

# INSTRUCTION MANUAL

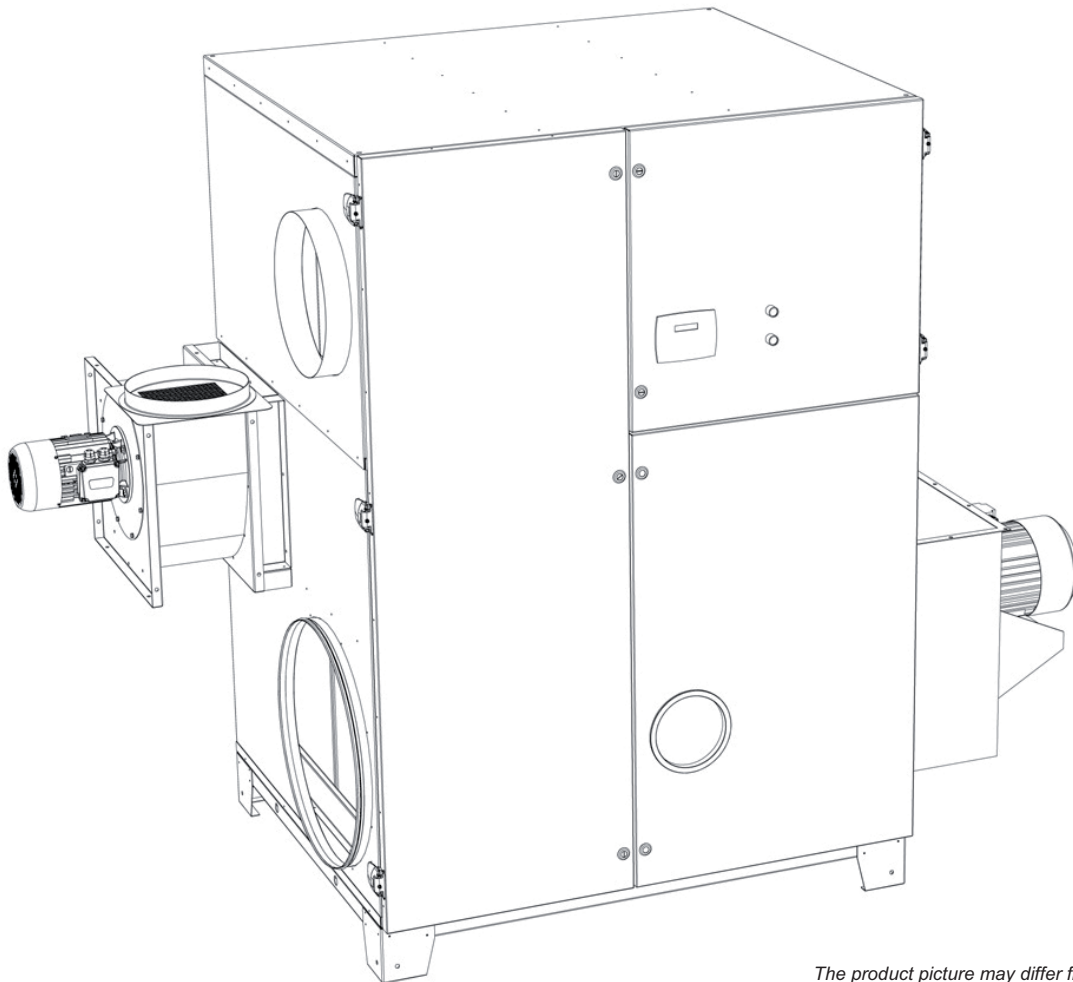


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## Dehumidifier CONSORB CZ-082/102/102L/104



*The product picture may differ from the actual product*





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## Appendix

1. Component list
2. Dimension
3. Energy saving (option)
4. EC Declaration of conformity

Electrical wiring diagram is located inside the electric box (The electric diagram has a drawing number. This number should correspond to the sticker with a drawing number found inside the electric cabinet).

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# 1 SAFETY

## 10.1 AIM OF THIS DOCUMENTATION

This document is included at delivery and is therefore an integral part of the equipment. It describes the machine's design and configuration at the time of delivery.

In the interest of safety, please study this documentation before installing or operating the equipment.

Instructions relating to safety, handling, operation and maintenance are to be followed.

Non-compliance can result in serious personal injury or damage to the machinery and may invalidate manufacturers' liabilities and warranties.

This documentation includes guidance for:

- Installers
- Operators
- Maintenance staff

Please retain this documentation throughout the lifetime of the equipment.

