguished:

1.3.1. User

The 'user' is anyone who actually uses the air handling unit as a climate control system. A 'user' requires no specific expertise.

1.3.2. Technician

The 'technician' is anyone who installs, repairs or maintains the non-refrigeration sections of the air handling unit.

The 'technician' must be well trained and qualified to perform the technical operations.

The 'technician' is required to have an in-depth technical background and is qualified to understand technical drawings (mechanical or electrical).

The 'technician' is not qualified to handle the refrigeration section of the air handling unit.

1.3.3. Service technician

Only a 'service technician' is qualified to deal with a refrigeration section as an integrated system of the unit.

The 'service technician' is qualified for the installation of the unit and for repair and maintenance of the entire air handling unit.

The 'service technician' is well educated in the areas of electronics, electrical engineering, mechanical engineering and refrigeration engineering. For the latter, a degree in CFC-mechanics is mandatory. The 'service technician' has a good technical understanding and is qualified to understand technical drawings (mechanical or electrical). Only the 'service technician' is allowed to handle the cooling part of the unit.

The air handling unit is operated by the user. The service technician is allowed to perform the same operations as the technician. Only adequately qualified (service) technicians are allowed to install and service the air handling unit. Dutch Blower B.V. does not accept any responsibility for work carried out by insufficiently qualified technicians or service technicians.

1.4 Use of operating instructions

This manual covers all aspects of the installation and maintenance of the air handling unit.

The aspects of daily routine operations are covered in a separate manual "Operating instructions".

This manual is solely for use by technicians and service technicians.

1.5 Warranty terms and conditions

Dutch Blower's warranty terms and conditions are in accordance with article 14 of the METAALUNIEVOORWAARDEN, which read in short: .

Dutch Blower B.V. guarantees the proper functioning of the air handling unit and reserves the right to resupply parts or repair imperfections.

The client shall, at all times, allow for Dutch Blower B.V. to repair defects.

Defects caused by normal wear, improper handling or repairs made by or on behalf of the customer are not covered by this warranty. Only substitution by original Dutch Blower B.V. parts is allowed.

The guarantee only applies if the customer has fully met all obligations towards Dutch Blower B.V. This includes proven correct maintenance of the unit according to Dutch Blower's guidelines.

Article 6 of the METAALUNIEVOORWAARDEN regarding transport is applicable.

If agreed, Dutch Blower B.V. accepts all responsibility for delivery of the unit at the agreed delivery address, but the customer is responsible for all damages resulting from unloading from the truck and transport to the final destination. The customer must conclude an all risk insurance for this part of the transport.

1.6 Purpose of the air handling unit

The purpose of the unit is the handling of air as outlined hereunder:

- mixing section;
- filtering of ambient air;
- filtering of air in cleanroom environments (HEPA);
- heat extraction and/or heat recovery;
- heating and/or cooling of air;
- humidification and/or dehumidification of air;
- filtering and treatment of very humid and/or very polluted air;

The air handling units of Dutch Blower B.V. maintain a low noise level; they are energy efficient, corrosion resistant, service friendly and reliable.

The air handling unit can be equipped with:

- a damper section;
- a filter section;
- a rotating heat exchanger;
- a plate heat exchanger;
- a heater section;
- a cooler section;
- a supply and/or a return fan.

1.7 Description of the subcomponents

1.7.1 Casing

By default, the casing consists of a base frame with double walled steel panels and doors. The doors/hatches are fitted with handles and hinges. The housing is insulated with Rockwool 223. The panels are detachable where needed. The outer panels are provided with pre-paint coating in the color RAL 7032 (light gray).

Optionally, housing and base frame consist of aluminum, RVS304 or RVS316L inside and/or outside.

1.7.2 Dampers

A standard unit is equipped with contra-rotating, aluminum dampers. They are suitable for manual or automated operation..

1.7.3 Filter section

The standard filter section is suitable for bag filters with a length of 550 mm. By default, class EU-5 filters are applied.

Optionally it can be equipped with a differential pressure manometer with either a switching or proportional differential pressure gauge.

1.7.4 Coils

By default, the cooler and heater coil consists of a galvanized steel frame, copper pipes and aluminum fins.

1.7.5 Centrifugal fans

Depending on the application, the applied centrifugal fans have blades curved either forward or backward.

The fan and electric motor are assembled on a steel frame, joined by a V-belt. The frame is cushioned by rubber vibration isolators. Depending on the desired airflow direction, the outlet openings of the fans are flexibly connected to either the casing or the internal wall.

