Dutch Blower

Customized is our standard

Manual

DBS standard dehumidifier

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Preface

This manual offers help at the installation and maintenance of the Dutch Blower dehumidifier.

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 dehumidifier.

An outline is given of the several operator groups which are allowed operation/maintenance of the dehumidifier. Operation instructions, warranty terms /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 dehumidifier is documented in the order specific 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 dehumidifier.

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 dehumidifier 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 dehumidifier.

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 dehumidifier.

1.3.3. Service technician

The ‘service technician’ is qualified for the installation of the unit and for repair and maintenance of the entire dehumidifier.
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 heating and control part of the unit.

The dehumidifier 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 dehumidifier. 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 dehumidifier.

If the unit has an integrated control panel with PLC, the aspects of daily routine operations are covered in a separate manual "Control manual". 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 dehumidifier 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.

If desired, the METAALUNIEVOORWAARDEN can be mailed to you, or they can be downloaded from the link below:

http://www.dutch-blower.nl/uploads/MU_voorwaarden_engels.pdf

1.6 Purpose of the dehumidifier

The purpose of the dehumidifier is removing moisture out of the process air by means of a rotating wheel which adsorbs the moisture from the process air and brings it into a second warm reactivation air stream.

1.7 Description of the subcomponents

The dehumidifier consists of, and can be equipped with:

– a casing;
– filter sections;
– a rotating desiccant rotor;
– a rotor drive system;
– electric heater;
– a process fan.
– a regeneration fan.
– a control panel *(additional)*

1.7.1 Casing

The casing consists of single walled AISI304 panels.

1.7.2 Filter section

The standard filter section is suitable for plate filters, the filter types are described in the order specific documentation.

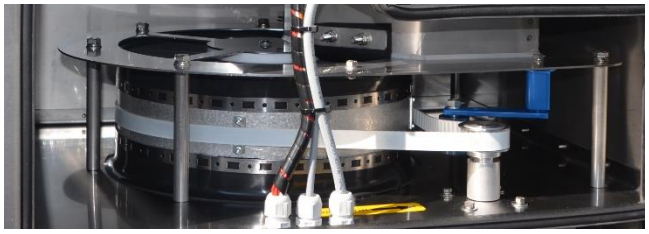
1.7.3 Rotating desiccant rotor

The desiccant rotor is a high capacity desiccant media captivated in a circumference rim with radial spokes. The spokes attach to a central hub with integral sealed bearings. The sealed bearings ride on a solid center shaft. The rotor is held in place with a lock ring on each side.

1.7.4 Rotor drive system

The rotor drive is a very critical component in the dehumidifier. Damaged media and seals will still allow for some moisture removal, however if the drive system is not properly maintained and fails the desiccant media will no longer remove moisture.

The cassettes use a toothed wheel and a toothed belt driven by an electrical motor with a gearbox. A self-tensioning pivot arm ensures that the belt is sufficiently tensioned around the circumference of the rotor.



The seals are made of high temperature low friction rubber and designed to provide a long service life.

– The circumference seals are intended to seal the circumference of the rotor on both sides.

– The radial seals contact the face of the desiccant media and seal between the process and reactivation areas.

1.7.5 Electric heater

Electric heaters are used to heat the air. An electric heater is used to heat up the process and regeneration air stream.

1.7.6 Process fan

Plug-in fan:

The applied fans have blades curved backward. The fan and electric motor are mounted together on a steel base frame.

1.7.7 Regeneration fan

The applied fans have blades curved backward. The fan and electric motor are mounted together on a steel base frame.

1.7.8 Controller (additional)

In order to achieve the best performance out of the dehumidifier under different ambient conditions, the unit can be equipped with a PLC.

Read for more information the order specific "Control manual" which is delivered by the unit and lays in the control cabinet.

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 dehumidifier 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 and shut the unit down.

