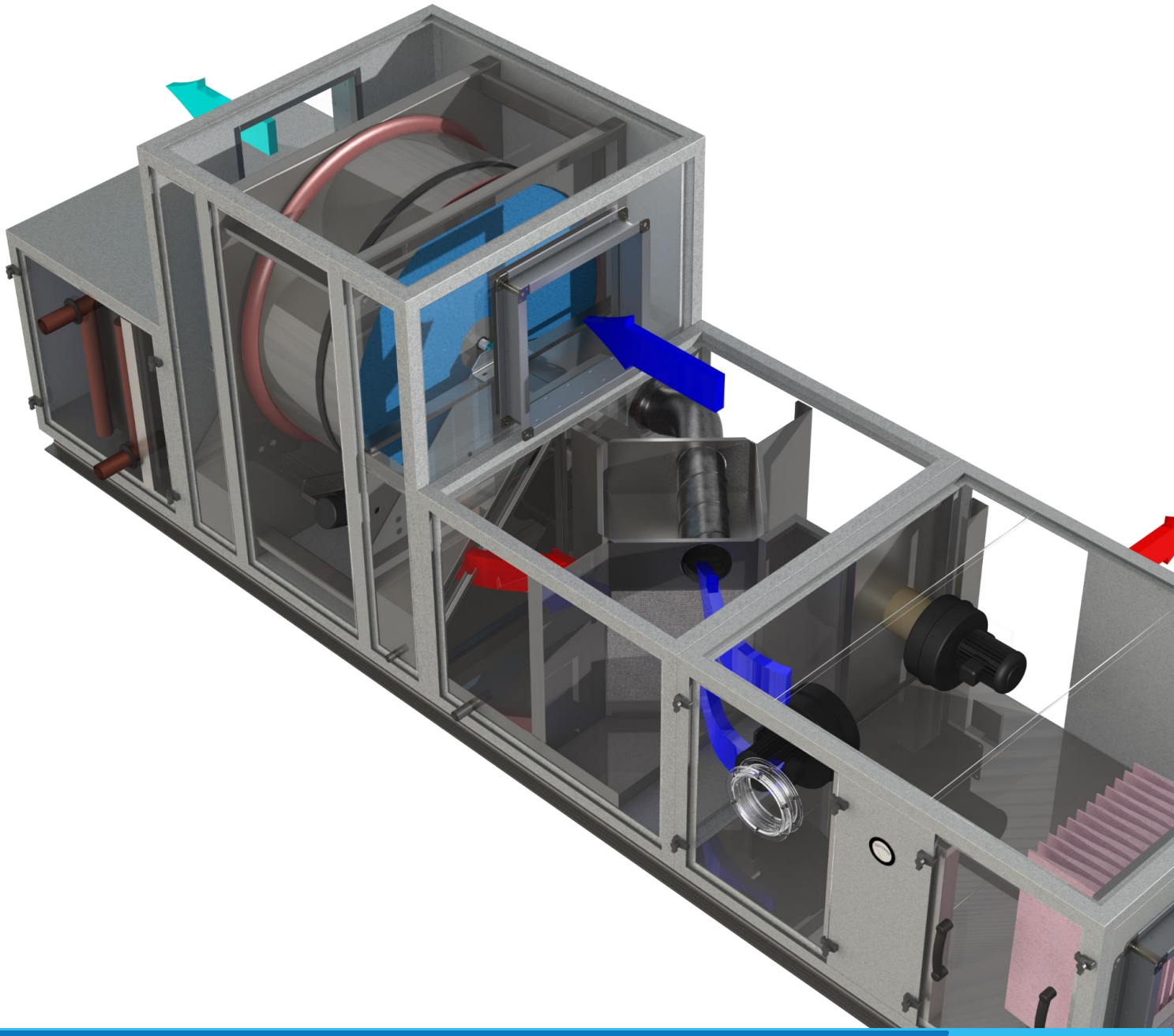
Dutch Blower

Professionals in Air handling



Manual

Dutch Blower desiccant dehumidifiers

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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 cooling 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.

