

DEHUMIDIFIER DEHUTECH 440



TECHNICAL MANUAL

SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE

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GENERAL SAFETY INFORMATION

- Anyone operating the DehuTech 440 should have access to this manual, and should be aware of the safety information.
- Only personnel with adequate knowledge of the dehumidifier should be allowed to operate and service it.
- Only personnel with authorisation for electrical installations are allowed to make repair of electrical components.
- Repair of electrical components should be carried out by suitable qualified personnel.
- The dehumidifier must not be installed in areas where explosion proof equipment is required.
- Disconnect the dehumidifier from the mains prior to opening the service hood.
- Prior to servicing the dehumidifier must be left to cool down for at least 15 minutes after operation.
- The service hood should remain mounted except when servicing is carried out.
- The dehumidifier can only be used for dehumidification of air at atmospheric pressure.
- Never use the dehumidifier without the filters as the desiccant rotor can become contaminated and lose capacity.
- Signs and instructions on the dehumidifier should not be removed or altered.
- This manual should always be accessible and kept close to the dehumidifier.
- All maintenance and control of the dehumidifier should be as per the specified schedule.
- Use only genuine spare parts.
- Written permission must be obtained from DehuTech AB prior to making any alteration or modifications.

APPLICATIONS

Dehumidifier DehuTech 440 is of the solid desiccant wheel type designed to dry air of atmospheric pressure. The dehumidifier can be used for drying air of up to 100 % relative humidity (RH) with temperatures from -30 °C to +40 °C.

The applications are numerous and wide spread. Below are some examples:

- Controlling humidity levels in production processes.
- Drying of temperature sensitive products.
- Maintaining correct humidity in storage areas.
- Protection of equipment sensitive to corrosion.
- Controlling humidity levels in museums and archives.
- Drying after water damage and drying of buildings during construction.
- Climatic improvements in damp areas.

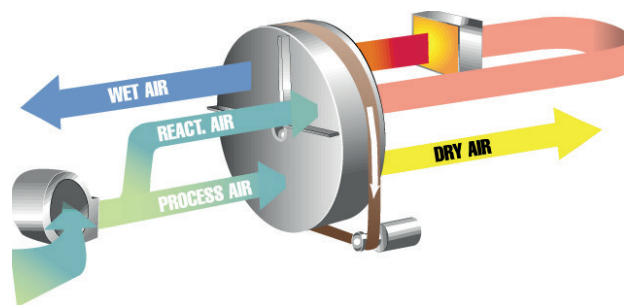
METHOD OF OPERATION

The dehumidifier operates with two air streams. A larger air stream to be dehumidified, and a smaller air stream to exhaust the moisture out of the desiccant rotor.

Both airstreams are created by one common fan which pressurises a compartment of the dehumidifier creating two separate airstreams.

The larger air volume, the process air, passes through the slowly rotating silica gel rotor. Silica gel is a hygroscopic material adsorbing water vapour direct from the air. When passing through the rotor the humidity of the air is reduced, whilst the moisture content of the rotor material increases. On exiting the rotor the dried air is introduced into the area, or the process to be dehumidified. The adsorption process works in temperatures from -30°C to $+40^{\circ}\text{C}$.

The smaller air volume, the reactivation air, adsorbs the moisture from the silica gel rotor. This reactivation air first enters a purge sector of the rotor, thus cooling down the rotor material, and simultaneously increasing the reactivation air temperature. The temperature of this pre-heated air is further increased by an electrical heater to a temperature of approximately $+90^{\circ}\text{C}$. As the reactivation air passes through the rotor, in an opposite direction to the dry air, it will decrease the moisture content of the rotor material. The reactivation air will leave the dehumidifier as warm, wet air, which is then exhausted out from the building.



PRODUCT DESCRIPTION

Casing

The casing is fabricated from stainless steel. The top of the dehumidifier has a top hood that can be removed for service access to electrical and mechanical components. All duct connections to the dehumidifier are designed for connections to standard size spiral ducts except for the process air inlet.

