

MASTER

DHA 160



Instruction manual

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General safety information

- Anyone operating the DHA 160 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 any service panel.
- Prior to servicing the dehumidifier must be left to cool down for at least 15 minutes after operation.
- The service panels should remain closed 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.

Applications

Dehumidifier DHA 160 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.

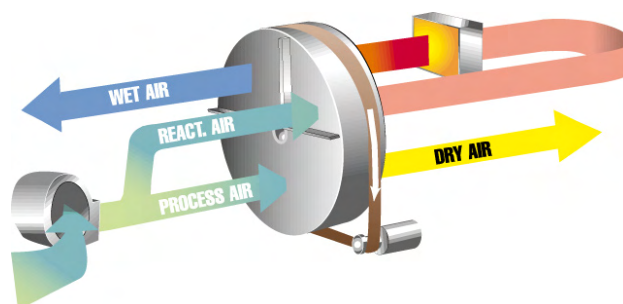
Method of operation

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 °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 °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

The dehumidifier is designed to meet the requirements of IEC protective class IP 44:

Casing

The casing is fabricated from stainless steel 2333. The top of the dehumidifier has a top panel 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.

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 maintains tension to prevent belt slip. Correct operation 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 stainless 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 top panel 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 stepless control for 30 - 100 % of the dehumidification capacity. This is achieved by controlling the wet air volume.

Electrical panel

The electrical panel is located inside the dehumidifier and is accessible through the top panel. 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 DHA 160 is designed for indoor installation. The dehumidifier should be installed horizontally.

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.

Reactivation air into the dehumidifier

For reactivation of the dehumidifier an additional air volume is needed. This air enters the unit along side the process air. As an option the dehumidifier can be equipped with a duct connection for entering air. The duct should be as short as possible, requires no insulation, and can slope up or down. In some installations, as an alternative, the reactivation air can be taken from the installation room, for this alternative no duct connection is needed.

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. If the process air inlet needs to be connected to a duct system, the dehumidifier is prepared for using a plate with a duct connection. 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

When the dehumidifier is installed in a separate plant room all inlet and outlet openings are usually ducted.

The dehumidifier takes the process air as ambient air, or as pre-treated air (cooled/heated), or alternatively as return air from the dehumidified room. 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 16.

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 panel 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.
9. Connect the dehumidifier to the main electrical supply by turning the isolation switch to ON, or alternatively connect the power plug to the socket.
10. 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.
11. Mount the service panel and ensure it seals properly to the casing.
12. The dehumidifier is now ready for operation.
13. Start the dehumidifier and check that the unit is operating at the correct air volumes.
14. 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 16.

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 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 intervals