## 10.2 ACCENTUATIONS IN THE TEXT



**Attention!** This is advice on safety! Identifies potential hazards that may cause injury to personnel.



Actions which must be taken to reduce risk of injury are marked like this.



Additional useful information is labelled like this.

## 10.3 INSPECTION OF GOODS

The equipment was factory tested and inspected before delivery.



**Attention!** Check for transportation damage!



Continue the use of this product only if you assess it as being undamaged and faultless. Any damage must be recorded by the forwarder at time of delivery and reported to the supplier of the equipment at the earliest opportunity.



Please check condition of the equipment carefully for damage upon receipt and after removal of all packaging.

## 10.4 SAFETY

### 10.4.1 GENERAL ADVICE

This equipment conforms to the appropriate European regulations and directives and is designed and manufactured to be safe and reliable in operation.

Continued safety and reliability is entirely dependent on correct handling, installation, operation and maintenance of the equipment supplied.

## 10.5 INTENDED USE

This equipment is specifically designed for atmospheric air drying. It is unsuitable for any other use. For further advice please contact your DST representative.

Unless specifically stated in this manual, the following applications are prohibited:

- Conditioning of gases (other than air).
- Conditioning of air contaminated with chemicals or aggressive elements.
- Conditioning of air containing flammable or explosive elements.
- On rooms or air systems having a potentially explosive atmosphere (Ex-Zones).
- Conditioning of air at elevated pressures.
- Unless the air that enter the unit is properly filtered with at least G4 class.

### 10.5.1 SAFETY ADVICE REGARDING TRANSPORTATION



**Attention!** Heavy equipment being dropped!



Only use tested and certified lifting equipment to offload and position the unit.



If a fork lift is used to move the unit, please ensure the load is evenly balanced.



If lifting the unit on a pallet, ensure the unit is firmly secured to the pallet.



Evacuate and secure the danger area during lifting and positioning of the unit.

### 10.5.2 SAFETY ADVICE - MECHANICAL



**Attention!** Mechanical hazards!



Installation, testing, commissioning preventative and corrective maintenance must be carried out by a qualified person or under supervision of a qualified person. Wherever possible, all mechanical work must be carried out with the electric supply switched off.


A qualified person (mechanical) is defined in this manual as:


- A mechanical technician or engineer qualified to service and maintain air conditioning plant and associated systems.
- Has completed the appropriate health and safety training.
- Has read and is familiar with the contents of this manual.
- Is professionally competent to commission and service this type of equipment.



For your own safety, wear the appropriate personal protective equipment (PPE).


### 10.5.3 SAFETY ADVICE - ELECTRICAL


 **Attention!** This equipment will contain high voltage electrical components!


 Wherever possible, all electrical work must be carried out with the electric supply switched off. It is recommended that electrical isolators are locked in the off position. All electrical work must be carried out by a qualified person or under supervision of a qualified person.


A qualified person (electrical) is defined in this manual as:


- An electrical technician or engineer qualified to service and maintain air conditioning plant.
- Has completed the appropriate health and safety training.
- Has read and is familiar with the contents of this manual.


 For your own safety, wear the appropriate personal protective equipment (PPE).


 **Attention!** If the unit control panel isolation switch is off, the incoming cable terminals may still be live!


 If working on the unit's isolation switch, ensure that electrical power is isolated and locked to prevent accidental resetting.


 **Attention!** Permitted Voltage!

 Check incoming electrical voltage and operating frequency conform to the electrical wiring diagram and the manufacturer's type plate attached to the unit.

 Electrical connection are to be made in accordance with local regulations.

 **Attention!** Loose terminal connections!

 Due to vibration during transportation it is advised that electrical terminals are checked for security and retightened where necessary.


 The following connecting terminals in the electrical control cabinet should be checked periodically and retightened if necessary:


- Connecting terminals in the main isolator switch.
- Connecting terminals in main components of the heater circuits.
- Connecting terminals in main components of the fans circuits.


Periodical as defined in this manual means:

- During installation.
- Two months after commissioning date.
- During annual maintenance.


 **Attention!** Electrical parameters!

 Parameters used in the electrical protection and alarm circuits must not be modified or adjusted. Factory (default) parameters are shown in the electrical wiring diagrams.


 **Attention!** Safety functions!


 The operation of all electric safety devices are to be checked at commissioning and during service/maintenance. Under no circumstances are these devices to be deactivated (e.g. adjustment or bridging).