Rotor

The dehumidifier has a drying rotor fabricated from a desiccant material. The rotor has a matrix of corrugated and flat heat resistant sheets which houses the Silica Gel desiccant agent. This matrix creates a large number of axial flutes through the rotor, which together builds up an immense surface area for moisture adsorption in a small volume. The rotor is manufactured and processed to be able to withstand moisture saturated air without being damaged. This means that the rotor can be used in conjunction with a precooling coil. Furthermore the rotor will not be damaged even if the fan or the heater for reactivation should fail during operation. The rotor is incombustible and non flammable.

The slow rotation of the rotor is achieved by an electrical gear motor and a belt drive. The belt sits on the outer rim of the rotor and is driven by a pulley on the drive motor. A adjustable belt tension device keeps the belt in place and main-tains tension to prevent belt slip. Correct opera-tion of the drive system, and direction of rotation can be checked by opening the top panel.

The centre hub of the rotor is equipped with ball bearings. The rotor shaft is made from stain-less steel. The complete rotor part can easily be removed and lifted as one piece out from the casing.

Filter

The dehumidifier has one common filter for process- and reactivation air.

Fan for process- and reactivation air

The fan is a direct drive radial fan with a single phase standard motor class IP 54, ISO F. The fan is accessible for service after removing the service hood of the dehumidifier.

Heater for reactivation air

The reactivation heater is of the PTC-type (Positive Temperature Control), which can not be overheated, and gives the possibility of a steplless control for 30 - 100 % of the dehumidi-fication capacity. This is achieved by controlling the wet air volume.

Electrical panel

The electrical panel is located inside the dehu-midifier and is accessible through the service hood. Switches and indications for operation are mounted at the front of the electrical panel.

Operation options

Using the operation switch on the front side of the dehumidifier, different running options can be selected:

0	Dehumidifier not in operation.
1	Dehumidifier in operation mode.
MAN	Dehumidifier in continuous operation.
AUTO	Automatic operation by remote humidistat, or other external on/off signal.

INSTALLATION

Installation and service access

Dehumidifier DehuTech 440 is designed for indoor installation.

All components in the dehumidifier are accessible from the top of the unit. For inspection and service, a space of 400 mm must be left free above the dehumidifier to accommodate for servicing of filter, fan and rotor.

When using a mounting plate, the dehumidifier must be put so that the rotorshaft still is horizontal and the wet air outlet is placed low.

Duct connection for permanent installation

The dehumidifier can be installed in the room that should be dehumidified or in a separate room.

To obtain the best performance the outlets from the fans should be equipped with diffusers.

Wet air duct out from dehumidifier

The wet air from the dehumidifier should be exhausted to the outside. The duct should be as short as possible to minimise the chance of condensation of the wet air. This duct should slope down slightly to stop any condensed water from flowing back into the dehumidifier.

If the wet air duct is extremely long, or must be installed sloping upwards from the dehumidifier, it should be insulated and have a drainage point (2 mm) drilled at its lowest position.

A damper should be installed in the wet air duct to enable correct setting of the reactivation air volume during commissioning.

The exhaust opening should have a coarse wire net.

Process and dry air with the dehumidifier installed in the dehumidified room

When the dehumidifier is installed in the dehumidified room it would normally take the process air directly from the room without any duct system. The dry air outlet would normally have a duct system designed for distribution of the dry air in the building.

Process and dry air with the dehumidifier installed outside the dehumidified room

The dehumidifier takes the process air as ambient air. The dry air from the dehumidifier can be connected for post treatment or ducted back to the dehumidified room.

Dampers should be installed in the dry and wet air ducts, enabling correct commissioning of the air volumes.

Duct connection for basement installation

If the dehumidifier should be installed in the basement it is sometimes desirable to achieve a slight negative pressure in the basement to prevent odours from penetrating into the building. In these circumstances the reactivation air is taken directly from the basement and the wet air is exhausted out from the basement. This method of installation will create a small negative pressure. The other ducts should be installed according to "Duct connection for permanent installation".