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

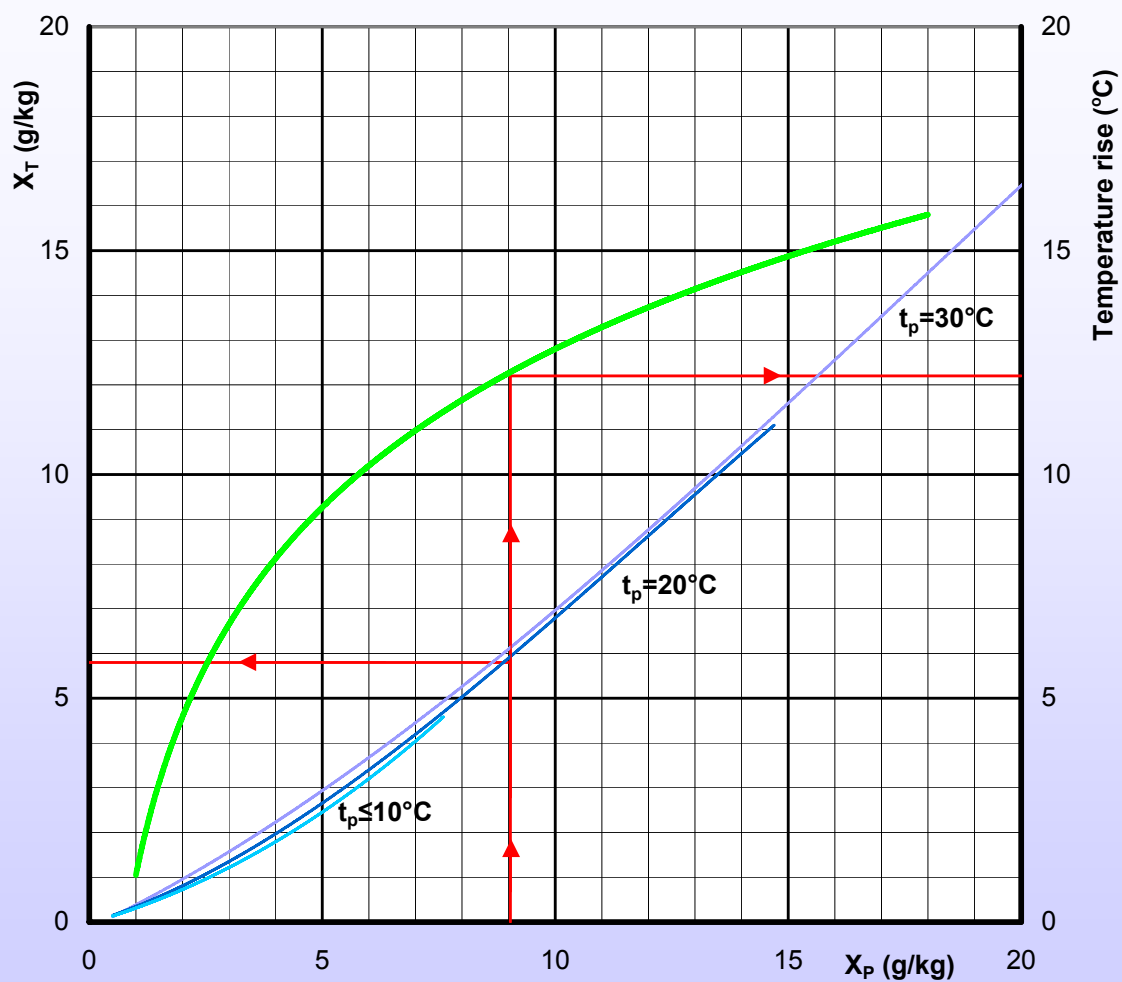
Fault finding

Malfunction	Possible cause of trouble	Corrective action
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
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
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
Rotor does not rotate	Drive belt is slipping Drive belt broken or worn Rotor jammed Drive motor faulty	Check belt tensioning Replace drive belt Check centre shaft, rim of rotor Replace complete gear motor
No dry- or wet air volume	Filter clogged Fan faulty Ducts blocked	Clean or replace filter Check fan, motor and impeller Check dampers and ducts