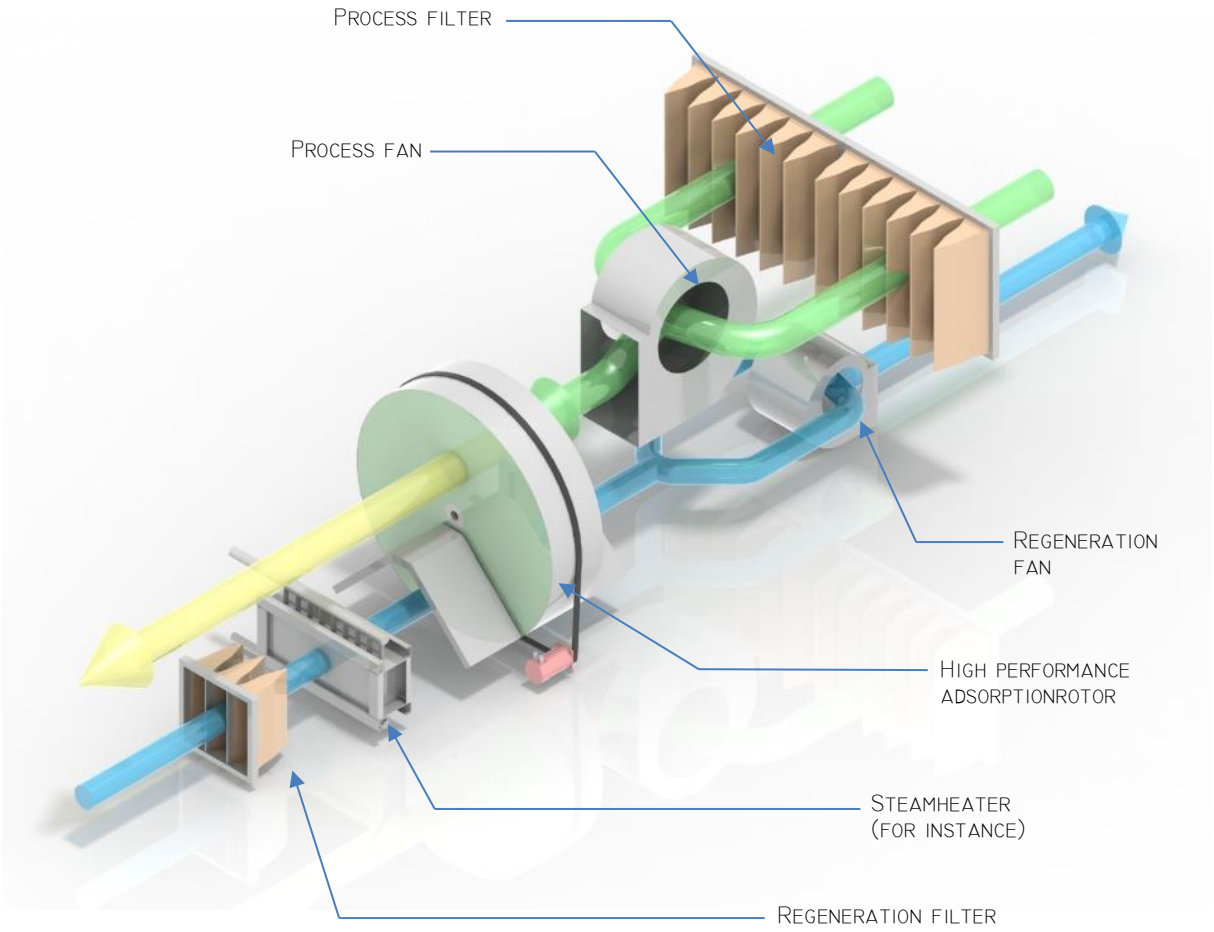
If agreed, Dutch Blower B.V. accepts all responsibility for delivery of the unit at the agreed delivery address, but the customer is responsible for all damages resulting from unloading from the truck and transport to the final destination. The customer must conclude an all risk insurance for this part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



1.7 Description of the subcomponents

The dehumidifier consists of, and can be equipped with:

– a casing;
– a damper section;
– a filter section;
– a rotating desiccant rotor;
– a rotor drive system;
– a plate heat exchanger;
– a heating coil;
– a cooling coil;
– an electric heater;
– a process fan.
– a regeneration fan.
– a control panel.