Temporary installation

With temporary installations for water damage or building drying, flexible plastic ducts would normally be used instead of the spiral duct type. The drying method differs depending on situation and construction to be dried. The complete room could be dehumidified, or just the damaged part. For the later option plastic sheet is used to cover the damaged area, and the dry air is supplied under the sheet. For both options the wet air must be exhausted out from the building via flexible duct, or alternatively connected to the general exhaust ventilation system for the building.

Electrical installation

See the electrical wiring diagram on page 11.

COMMISSIONING

On initial start up, the following steps should be taken in this order:

1. Ensure that the external isolation switch is isolating the unit from the mains, or that the power plug is disconnected.
2. Select the OFF position on the main switch (orange) at the front of the dehumidifier.
3. Open the service hood on the top of the dehumidifier and ensure no foreign objects are left inside the unit or in the electrical compartment
4. Make sure the air filter is installed.
5. Rotate the fan impeller by hand and make sure it can move freely.
6. Ensure that the dry and wet air dampers are open, and that ducts are clean and free of blockages.
7. Ensure that the mains supply fuse is suitably rated (10A), and that the fuse is of a slow kind.
8. Connect the dehumidifier to the main electrical supply by turning the isolation switch to ON, or alternatively connect the power plug to the socket.
9. Select the MAN position on the operation switch (black) of the dehumidifier. Switch the main switch (orange) to the ON position for 3-4 seconds. Check that the rotor is slowly rotating, the fans are starting, and that the orange lamp in the main switch lights up. Turn OFF the dehumidifier.
10. Mount the service hood and ensure it seals properly to the casing.
11. The dehumidifier is now ready for operation.
12. Start the dehumidifier and check that the unit is operating at the correct air volumes.
13. From the factory the dehumidifier is electrically wired in such a way that when operating in AUTO mode, the controls operate the complete unit to start or stop. By shifting one terminal connection in the electrical panel the operation mode can be altered to operate the fan continuously. The control will then only operate the heater on/off, depending on the signal from the humidistat or other external signal.

See the electrical wiring diagram on page 11.

MAINTENANCE

NOTE ! With all maintenance and service of the dehumidifier:

- **Switch off the dehumidifier approximately 15 minutes prior to opening the service panel, allowing the heater to cool down.**
- **Disconnect the dehumidifier from main electrical supply by turning the external switch to the off position or by pulling out the power plug.**

The maintenance intervals for the dehumidifier depend on the surrounding environment and installation site. Recommended maintenance intervals could therefore differ from one installation to another. Incorrect maintenance and service may result in reduced dehumidification capacity.

Filter

The dehumidifier is equipped with one common filter for the process air and reactivation air. The filter is positioned at the inlet and will clean the air prior to entering the dehumidifier.

Intervals for cleaning or replacement of the filters will be determined by the amount of dust and particles in the air at the installation site.

We recommend that the filter is checked at least once a month, at least for the first year of a new installation.

Never operate the dehumidifier without the filter, as the rotor can be damaged by dust.

Rotor

The rotor is maintenance free. However should it be necessary to clean the rotor careful use of compressed air should be the first choice. With severe contamination the rotor can be washed out with water.

Cleaning with water is no routine matter, please contact DehuTech AB or a local distributor prior to this procedure.

Check the rotor bearing and the rotor surface once a year.

Electrical motors

The electrical motors are equipped with ball bearings. The bearings are designed to last the life of the motor and therefore no maintenance is required.

Check the motors once a year for any abnormal sound.

Heater

The reactivation electric heater does not need maintenance, but should be checked twice a year for any dust or mechanical damage to the heating rods. Clean with a soft brush, or vacuum clean with dust. Gentle use of compressed air is another alternative.

Rotor drive belt

Check the belt tensioning at regular intervals. Adjust when needed by moving the tensioning support wheel closer to the desiccant rotor.