 **Attention!** Defective electrical components!


 Defective electrical components and defective wiring must be replaced immediately. The equipment must not be operated until the defect has been repaired and the unit has been retested.


### 10.5.4 UNIT RELATED SAFETY ADVICE


 **Attention!** Danger from incorrect installation!


 The air dryer is designed for internal installation. For external use it will require a weatherproof enclosure.


 Do not rinse the unit with water.


 Use of the air dryer in areas having a potentially explosive atmosphere (Ex-area) or treatment of air with potential explosive/flammable components is prohibited.

 The air dryer requires installing on a horizontal plane.


 The air ducts shall be connected load and vibration free.


 **Attention!** As standard, the air dryer is equipped with electrical resistive heater elements (regeneration air heater).


 For normal shut down, switch off the unit using the OFF-button. If switching the unit off in an EMERGENCY, the main isolator switch or emergency stop button may be used. However, residual heat from the heater elements will remain in the unit and this can result in damage to components close to the heater and release of the safety thermostat TH1.

 For maintenance purposes shut down the unit using the OFF button and allow the system to cool down before attempting to access internal components.


 **Attention!** Automatic restart after power failure! (Option)


 If the automatic restart function was selected (option), to prevent unintentional restart, ensure that the main isolator switch is off and power isolated before servicing internal components.


 Advise all operating & maintenance personnel regarding automatic restart function if applicable.


 Do not remove the warning notice on the machine which alerts personnel to the dangers of an automatic restart function.


 **Attention!** Condensate in wet air outlet duct.


 Due to concentrated water content in the wet air outlet duct, incidental condensate may flow back into the machine and damage the equipment. To prevent this, install the wet air outlet duct at a slight gradient. If the duct needs to be installed at high level, fix a condensate drain at the lowest point of the duct.

 Wet air ductwork must be insulated to prevent condensate.

 Ensure that the condensate drain does not create an ice hazard in winter.

 **Attention!** Equipment fans can produce noise levels above 80 dB (A) depending on ductwork connection used.

 Use ear protection, if remaining close to an operating machine for any length of time.

 Pay attention to accessibility requirements for maintenance and service purposes.



## 10.5.5 HAZARDOUS OPERATING CONDITIONS

Operation of the system is deemed to be hazardous, if:

- Is not operated inside or is not protected within a weatherproof enclosure.
- Is not operated within the permitted operating parameters (see technical specifications).
- Is operated outside the scope of 'normal' use (see intended use).

## 10.5.6 RESPONSIBILITIES OF THE OPERATOR

It is the responsibility of the operator of the system to ensure that all personnel engaged with installation, operation, maintenance and service of the equipment have read and understand the relevant sections of this manual.

## 10.5.7 MINIMISING HAZARDS

To ensure risk to personnel is minimised:

- Ensure that all activities relating to this equipment are carried out by qualified and authorised staff only.
- Identify and prevent potential safety hazards in the environment.

Failure-free Operation

- To ensure a failure-free operation, please make the following arrangements:
- Keep this manual ready to hand with the unit.
- Use the machine as intended only.
- Only use the machine if it is fully functional.
- Check the condition of the machine before using.
- Check the machine on operational efficiency at regular intervals.
- Carry out maintenance and testing at the prescribed intervals.

## 10.6 DISPOSAL/RECYCLING



When unit is no longer in use and taking out of service - dismantle the unit and recycle the components according to the local regulations. Contact your DST representative for any questions.

# 2 PRINCIPLE OF OPERATION

## 2.1 APPLICATIONS

DST desiccant type dehumidifiers are normally used where dry air is essential to the various manufacturing processes used in chemical, pharmaceutical, food or confectionery industries, or where a dry environment is required for storing and handling of moisture sensitive products and raw materials.

The well proven air drying technology using the adsorption principle provides great flexibility in solving humidity problems. It offers the user independent humidity control, down to dewpoints far lower than the effective operating range of refrigeration dehumidifiers.

## 2.2 DESIGN

The standard dehumidifiers are made as complete units including rotor, fans, rotor motor and rotor drive transmission, heater for the regeneration, controls and electrical equipment.