1.7.6 Plug-in fans

The applied plug-in fans have blades curved backward. The fan and electric motor are mounted together on a steel base frame. The frame is cushioned by rubber vibration isolators. Depending on the desired airflow direction, the outlet openings of the fans are flexibly connected to either the casing or internal wall.

1.8 Technical specifications

Please refer to the order-specific documentation for the drawing of the air handling unit with the dimensions and technical specifications.

The icons used in this manual as well as the safety symbols on the unit must be observed at all times.

2. SAFETY ASPECTS

2.1 Risk of injury



- **entrapment hazard by underpressure at doors on suction sides;**
- **smack hazard when opening doors at the pressured side;**
- **hazardous rotating machine parts like fans etc.**

The technician and the service technician are not allowed to wear loosely fitting clothing which may get entangled in any way. To prevent scalping, long hair must be up in a bun, or covered by a hairnet.

When the air handling unit is situated outside and/or at a height, the user should always wear appropriate footwear to prevent slipping. The operator must be aware of very hot machine parts which may cause burns.



- Risk of injury by sharp edges and cutting blades can occur at:
- **maintenance or cleaning of the cooling and heating coils;**
 - **end faces of internal sheet material, such as panels and profiles.**

In the event of any defect of the unit, it must be stopped at once with the main switch turned to position 0 and a technician or service technician must be called in.

The main switch must remain switched and locked to 0 by a key before any repair is carried out. The operator should wear the key with him at all times.



Delay all repairs until:

- **all components in the unit have cooled down to ambient temperatures;**
- **all moving parts have come to a complete standstill.**

The main switch may only be unlocked and switched back to position I when no more repairs are to be done, except when otherwise outlined in the instructions.



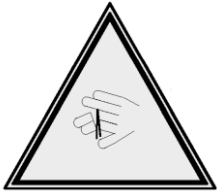
Check before restarting:

- **there are no persons in hazardous places;**
- **all protective devices are installed, e.g. the CE-grids at the fan section.**

All maintenance, repairs, troubleshooting or any other operation not listed in the 'Installation and maintenance instructions' may only be performed by a service technician, unless otherwise outlined. All actions should be conducted only when the machine is out of operation and is disconnected from the grid, except when otherwise outlined in the instructions.

The casing may only be opened by a (service) technician. When leaving, the technician must close and lock all doors/hatches of the unit.

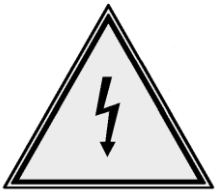
The following safety icons are attached to the machine in order to point out potential hazards to the operator. The user is obliged to check the safety icons on the unit in advance to acknowledge the corresponding potential hazards.



Danger of pinching by rotating parts



Danger of shearing by rotating parts



Danger of injury by electric voltage



Danger by abruptly opening doors

2.2 Damage to the unit



When dampers are closed during operation, in particular when done abruptly, the unit may get damaged beyond repair by underpressure.

3. TRANSPORT AND STORAGE

3.1 Acceptance of the air handling unit

Prior to unloading the unit, which is usually transported by truck:

1. visual inspection of any damages.



Never stand on the unit during inspection, as this will cause damage.

2. Verify the data on the type plate corresponding with the specific unit datasheets.
3. Check (immediately after unloading) whether the delivery is complete following the packing list. In particular, check components like temperature sensors, siphon, remote control, sealing tape and intake and/or exhaust hoods.

3.2 Storage

If it takes some time before the unit is installed, make sure that the unit is stored dry and well protected. In particular take care of sufficient space between packaging and housing to prevent condensation.



- **When storing the unit temporarily, make sure the unit is placed on a flat surface;**
- **If the unit is stored for more than 3 months, the V-belt may be slacked.**

Storage conditions:

Humidity

Store units dry, in a non-condensing environment.

Air temperature

-10°C to 45°C

4. HOISTING INSTRUCTIONS



Read instructions before hoisting

Using the proper hoisting equipment correctly enhances safety during hoisting.

Hoisting equipment must have valid certificates; check these certificates.

Employees must wear adequate safety helmets, safety shoes and working gloves when hoisting.

Ensure safe working situations for everyone involved.

Ensure (escape) space for staff responsible for positioning.

A crane/fork-lift driver is not allowed to handle a load if he cannot fully overlook the area that the load is following, unless he is under supervision of a specially dedicated person for instructions.