General summary of maintenance

	Filter	Rotor Bearing	Motors	Rotor drive	Heater	Sealings
On demand	√					√
Every 6th month				√	√	
Every 12th month		√	√			

TRANSPORTATION

Observe the following for transport or handling of the dehumidifier:

- Check the dehumidifier on delivery for any transport damage.
- The dehumidifier should be protected from rain and snow.
- The dehumidifier should always stand upright on its feet.
- Transport and lift the dehumidifier by the two handles on each side of the transportation box.

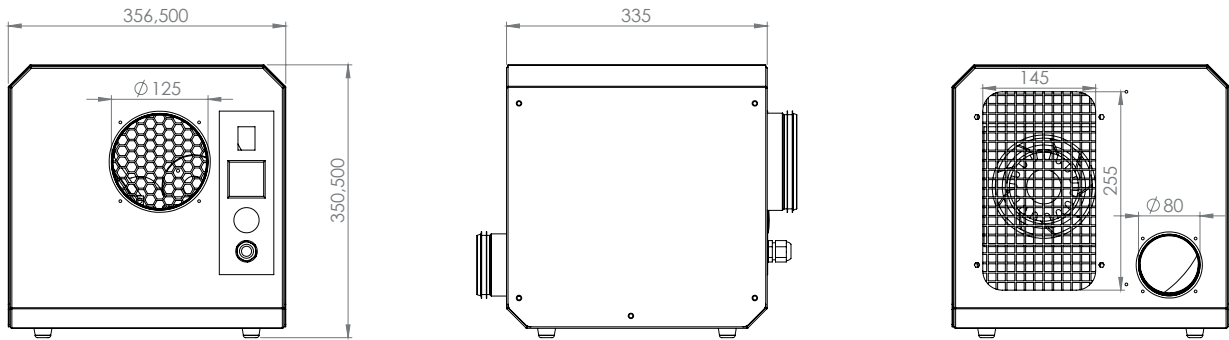
FAULT FINDING

MALFUNCTION	POSSIBLE CAUSE OF TROUBLE	CORRECTIVE ACTION
1. None, or reduced dehumidification capacity	Filter clogged Electrical heater faulty Airflow reduced No rotation of rotor Internal leakage in unit Altered air volumes Altered reactivation temperature Air leakage	Clean or replace filter Check fuses Check openings and dampers Check belt tensioning Check springs Measure and check air volumes Check reactivation heater Check panel and casing
2. Main fuse faulty	Fan faulty Too large air volume Rotor does not rotate Reactivation heater faulty	Check fan and motors Check air volumes and dampers Check drive motor and drive belt Check reactivation heater
3. Dehumidifier does not start	No control circuit Faulty control signal Fuse for controls faulty	Check control fuses Check external start/stop signal Check electrical components

<p>4. Rotor does not rotate</p>	<p>Drive belt is slipping Drive belt broken or worn Rotor jammed Drive motor faulty</p>	<p>Check belt tensioning Replace drive belt Check centre shaft, rim of rotor Replace complete gear motor</p>
<p>5. No dry- or wet air volume</p>	<p>Filter clogged Fan faulty Ducts blocked</p>	<p>Clean or replace filter Check fan, motor and impeller Check dampers and ducts</p>