Technical data

Performance chart

CAPACITY DIAGRAM

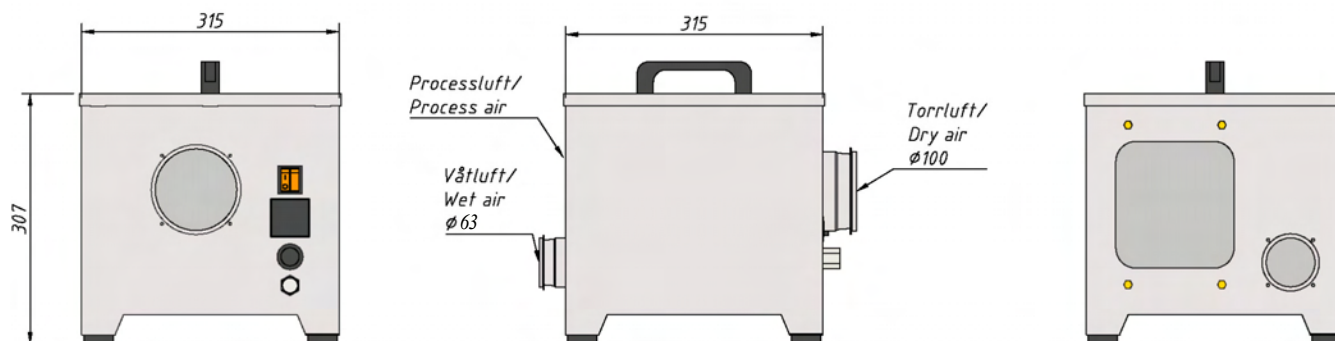


EXAMPLE:

Process air: $x_p = 9,0$ g/kg, $t_p = +20^\circ\text{C}$ giving

Dry air: $x_T = 5,8$ g/kg, $t_T = 20 + 12,2 = 32,2^\circ\text{C}$

Dimensions



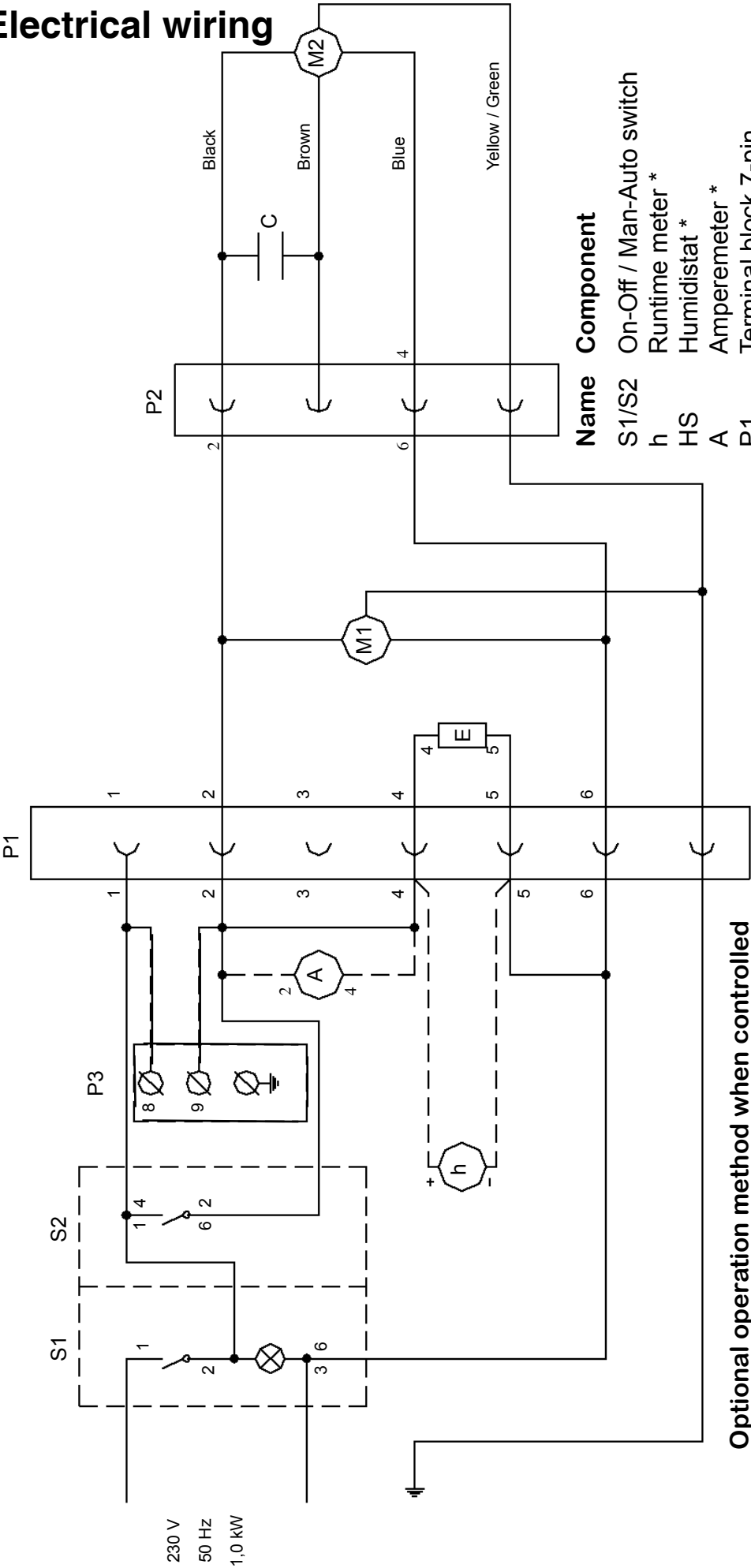
Technical data

Dehumidification capacity (at +20 °C and 60 % RH. See performance chart for other data)	0,6 kg/h
Dry air flow (at 85 Pa available pressure)	160 m ³ /h
Wet air flow (freeblowing)	40 m ³ /h
Power supply (1 x 230 V, 50 Hz)	1,0 kW
Current (connection fuse: 10 A)	4,3 A
Weight	14 kg
Noise level	57,5 dB(A)

Spare parts list

Part	Technical specification	No installed	No of recommended spare parts	Comment
Drive motor	Gearmotor 230-240 V 50 Hz 3 rpm, low temp grease	1	1	
Belt pulley	5G 37	1		
Drive belt	Round 5G 790	1		
Fan	G2E 140-AE77-B9	1		
Capacitor	2 µF 400 V	1		
Heater PTC	2DU44B	1	1	
Wet air duct	Heat resistant flexcord Ø63	1		
Rotor	PPS 160	1		
Belt tensioning		1		
Filter	AAF R29 EN779:G3 210 x 250	1	3	
Toggle switch	2x1 pol. electrical switch	1		
Cord	H07RNF/3 X1,5	1		
Process air duct connection	Ø125	0		Option

Electrical wiring



Optional operation method when controlled by humidistat

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

Optional connection of an amperemeter

An amperemeter could be installed by replacing the cable from terminal P1:2 to terminal P1:4 with the amperemeter.

Connection of humidistat

*) Optional

Name	Component
S1/S2	On-Off / Man-Auto switch
h	Runtime meter *
HS	Humidistat *
A	Amperemeter *
P1	Terminal block 7-pin
E	React. heater
M1	Drive motor, rotor
C	Capacitor
P2	Terminal block 4-pin
P3	Terminal for humidistat
M2	Fan

Electrical components

No	Part	Mark	Type	Quantity	Manufacturer
1	Gear motor 230 V, 50 Hz, 3 rpm	M1	823055BJ	1	Crouzet AB
2	Radial fan, G2E 140-AE77-B9	M2	EK656	1	ZIEHL-ebm AB
3	Capacitor, 2 µF, 400 V	C		1	ZIEHL-ebm AB
4	Toggle switch 2x1-pol. bl/or	S1/S2	255O36	1	Orbitus Ind.komp
5	Amperemeter	A		*	Tälje mätinstrum.
6	Heater, 230 V	E	see page 15	1	Victon Ltd
7	Terminal male 7-pin	P1	sls 5.08/7B sn or	1	Weidmüller AB
8	Terminal, female 7-pin	P1	blz 5.08/7 sn or	1	Weidmüller AB
9	Terminal male 4-pin	P2	sls 5.08/4B sn or	1	Weidmüller AB
10	Terminal female 4-pin	P2	sls 5.08/4 sn or	1	Weidmüller AB
11	Blind panel, 48 x 48	-	11110	1	Tälje mätinstrum.
12	Blind plug, 22,0-25,5 mm	-	P208/4	1	OEM Component
13	Cord, H07RNF/3G1.5/3,5m	H02	2440032	1	OEM Component
14	Runtime meter	h		*	
15	Humidistat plug connection	HS		*	

*) Option