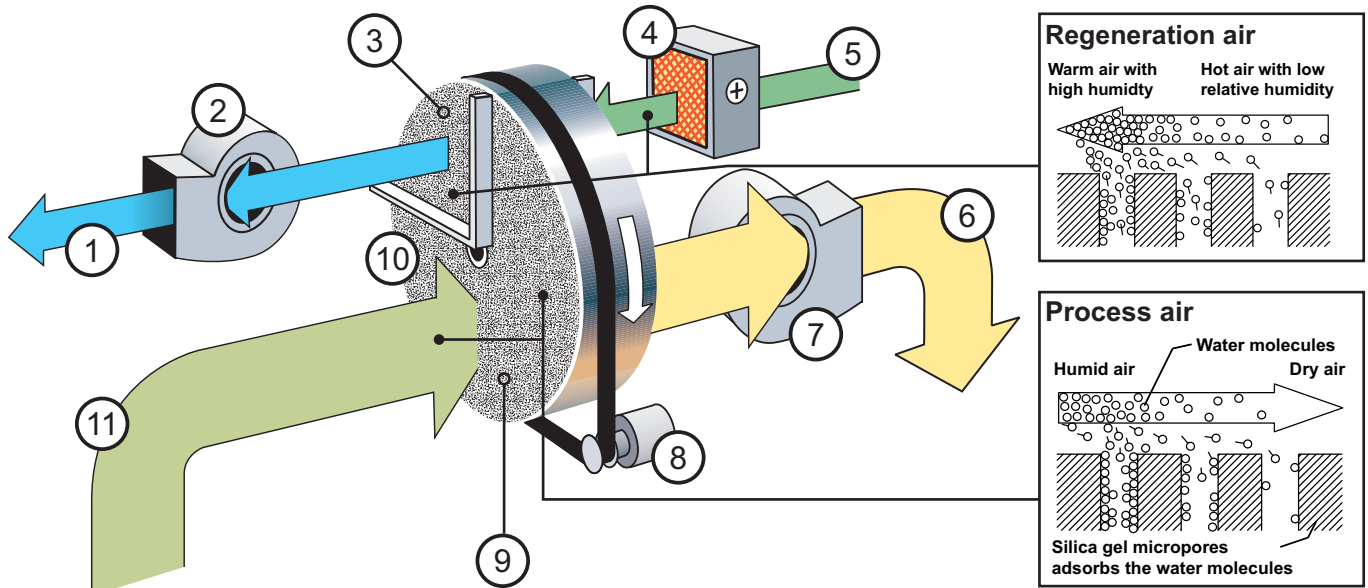
The water vapour is effectively adsorbed from the treated air in the SSCR silica gel rotor.

The regeneration heater is normally electric, but steam and hot water-heater are available as option.

## 2.3 PRINCIPLE OF OPERATION

It works on a continuous process with two air streams of different flow rates, normally having a flow ratio of approximately 4:1. The greater flow, *process air*, is dried as it passes through the dehumidifier, while the smaller flow, *regeneration air*, is used to heat the rotor material to evaporate the adsorbed moisture vapour from the desiccant. The moisture which is removed from the process air, is transferred over to the other sector as the SSCR rotor turns slowly.