A crane must be de-activated when wind may jeopardize its stability or if the load can no longer be held in position. An outside crane must be de-activated when wind speed at the crane exceeds 20 m/s at a height of 10 meter.

For present information on wind direction, wind speed and wind force, check the local weather forecast.

4.1 Hoisting instructions

Weight and dimensions of the air handling unit is laid down in the order-specific documentation.

Lift the air handling unit by the designated attachment points or the crane hooks.

Use long 4 equal lifting belts with shackles and spacers or equalizers, in order to prevent horizontal forces to influence the unit's position (figure 1).

Only air conditioning units with crane hooks on top may be lifted without spacers blocks

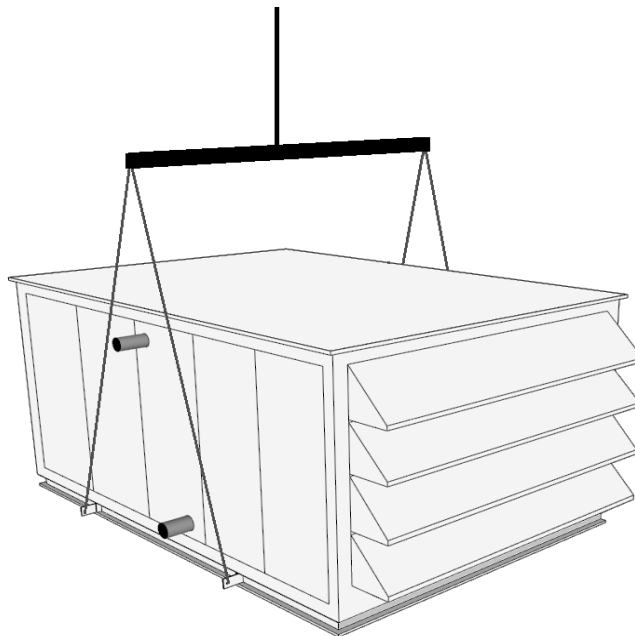


Figure 1 (hoisting with an equalizer)

Prevent damage to the paintwork.



Never stand on top of the unit while attaching the lifting belts/cables to prevent damage. The pitched roof may be pressed down, eventually causing leakage.

Ensure that the air handling unit is lifted and released as gradually as possible with minimal shocking to prevent damage.

5. INSTALLATION INSTRUCTIONS

5.1 Installation

Only qualified technical personnel is allowed to install the air handling unit.

Before the unit is positioned, take care of enough space for cables. Position the unit with a crane.

When installing the unit, ensure that duct connections are put in the right position and not 180 degrees the other way around.

After installing, ensure the unit is fully horizontal. Service doors and panels must open and close unobstructed at all times. Ensure the skid base of the unit is supported adequately to prevent sagging.

Prevent any condensation in the air handling unit; during (re)construction moisture buildup may occur which may condense in the (cold) unit when out of operation. Therefore, switch on the fan as soon as possible, whenever feasible supported by heating to prevent condensation.

See to adequate spacing at the operating side of the unit to replace components whenever needed.

5.2 Prevention of vibrations

Prevent vibration transfer by separating the unit from the support structure by means of vibration matting (by default not delivered with the unit).

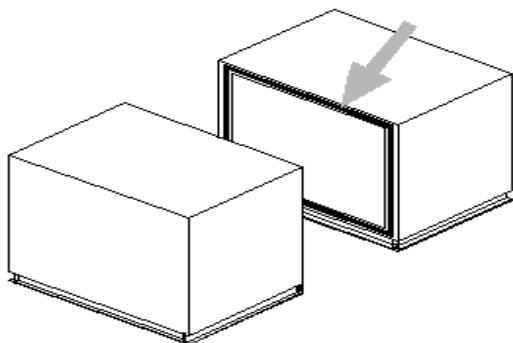
5.3 Assembly of individual parts

If the unit is delivered in individual parts, coupling blocks are mounted to the profiles unless otherwise agreed.

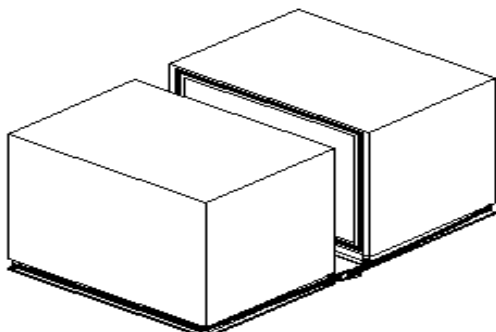
Required tools

- electric screwdriver
- bit holders
- star bits
- allen bits
- straps or suitable lifting equipment
- wrenches / socket-wrench set

Proceed as followed to assemble the various components.