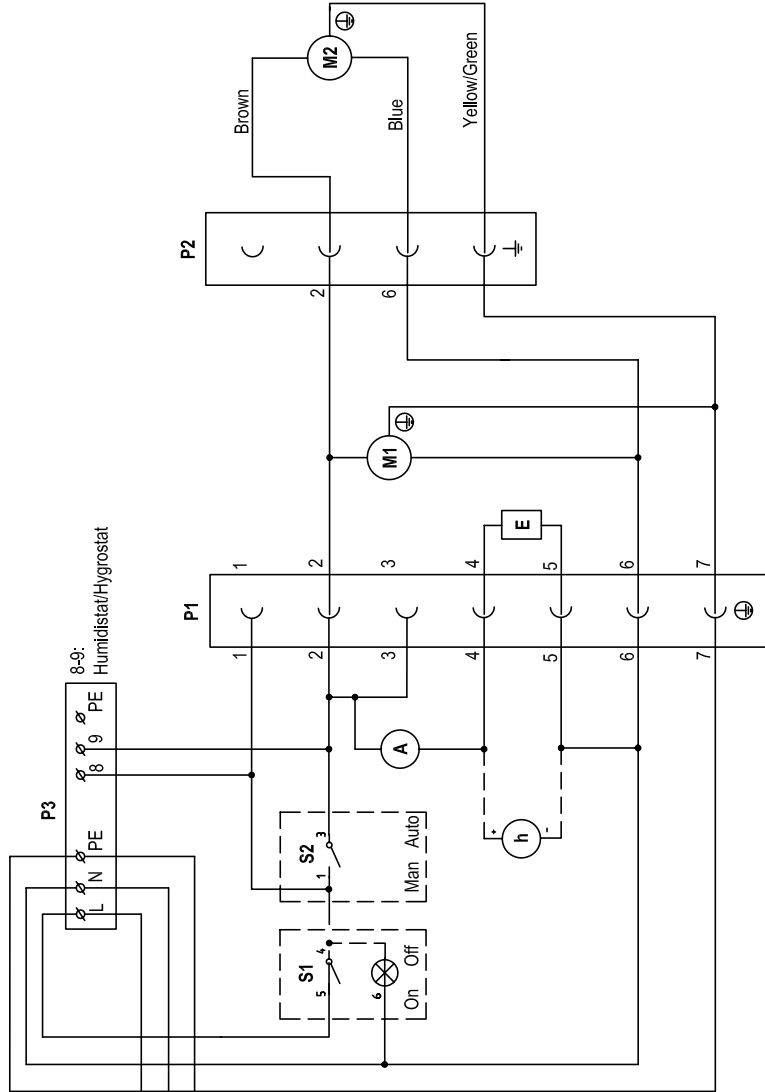
TECHNICAL DATA

Dimensions



<p>Dehumidification capacity (at +20 °C and 60 % RH. See performance chart for other data)</p>	<p>1,4 kg/h</p>
<p>Dry air flow</p>	<p>440 m3/h</p>
<p>Wet air flow (freeblowing)</p>	<p>100 m3/h</p>
<p>Power supply (1 x 230 V, 50 Hz)</p>	<p>2,1 kW</p>
<p>Current (connection fuse: 10 A)</p>	<p>9,1 A</p>
<p>Weight</p>	<p>14 kg</p>

ELECTRICAL WIRING



230VAC, 50Hz
1,6kW

Pos. Component/Komponent

- S1/S2 On-Off/Man-Auto switch/brytare
- A Amperemeter/Amperemätare
- P1 Terminal block 7-pin/Jackplint 7-pol
- E React. heater/Reg. värmare
- M1 Drive motor/Drivmotor - rotor
- P2 Terminal block 4-pin/Jackplint 4-pol
- P3 Terminal for inc.power & Humidistat/Hygrostat- & kraftplint
- M2 Fan/Fiäk
- h Runtime meter/Drifttidmätare*

*) Optional

Optional operation method when controlled by humidistat

If continuous operation of the fan is requested, and the humidistat should control **only** the reactication heater, shift wire 2-2 from terminal P1:2 to terminal P1:1.

Connection of humidistat & connection of runtime-meter

Connect the humidistat to P4:8-9.

Connect the runtime-meter to P1:4 and P1:5.

Alternativt driftsätt vid hygrostatstyrning

Om kontinuerlig fläktdrift önskas och hygrostaten HS enbart skall styra reg.värmaren, flytta kabel 2-2 från plintplats P1:2 till plintplats P1:1.

Inkoppling av hygrostat & inkoppling av drifttidmätare

Hygrostat kopplas in på plint P4:8-9. Drifttidmätare kopplas in på plintar P1:4 och P1:5.