FIGURE 1: Principle of operation & rotor



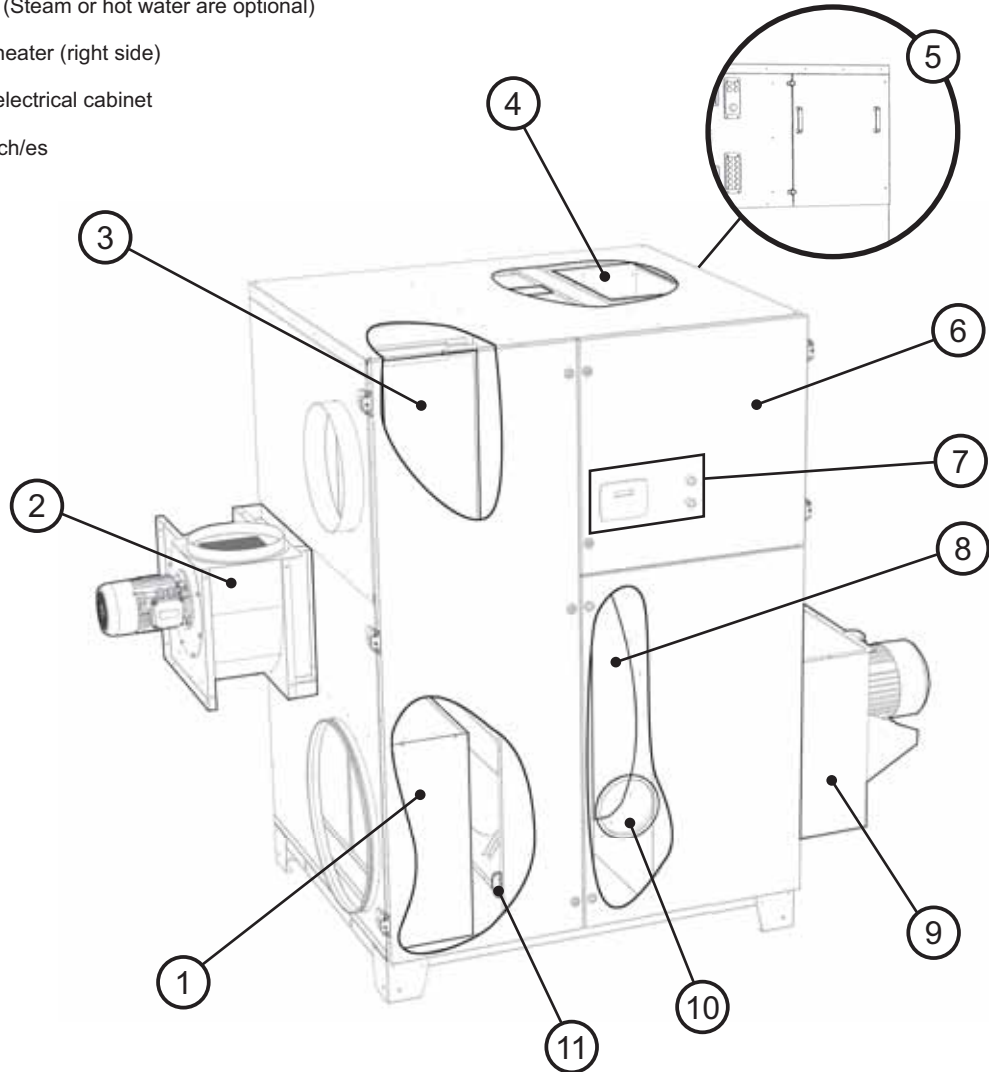
1. Wet air outlet
2. Regeneration air fan
3. Regeneration sector (25%)
4. Regeneration heater
5. Regeneration air in
6. Dry air outlet
7. Process air fan
8. Rotor motor
9. Process sector (75%)
10. Rotor
11. Process air inlet

**CONSORB** is a continuous dehumidifier able to reach very low dew points. The rotor is divided by seals into two separate air sectors, process and regeneration. The process air is dried by adsorption in the process sector, which is 75% of the rotor. The regeneration air is first heated by the regeneration heater before it flows into the regeneration sector where it evaporates the adsorbed moisture vapour and drives it out of the rotor.

# 3 PRODUCT DESCRIPTION

## 3.1 PRODUCT OVERVIEW

1. Process filters
2. Regeneration fan
3. Regeneration filter
4. Electrical reg. heater (Steam or hot water are optional)
5. Access panel to the heater (right side)
6. Access panel to the electrical cabinet
7. PLC and control switch/es
8. Rotor
9. Process fan
10. Inspection window
11. Rotor motor



## 3.2 COMPONENTS DESCRIPTIONS

### 3.2.1 ROTOR

The heart of a DST dehumidifier is the very efficient patented SSCR silica gel rotor. The rotor matrix is manufactured from alternate layers of flat and corrugated sheets of silica gel and metal silicates, chemically bonded into a tissue of inorganic fibres. It is made to form a vast number of axial air channels running parallel through the structure. The large internal surface area combined with the special micro structure of the SSCR silica gel material, ensures maximum contact area to give the rotor an extremely high capacity for adsorbing water vapour.

*Section of a dehumidifier rotor from Seibu Giken. The high number of channels means that moisture is adsorbed with extra efficiency!*



FIGURE 2: Rotor

### 3.2.2 ROTOR MOTOR

The rotor is driven by a single phase rotor motor with a synchronous transmission belt. A belt adjustment rack prevents the belt from slipping and overloading the rotor motor.



FIGURE 3: E.g.\* Rotor motor and belt adjustment rack

### 3.2.3 FILTER

The air filters is available in both F7 and G4 in bag filter or panel filter .

Inlet	Filter type
Regeneration air in*	F7/G4
Process air in*	F7/G4

See "10 Technical data" for more information.

### 3.2.4 FAN

The process air fan and the regeneration air fan is single inlet centrifugal fans, directly driven by three-phase AC motors.