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. 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 Damper section

A dehumidifier can be 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 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.

1.7.5 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.

1.7.6 Plate heat exchanger

Plate Heat exchangers are utilized for both the cold and warmth recovery of the regeneration air stream. By means of the heat exchanger, two air currents of differing characteristics (i.e. warm return current and a cold supply current) are forced to pass by each other in opposite directions or parallel to each other through thin, specially structured plates without any contact between one air current and the other. The energy transfer is caused by the numerous plates present in the heat exchanger. A mixing of the two air streams will not occur. Consequently, the transfer of humidity, pollution, bacteria and odours is avoided.

1.7.7 Coils

Coils are used to heat or cool the air. By default, the cooler and heater coil consists of a galvanized steel frame, copper pipes and aluminum fins.

1.7.8 Electric heater

Electric heaters are used to heat the air. By default, an electric heater is used to heat up the regeneration air stream.

1.7.9 Process fan

Centrifugal fan:

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.

Plug-in fan:

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.

1.7.10 Regeneration fan

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, or direct driven (smaller units). The frame is cushioned by rubber vibration isolators. The intake and outlet openings of the fan are flexibly connected to either the casing and the internal wall to transport the wet exhaust reactivation airstream.

1.7.11 Control panel (additional)

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

Optionally the dehumidifier can be equipped with a color touch screen. The air conditioning process can then be easily operated by the user.

There is also the possibility to access the PLC from a distance to change values or to adjust settings in the controller.

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

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 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 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.**

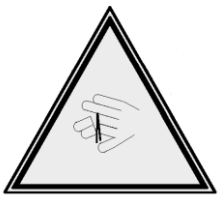
The main switch may only be unlocked and switched back to position I when no more repairs are to be done, except when otherwise outlined in the instructions.

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.

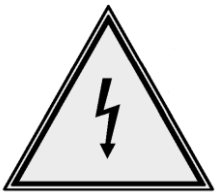
The casing may only be opened by a (service) technician. When leaving, the technician must close and lock all doors/hatches of the unit.

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 dehumidifier is laid down in the order-specific documentation.

Lift the dehumidifier 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

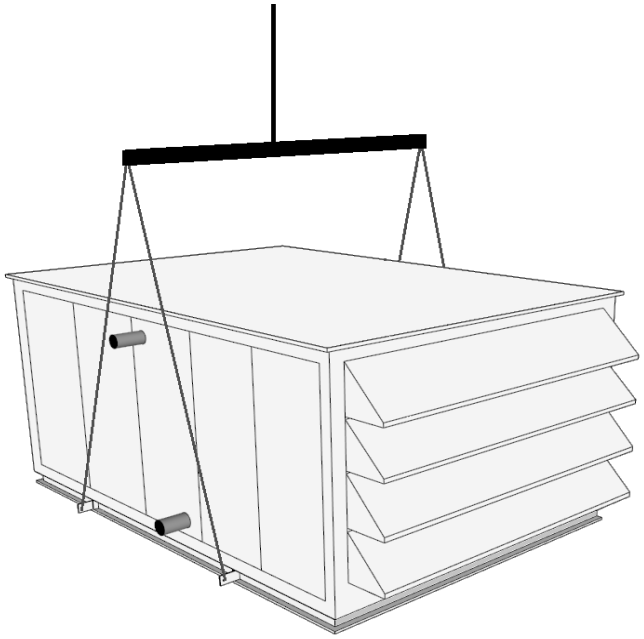


Figure 1 (hoisting with an equalizer)

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 dehumidifier 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 dehumidifier.

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 dehumidifier; 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. Provide enough space to replace the whole desiccant rotor or rotor segments.

Make sure that the dehumidifier is installed with a safety switch even when the unit is delivered without!

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).