Apply the enclosed cell band on the casing sections.



Connect the individual skid base parts with the straps.

Attach the bolts through the gusset plates of the skid bases.

Link the coupling blocks or screw from the inside out through the profiles.

5.4 Connecting the electrical wiring

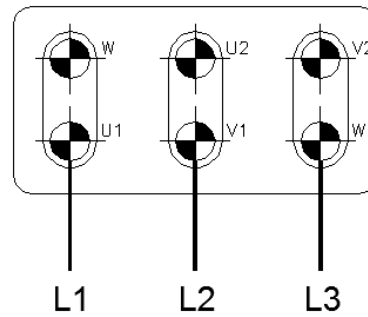
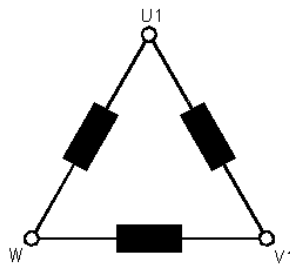
Only to be carried out by a qualified electronic technician

Connection for single speed motors:

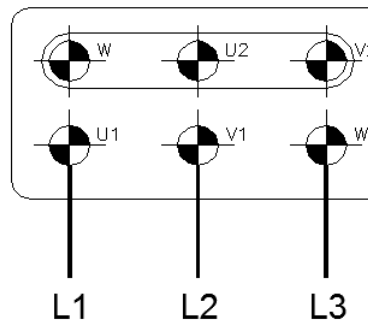
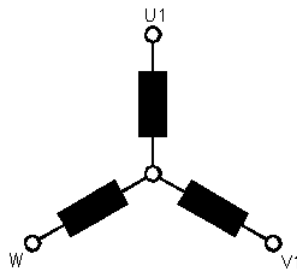
By default, the unit is equipped with standard single speed motors (pole numbers: 2, 4, 6, 8), with synchronous speed at 50 Hz: 3000, 1500, 1000, 750 rpm. The motors must be connected in a star or delta configuration, depending on the voltage (*see diagram below*)

Type plate motor	Voltage		
	3~230 Vac	3~400 Vac	3~690 Vac
230 - 400 Vac	Δ	Y	-
400 - 690 Vac	-	Δ	Y

Y-connection



Δ-connection



Junction-box or control panel if present

The control cables may be connected to the designated terminal block. Verify that the wiring is connected in accordance with to the wiring diagrams. Measure the connections before connecting the unit to the grid by switching the main switch to position.

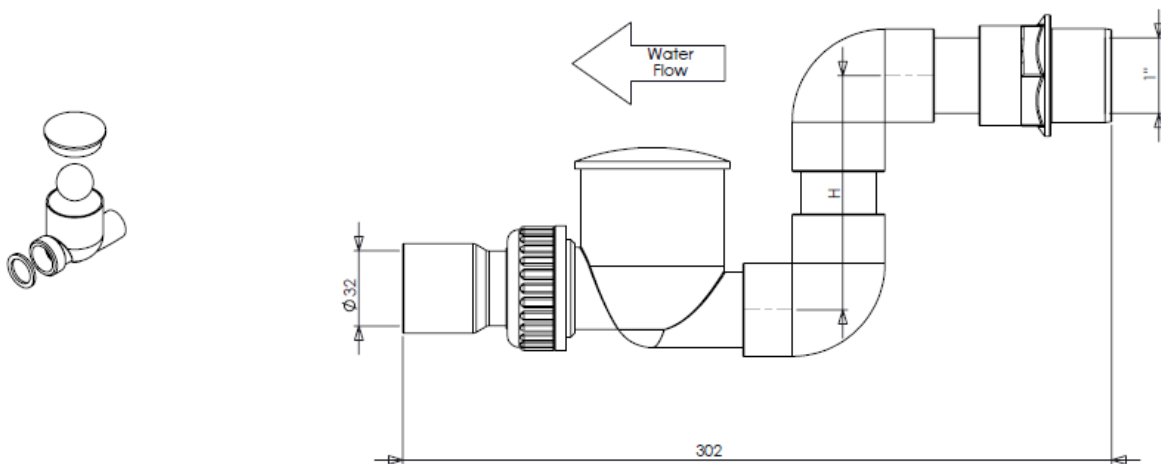
Plug fan with EC motor

If the fan is equipped with an EC motor, the motor must be connected in accordance with the instructions provided by the fan supplier. If no manual is available, contact Dutch Blower B.V.