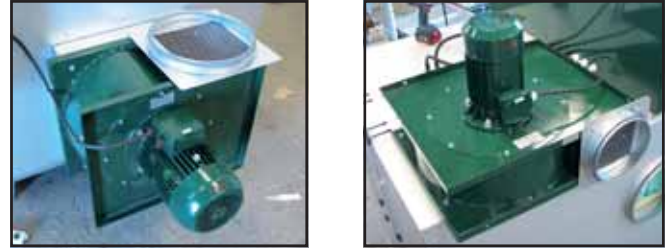


FIGURE 4: E.g.\* Standard process and regeneration fan

### 3.2.5 REACTIVATION HEATER AND COOLER

The standard regeneration heater is a resistive electric heater. Other heaters are available.

See "10 Technical data" for more information.

### 3.2.6 ELECTRICAL BOX DESIGN

The PLC control panel is located at the front of the electrical panel. The electric cabinet houses multiple electronic devices and control units, such as contactors, fuses, motor protectors, relays, transformer. They are attached to DIN-rails. In addition, all possible external connections are to be connected to one of the fixed rails.

### 3.2.7 OVERHEAT PROTECTIONS AND THERMOSTAT

TH2 and TH3 are electronic temperature transmitters. TH2, thermostat, regulates the heater temperature and TH3, overheat protector, stops the unit if the wet air temperature is too high. There is no reset button for TH3, the reset is performed through the PLC.

TH1 is a mechanical overheat protector and works the same as TH3. The reset button and adjustment are made on the thermostat.

**Note:** If TH1 or TH3 has triggered, the unit will stop and start cooling process for a pre-set time.

**Note:** When TH1 is triggered, the overheat protector automatically triggers the regeneration heater fuses as well.

See "10 Technical data" for default settings.

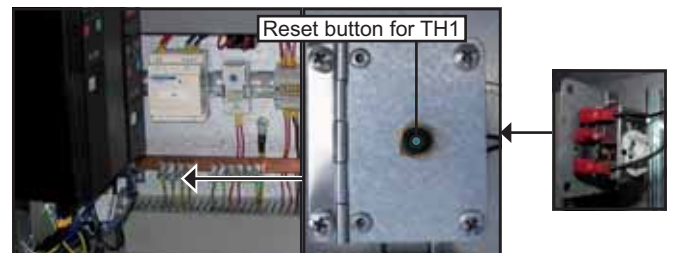


FIGURE 5: E.g. TH1\*



*Unit with reactivation coils (gas, hot water or steam) is not equipped with TH1.*

\* Pictures are used as a reference only. Components and installation setup may differ from delivered product.

### 3.2.8 PRESSURE NOZZLES

Pressure nozzles can be used to control or monitor airflows, using gauges or pressure sensitive devices. The air nozzles are marked on the unit.



FIGURE 6: Pressure nozzles

## 3.3 DESCRIPTION OF OPTIONAL COMPONENTS

### 3.3.1 FREEZE PROTECTION DEVICE

Monitors the return water temperature from the coil and sound an alarm to the PLC.

The device will open and close the dampers at the regeneration air in and wet air out and sound an alarm if the temperature of the return water is below a certain temperature.

The device is optional and located on batteries. The freeze protection sensor do not come installed and needs to be installed once the unit is in position.

The alarm temperature can be changed via a potentiometer, which is located in the cabinet. This is not recommended, consult your DST representative for more information.

See electrical diagram for more information on the devices.

See "10 Technical data" for temperature setting.

### 3.3.2 FILTER GUARDS

Electronic filter guard for process air filter. The device is connected to the PLC, which displays a message if the filter needs to change.

If the differential pressure increases beyond the recommended value, the filter needs to be replaced as soon as possible. See "10 Technical data" for recommended pressure.



FIGURE 7: E.g. Differential U-tube manometers setup

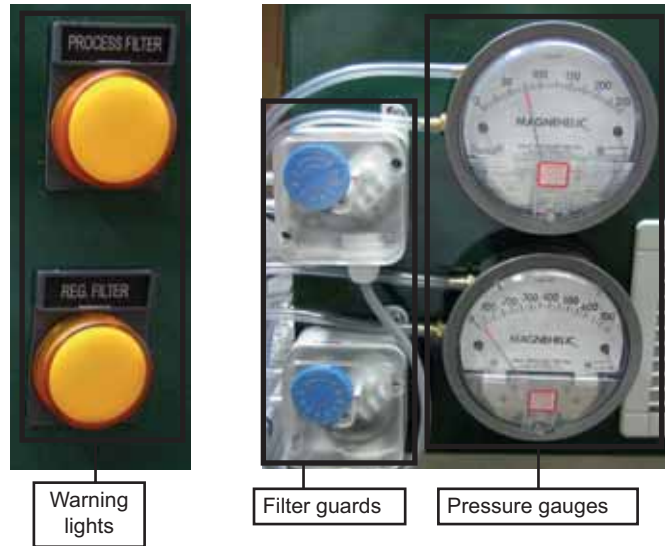


FIGURE 8: E.g. Electronic filter guard with warnings lights combined with pressure gauges



To change the pressure setting, remove the cover by loosening the two screws. Rotate the blue wheel to alter the setting according to specified need.