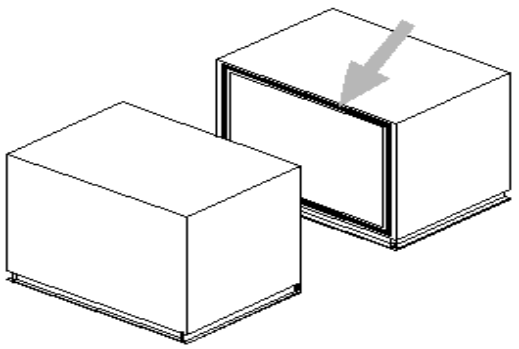
5.3 Assembly of individual parts

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

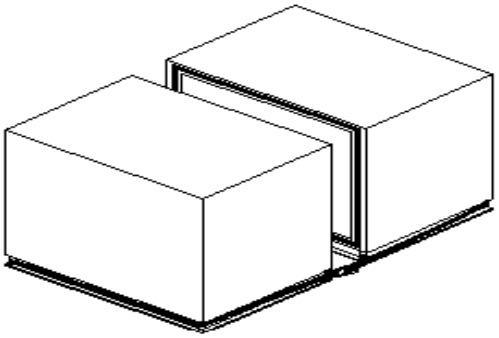
Required tools

– 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 trough 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

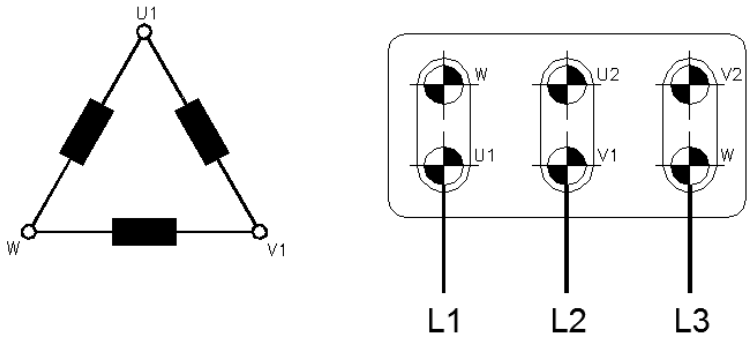
Connection for single speed motors:

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)*

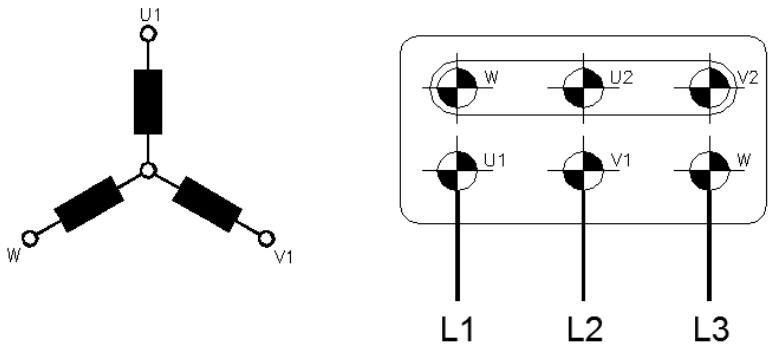
	Voltage		
Type plate motor	3~230 Vac	3~400 Vac	3~690 Vac
230 - 400 Vac	Δ	Y	-
400 - 690 Vac	-	Δ	Y

Note: *Voltage can be different in foreign countries, for instance U.S. or Canada.*

Δ -connection



Y -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.

5.5 Connecting cooling or heating coil

During installation, there can be high pressure as well as high temperature fluid jets and therefore take the necessary precautions.

The safety auxiliary equipment shall be provided for in compliance with the regulations in force. They shall prevent from exceeding the acceptable limits of the pressure equipment and in particular:

– Pressure limiting devices(PED All "I" 2.11.2)
– Temperature control devices (PED All "I" 2.11.3)
– Damage limiting devices in case of fire breaking out outside the premises (PED All "I" 2.12)

Leave enough space to allow access to the exchanger and to remove it if needed.

The piping system shall be supplied with valves and bypasses to shut off feeding in case of inspections and/or repairs.

Provide suitable air exhaust taps in order to eliminate gas formation in the pipe lines.

Do not tighten the bolts without making sure that the gaskets are fully in place.

Start operation gradually and do not abruptly let hot fluid into the exchanger when it is empty or cold.

Open the exhaust vents of the pipe side circulation and let the internal fluid circulate up to complete filling. Then close the exhaust vents and slowly bring the exchanger up to the temperature level.

Give pressure to the installation gradually and carefully control if irregularities are present.

In order to stop the installation it is necessary to block the hot fluid flux.