Delay all repairs until:

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

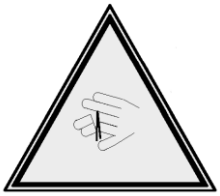
Check before restarting:

- **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

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.
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;**

Storage conditions:

Humidity	Store units dry, in a non-condensing environment.
Air temperature	-10°C to 45°C

4. INSTALLATION INSTRUCTIONS

4.1 Installation

Only qualified technical personnel is allowed to install the dehumidifier.

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

See to adequate spacing at the operating side of the unit to replace components whenever needed. Provide enough space to replace the whole desiccant rotor or rotor segments.

4.2 Connecting the electrical wiring

Only to be carried out by a qualified electronic technician

The control cables must be connected to the specified terminal block. Check if the wiring is connected according to the wiring diagrams. Measure the connections before you connect the device to the electricity grid. Turn on the main switch.

5. STARTUP

Make sure that the dehumidifier is checked well before starting with the test-run.

5.1 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.

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

5.2 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.

Never open the unit when it is running!

5.3 Measurement of performance

1. Measure dry bulb temperature, dew point and air volume flow at:
- Entering process air inlet, leaving process air outlet.
- Entering reactivation air inlet, leaving reactivation air outlet.
2. Measure dry bulb temperature at the reactivation heater outlet.
3. Time rotor speed of rotation.
4. Measure process and reactivation air pressure drop and drive motor amperage.

Compare all measurements against the data provided from Dutch Blower. The result should agree within a few percent of graph. In event of substantial (>5%) difference between measured and predicted results, reperform measurements.

6.3.1 Common measurement and calculation errors are:

Process leaving dew point is inaccurately determined by measuring wet bulb (or RH) and calculating dew point. In many cases, the leaving process air is so dry that even slight measurement errors in dew point (or RH) will have significant results.

Uneven temperature and flow in air streams causes variance in all readings. Take an average reading in transverse across the face of the rotor in order to minimize variance.

Heat and mass transferred do not balance. The amount of heat gain in kWh on the process side must match the heat loss in kWh on the reactivation side. Also, the amount of moisture removed on the process side must match the amount of moisture gained on the reactivation side. If mass and heat transfer do balance, it is likely that the readings obtained are correct.

Problem	Inspection	Action
Rotor does not rotate	Power not on	Energize
	Check direction of rotation	Change direction
	Check that the rotor is free to rotate	Determine cause and remove obstacles
	Check the operation of the drive motor	Replace drive motor Check wiring and capacitor
	Check seal clearance	Check rotor alignment Adjust or replace seals
	Check that the bearings are free to rotate	Replace bearing
	Check engagement of the rotor in the pulley	Adjust or replace
	Check drive belt tension	Adjust tension
Rotor rotates but drying performance is poor	Make measurement of performance	Determine cause
	Check seal clearance	Adjust or replace seals
High process outlet temperature	Check seal clearance	Check rotor alignment Adjust or replace seals
	Check rotor speed	Contact Dutch Blower BV
Low reactivation outlet temperature	Check seal clearance	Check rotor alignment Adjust or replace seals
	Check rotor speed	Contact Dutch Blower BV
	Check heated temperature	Adjust to set point

6. MAINTENANCE INSTRUCTIONS

6.1 Maintenance of air filters

Only to be carried out by a technician

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.

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

6.2 Maintenance of desiccant rotor

The drive system is designed for long life and minimum maintenance. Following the maintenance intervals will result in years of trouble free operation.

6.2.1 Interval maintenance

Inspect the rotor face for shrinkage, inspect the seals for gaps and inspect the drive system:

- **2-3 months after commissioning**
- **yearly**

Check:

- Pressure drop > 1.25 x new Clean rotor.
- Performance <95% of new rotor.
- Make measurement of performance and troubleshoot.