FIGURE 9: Filter guard is installed inside the electrical cabinet

### 3.3.3 CONTROL OF THE REACTIVATION HEATER

There are two optional ways to control the heater capacity; 1) binary control, 2) linearly control. Both of the controls are a part of the energy saving method.

The binary heating system is a step-based heater control. The heater will, by binary, increase the heater step by step depending on the set-points from the humidity sensor or other desired settings. The heater capacity is controlled by a 0-10Vdc signal from an external regulator or a humidity controller EH3.

This option includes a rotation guard for the rotor.

For accurate control of the heating effect, the heater can be controlled linearly by adjusting the heating effect stepless. The effect is controlled by a thyristor, which is mounted inside the electric cabinet. The thyristor receives its analogue input signal of 0-10vdc from an external regulator or a humidity controller EH3.

The device pulses out power to the regeneration heater in order to control the heater. The length of the pulses varies depending on the analogue input signal (0-10vdc). The higher the analogue signal = the longer it pulses, which in turn produces a higher heater output. If the analogue signal is low = the shorter it pulses, which in turn produces a lower heater output.

See "3 Product description" for more details on energy efficiency.

See "3 Product description" for details on rotation guard device.

See "10 Technical data" for binary heating steps.



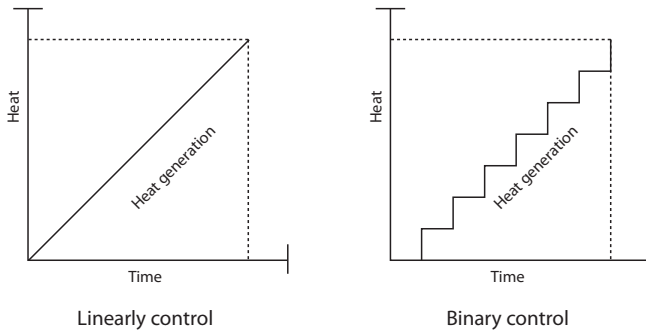


FIGURE 10: Reactivation heater control

### 3.3.4 AUTOMATIC RESTART

Automatic restart after power failure. Also equipped with a emergency stop button and labelled with a warning sign.



FIGURE 11: Sticker

### 3.3.5 EMERGENCY STOP BUTTON

Press the emergency stop button to halt the machine immediately in case of emergency. Always installed on the front electrical panel when the unit is equipped with automatic restart.

### 3.3.6 ROTATION GUARD

Monitors the rotor rotation. If the rotor stops spinning, the unit will stop and display an alarm on the PLC.

### 3.3.7 ADJUSTABLE ROTOR SPEED

Stepless setting of the rotor speed. Manually controlled from the PLC or a control box with a built-in potentiometer.

### 3.3.8 FREQUENCY CONVERTER TO FANS

The frequency converter is used to set the desired airflow without dampers and reduce start-up current.

See electrical diagram for more information and location of the frequency converter.

### 3.3.9 INSULATION

19mm (foamed rubber) insulation can be added along the inside of the process and reg. air compartment to prevent possible condensation on the outside surface of the unit.

### 3.3.10 REACTIVATION HEATER COILS

Optional heating other than electrical heating are available, such as hot water and steam coils.

For units with steam or hot water, only the battery is included. The necessary fittings (shut-off valves, condensate separator, valves), must be installed on-site.

### 3.3.11 ICE-FAN

If an increased air flow is needed, the entire series can be fitted with a powerful ICE-fan (replacing the standard process fan) and frequency converters.

### 3.3.12 ENERGY SAVING

To save energy, the unit can be fitted with 3 different "Energy saving versions".

**Energy saving 1:** The dehumidifier is controlled by 1- or 2-step humidistats. E.g. an electric-mechanical HMM, or the controllers EH3 or EH4.

**Energy saving 2:** Controls the heater for units with electric heater. Can be linear, via a thyristor, or binary. The dehumidifier is controlled by an external regulator signal 0-10vdc, e.g. from a electronic controller EH3.