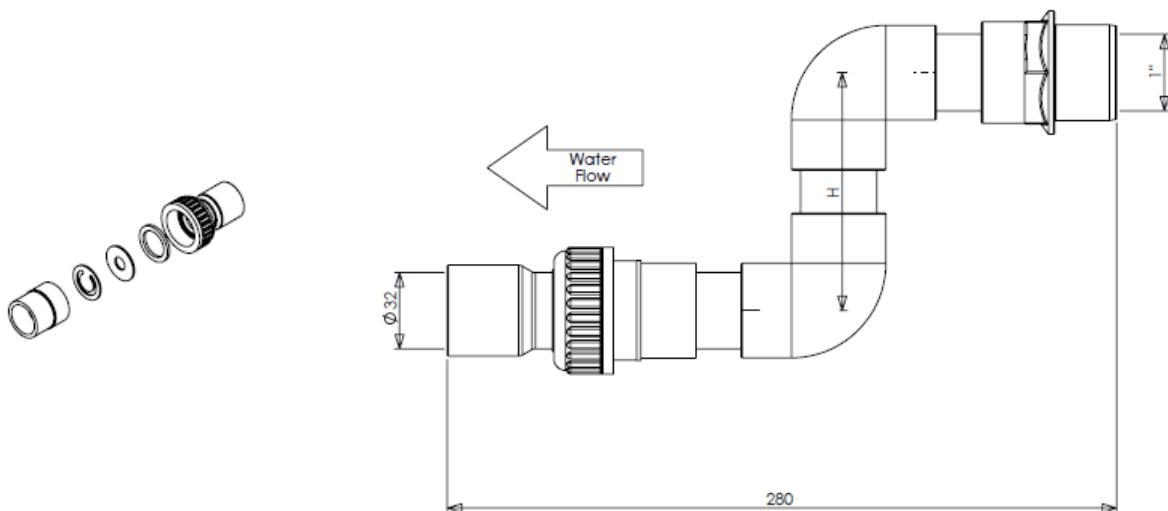
5.5 Mounting of the underpressure siphon valve

Only to be carried out by a technician

A ball or membrane siphon must be mounted on the drain of the drip tray or any other water drain. The siphon must be installed horizontally. Using the supplied 90° bends and the supplied 40 mm PVC pipe, the siphon can be connected in accordance with the following drawings.



Ball siphon $H = \text{minimum underpressure (mm water column)} + 30\text{mm}$



Membrane siphon: $H = \text{minimum underpressure (mm water column)} + 30\text{mm}$

5.6 Construction moisture

Wet cement floors, stuck work of walls and ceilings, brickwork, tiling etc. release lots of moisture. Applying 'heat guns' even enhances this process. This moisture condenses also in the air handling unit. Moist air enters via the openings for electrical wiring and air duct openings, after which the condensate precipitates in the switchboard, on the relay contacts, on the electronic components and on the C.V. tubes, rapidly causing corrosion.

6. STARTUP



Make sure the airhandling unit is checked well before starting with the test-run.

6.1 Installation check

Only to be carried out by a service technician

Make sure the unit is positioned horizontally without visible damage.

Remove all lifting cables and packaging materials.
Clear all the inlet and outlet openings and remove unwanted objects.

Ensure connections do not exert force on the unit. Air ducts and electrical wiring etc. must be properly braced.

Check the air duct connections for any air leaks.

Check the mounting of the underpressure siphon. Note the height of 200 to 300 mm.

Ensure that used cable diameters are correct; if too small, an unacceptable voltage drop will occur.

Check if the wiring is connected in accordance with the electricity diagrams. Test connections before connecting the unit to the grid.

Remove any transport bolts or blocks between fan and counter frame.

Check if fans run free and if V-belts are tightened. A correctly tightened V-belt will not overload the bearings of the fan and prevents slippage of the electric motor.

Check the tension of the V-belts. One should, with one finger, be able to press the V belts approximately 1 cm down, and in the event of long belts approximately 2 cm. Correct tightening prevents overload on the bearings of the fan or the electric motor.

Check the alignment of the pulleys: they should be in one line and may not be worn out. Check the alignment with a ruler or with a of small rope.

Ensure that the dampers can operate freely without obstacles. Check the coating for damages.