See “Measurement of performance”; chapter 6.3

The maintenance rotor seals and drive system comprises the following activities:

6.2.2 Inspect seals

Inspect the condition of the seals between the rotor and the metallic frame structure. The seals should be pliable and intact. They shall lightly contact the rotor. A small amount of residue will occur after extended use, it is completely normal. If large amounts of residue occurs, closely inspect the seals for excessive wear, especially the radial seals between process and reactivation. If excessive wear is evident the seals shall be replaced. Inspect to ensure a good seal exists between the metallic structure of the cassette and interconnecting ductwork. Any significant leakage in these areas affects overall performance and should be sealed.

6.2.3 Change seals

Radial seals: (Separating the sectors)

1. Remove the mounting bracket attaching the seal and remove from the cassette.

Install new seals;
2. Measure and cut the seal to fit the sector. This sector is insulated.
3. Compress the bulb on the seal between the rotor face and cassette frame. When the rotor rotates the bulb shall be compressed between the rotor and the frame.
4. Drill and pop rivet a mounting bracket on top of the seal.

Circumference seals: (Separating the rotor from the cassette)

1. Pull the seals from the rotor edge.
2. Clean up any residual adhesive tape from the rotor edge.

Install new seals;
3. Fasten double sided adhesive tape, edge to edge on the rotor rim. Attach the circumference seal on to the tape (grey side down). 50% of the seal width on the rotor and 50% of the width tailing up on the cassette side.
4. Attach the steel clamp on top of the seal to fixate it.

6.2.4 Inspect drive system

Inspect the condition of the drive belt. Replace if necessary.

6.2.5 Replace drive system

1. Remove electrical connections from the drive motor.
2. Unwrap belt from gear motor drive wheel.
3. Remove the motor bracket bolts.
4. Pull the drive system out of the cassette.
5. Replace the drive system using the reverse procedure.
4. Check the direction of rotation.
5. Run the drive system for 1-2 hours.

The drive system is self-tensioning. It is important that the drive motor turns in the correct direction. See the arrow showing the rotation on the cassette.

6.2.6 Replace rotor

Crush hazard:
- **Rotors larger then 1400mm are very heavy.**
- **Be careful when replacing!**

1. Secure the air handler and observe applicable safety precautions regarding confined space entry and electrical tag out.
2. Determine if the rotor will be removed from the drive side of the cassette (requires drive system removal, see “Replace drive system”; chapter 7.3.5) or the opposite side of the cassette.
3. Remove the circumference seals if they are to be re-used.
4. Place a suitable wooden beam under the rotor.
5. Loosen and remove both shaft bolts at the centre shaft of the rotor.
6. Slide the shaft out of the rotor. Use the wooden beam as a lever to keep the rotor in place.
7. Gently roll the rotor out of the cassette using the wooden beam. (Rotors larger than 1400 mm, have to be taken out sector by sector).

Install new rotor;
1. Replace the rotor using the reverse procedure.
Adjust the position:
2. Loosen the center shaft bolts. Alignment of the rotor is maintained by the rotor shaft position (vertical and horizontal) within the cassette.
3. Align the rotor to desired position. Small wooden wedges inserted between the rotor circumference and rotor seal are sufficient to align the rotor.
4. Re-tighten the shaft bolts.

Distortion of the cassette from improper installation may result in substantially unequal clearance between the rotor face and the cassette.

This can cause excessive drive torque requirement (reducing the life of the drive), uneven seal wear and reduced seal or media life.

6.3 Maintenance of electric heater

Only to be carried out by a technician

As a matter of principle it is not required to maintain air heating batteries. It will be sufficient to examine the connecting cables periodically to ensure that the screws at the terminals are still tight and that both earthing systems (connection and housing) are still operating properly and that the insulation of the cables has not been cracked.

Cleaning activities are required to be part of the maintenance activities only if the medium to be heated is extremely dirty or dusty (e.g. wood dust produced in a joiner's shop). It is recommended to clean the heating rods with the help of compressed air.

Air filters that may have been installed in front of or behind the air heating battery must be cleaned at regular intervals.

6.4 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 lightning in the dehumidifier is a standard 5 W LED lamp.

Notes

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