Do not make the exchangers operate under conditions different from those stated in the label.

If after operating the exchanger, there should be leaks between the connecting flanges, tighten the bolts as much as required to stop the leaks paying attention to possible pipe extreme temperatures.

In case of accidental breaks during operation there can be gas, fluid and fragment emissions; therefore take the necessary precautions in order to avoid the damage caused by those phenomena.

5.6 Connecting an electric heater

Only to be carried out by a technician

In the case of very high final air temperatures or very unfavorable conditions (e.g. reduced air quantity or recirculated air operation depending on the method used) there may be temperatures existing in the connection box which are no longer suited to use standard, rubber-insulated cables (this decision can be taken by the customer only). In this case use high temperature resisting cables, e.g. silicone, teflone or fiberglass insulated cables.

The shut-down procedure for fan and air heating battery shall be as such that the fan is still in operation for another five minutes to avoid overheating. For this reason the fan motor after-running is ensured with the help of a time-limit relay. Also, existing thermostats must be set on site in accordance with the requirements requested for. For example, a temperature safety limiter is adjusted between 50°C and 60°C with a final air temperature of 40°C; this applies also to other final air temperatures.

Depending on the operation conditions and in the case of voltage failure the surface of the heating rods can be heated up by 50°C to 70°C. It can hardly be expected that the air heating battery will be damaged. At worst, it may be necessary to replace a filter or a plastic cover.

Regulations for the Use of Control and Adjustment Devices
On principle, there are 4 parameters to be observed for the control of a heat battery:
- quantity of air;
- air intake or air exhaust temperature;
- operating voltage or current resulting thereof;
- use of operating groups (performance distribution).

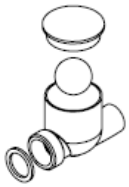
If the air exhaust temperature is required to be changed or if the air intake temperature changes a control can be achieved by switching on or switching off one or more operating groups without changing the quantity of the air.

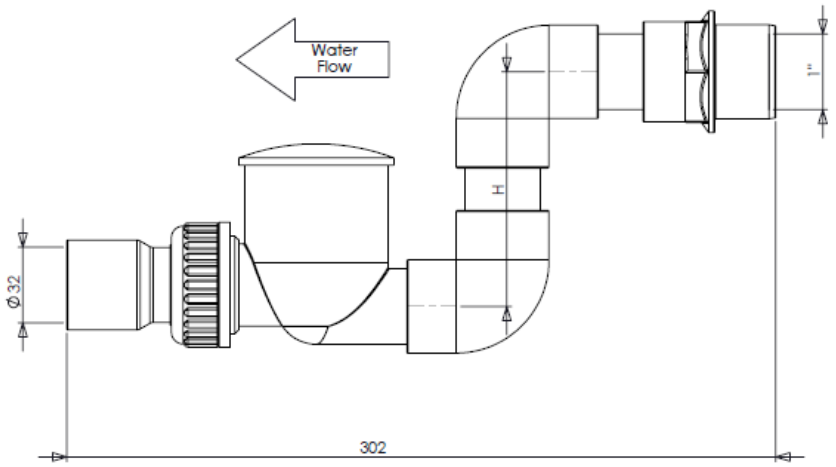
If the quantity of air changes (to less than approx. 70-80 per cent of the quantity of air defined for each heat battery embodiment) this may be balanced only by a voltage control (less current required). For technical reasons the switching off of one or more operating groups will not lead to success. If these instructions recommended by the manufacturer are not complied with this may result in a partly or completely destruction of an air heating battery.