Remove any drill shavings and grindings from the unit to prevent corrosion.

Close the inspection doors before start up of the unit.

6.2 Test run

Only to be carried out by a service technician

Only when all the above mentioned checks have been carried out, the service technician is allowed to start the unit for 'dry testing' its various functions.



Only in the event of a safety hazard, the main switch may be switched to and locked in position 0.



Ensure that loose clothing is not sucked into the fan when opening the service door.

Check the direction of rotation of the supply fan, and optionally the return fan. When the fans rotate into the wrong direction, the wiring of the motors must be changed.

After startup, retighten the V-belts.

After the startup, retighten the V-belts.

After approximately 100 hours, about 3 months and every 6 months, the V-belts must be retightened

6.3 Final control

Only to be carried out by a technician.

Turn the main switch to I.



Always close the unit when it is left unattended; even when the unit is left briefly.

Then check if the climate control operates satisfactorily throughout the building; make a note of all deviations.

Check if the condense drain is functioning properly.

Remove any drill shavings and grindings from the unit to prevent corrosion.

Check the vibration and noise level of the unit. Assess the acceptable limits.



Only leave the unit activated when you are 100 % convinced that this is justifiable! When in doubt, turn the main switch to the 0 position and contact Dutch Blower B.V. Better safe than sorry!

7. MAINTENANCE INSTRUCTIONS

7.1 Maintenance air filters

Only to be carried out by a technician

The standard length of air filters used in units from Dutch Blower is 550 mm.

The average lifetime of an air filter is approximately 6 months. The service life depends on the amount of dust produced in the building, the amount of dust in the outside air and the ratio of the amount of intake air to re-circulated air.

Optionally, a differential pressure gauge can be mounted in order to assess whether the filters must be replaced. A differential pressure breaker or a proportional differential pressure sensor are other options. Dutch Blower B.V. advises to mount both options as the timely replacement of the air filters is one of the most important maintenance points of an air handling unit.

Moreover, clean filters result in lower energy consumption. Please refer to the technical specifications for information about dimensions, quantities and filter type.

Check the pressure indicator of the milihelic and/or the differential pressure sensor with an oblique tube manometer, since both can be faulty.

In general, the technical specifications contain the initial, design and final resistance of the filters. Under the assumption of a constant pollution rate, the replacement time can be calculated based on these resistances.

When the original datasheet is somehow missing, then an end resistance of 150 to 250 Pa may serve as a guideline.

7.2 Maintenance V-belts and bearings



Only to be carried out by a technician

Block the fan wheel before you do any work on the V-belts and bearings.

Maintenance of the V-belts encompasses periodical tightening of the V-belts and timely replacement of observed wear. The V-belts must be retightened immediately after startup and again after 100 hours, after 3 months and every 6 months. The maintenance of the V-belts and bearings comprises the following activities:

Check the V-belts and replace if required.

Inspect the pulleys for wear when the V-belts are replaced.

Check the alignment of the pulleys; they must be in line with each other. Check the alignment with a ruler or a small rope.

Check the tension of the V-belts. One should, with one finger, be able to press short belts approximately 1 cm down, long belts approximately 2 cm. Tightening should be done in such a manner that no wear on the bearings of the fan or the electric motor will occur.

Inspect the bearings for excessive loss of grease; this may indicate overheating or overloading. Ultimately, the bearings may be hand-warm. For the bearings of the electric motors and the fans, no refill of the grease or other maintenance is required.

Inspect the condition of the bearings by performing a hearing test. The bearings must run silently. Furthermore, the bearings may definitely not vibrate.

7.3 Maintenance of the electronic components

Only to be carried out by a technician

Maintenance of the electrical components consists of the following activities:

Check the wiring of the main power supply, all wiring must be tightened securely.

Check the wiring for damage, the insulation should not have any cracks or wear.

Any lighting in the airhandling unit is a standard 5 W LED lamp.

7.4 Maintenance outside panels

Maintenance of the walls and coating consists of the following activities:

Check the outer wall for any corrosion. Contact Dutch Blower B.V. immediately when corrosion is detected. Small corrosion spots caused by grinding or drilling or from foreign objects left on the unit can easily be removed by polishing with car wax.



During the inspection of the unit, never stand on top of the unit, as this may cause damage. The pitched roof can be pressed down, which will result in leakage.

Check the roof for good drainage. The roof material is pitched mounted, so that no water can remain on the roof. In the event of stagnant water, repairs should be made immediately.

Notes

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