5.7 Mounting of the underpressure siphon valve

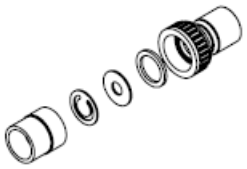
Only to be carried out by a technician

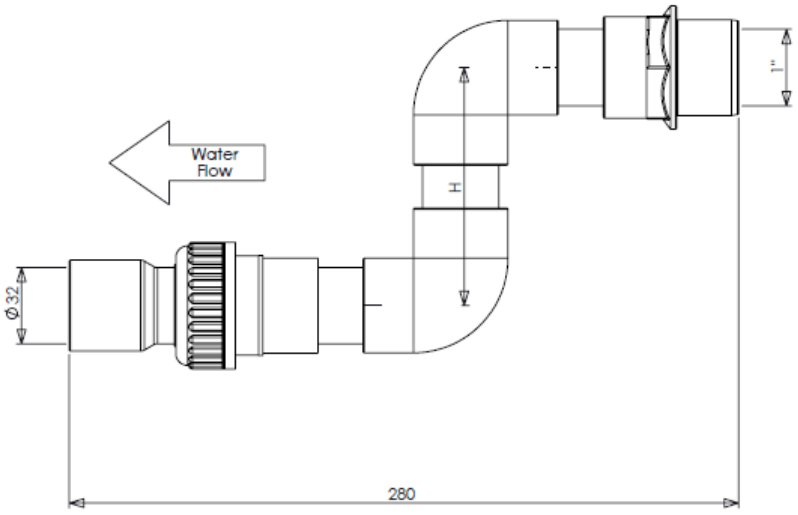
A ball or membrane siphon must be mounted on the drain of the drip tray or any other water drain. The siphon must be installed horizontally. Using the supplied 90° bends and the supplied 40 mm PVC pipe, the siphon can be connected in accordance with the following drawings.





Ball siphon H = minimum underpressure (mm water column) + 30mm





Membrane siphon: H = minimum underpressure (mm water column) + 30mm

5.8 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 that the dehumidifier 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.

Check if the rotor can rotate freely, the rotor face is parallel to the cassette frame and face panels.

Check if the rotor is correctly aligned in the cassette.

Check if the seals are correctly mounted and check the sealing for any gaps.

Check if the drive system operates correctly and the drive belt is properly tensioned.

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 if the rotor rotates in the correct direction.

Check the direction of rotation of the supply and regeneration fan. When the fans rotate into the wrong direction, the wiring of the motors must be changed. After startup, retighten the V-belts.

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.

Check if the condense drain (cooling section) is functioning properly.

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

Check if 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!

6.3 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

7. MAINTENANCE INSTRUCTIONS

7.1 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.

Optionally, a differential pressure gauge can be mounted in order to assess whether the filters must be replaced. A differential pressure switch or a proportional differential pressure transmitter 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 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 of V-belts and bearings

Only to be carried out by a technician

The V-belts must be retightened:
- **immediately after startup**
- **after 100 hours**
- **after 3 months**
- **every 6 months.**

The maintenance of the V-belts and bearings comprises the following activities:

Maintenance of the V-belts encompasses periodical tightening of the V-belts and timely replacement of observed wear.

Check the V-belts and replace if required.

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

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 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.

7.3.1 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:

- Shrinkage of the rotor, if yes: **Retighten all bolts if the rotor is build out of multiple segments !!**

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:

7.3.2 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.

7.3.3 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.

7.3.4 Inspect drive system

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

7.3.5 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.

7.3.6 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.

7.4 Maintenance of cooling or heating coil

Only to be carried out by a technician

All maintenance operations shall be carried out wearing safety gloves.

During maintenance, there can be high pressure as well as high temperature fluid jets and therefore take the necessary precautions.

All maintenance operations on the heat exchanger shall be carried out with the installation turned off.

When the exchanger is stopped for maintenance it is absolutely necessary to exhaust all internal fluids and not to loosen any screw or bolt until the internal pressure has decreased and the temperature of the parts is the same as the room temperature.

Check the connection seals with gasket every time the exchanger is restarted after having been stopped.

Make sure that all installation parts are clean and under perfect operating conditions.

Carry out a periodical draining if the air tends to accumulate in the pipe side circulation.

Never leave the exchanger off when it is full of fluid on the pipe side if there is a possibility of freezing since the fluid freezing would cause irreparable damage to the exchanger. Foresee total emptying in order to avoid such a problem.

When the heat exchanger is disassembled, it is recommended to use new gaskets for reassembling it; this will prevent possible future leaks since the gasket compounds become fragile and dry and their reuse does not guarantee a good seal. To remove or prevent the formation of rust on the steel surfaces, dry the area, use a steel brush to clean it and spray it with cold zinc paint.

7.5 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.

7.6 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.

7.7 Maintenance outside panels

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

Check the outer wall for any corrosion. Contact Dutch Bower 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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