**Energy saving 3:** Controls the regeneration airflow and thereby the steam consumption for units with steam heater. The dehumidification capacity is controlled from around 15% up to full capacity. The dehumidifier is controlled by a regulator signal 0-10vdc, e.g. from a electronic controller EH3.

See appendix on energy saving.

# 4 INSTALLATION

## 4.1 UNIT INSTALLATION

Follow the direction regarding installation of heavy and medium heavy dehumidifiers.

**Note:** Use the installation guidelines as a reference only.

### 4.1.1 LIFTING

The unit can be off-loaded and positioned using a fork lift by lifting between the feet of the unit, alt. on some dehumidifiers, lift the unit by the built-in handles.

- The forks must be of sufficient length to be in contact with both sides of the base frame.
- The forks should be initially positioned centrally across the middle sections of the unit but must be checked for balance prior to final lifting.
- The unit with handles is very heavy (!). At least two persons are needed to lift the unit without forklift.

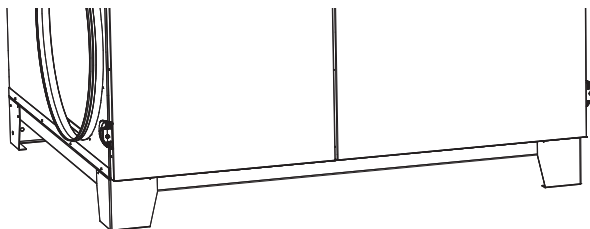


FIGURE 12: Base of the unit

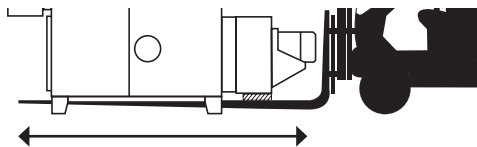


FIGURE 13: Forks with sufficient length

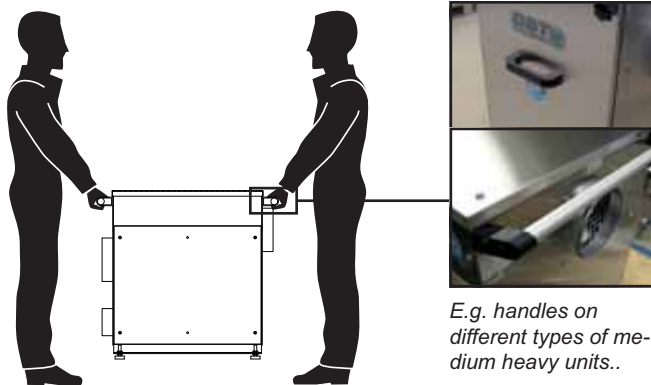


FIGURE 14: At least two persons are needed to lift the unit, if equipped with handles.

### 4.1.2 TRANSPORT

Due to risk of tipping over, use caution when lifting & moving dehumidifiers with external fans or with high centre of mass, .

**Note:**

- If necessary, use support beams during movement.

- Secure any panels, doors or loose equipment.
- Keep the unit balanced at all time when moving the unit.
- See safety chapter regarding lifting safety

*Units with external fans or high centre of mass may run the risk of tipping over during transport.*

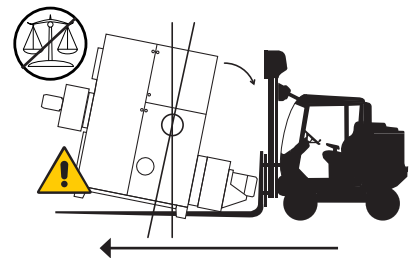


FIGURE 15: Risk of tipping over.

*During movement, balance the unit with support beams or similar if necessary. Otherwise use caution during transport.*

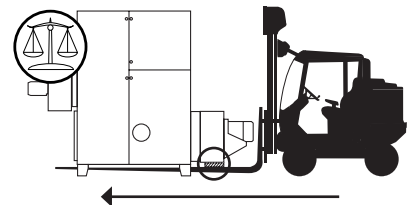


FIGURE 16: E.g. Moving the unit with support object.

See "10 Technical data" for weight information.

### 4.1.3 POSITIONING

Position the machine with adequate working space around the unit to allow inspection and service. Size of unit and the position of the access panels/doors varies depending on the series. Follow the below recommendation to avoid misplacement.

- Adequate space must be left clear in front and/or rear of the unit to allow access doors/panels to be opened and removal of rotor.
- The free floor area in front of the inspection doors should be as wide as the unit.
- See dimension for measurement, working space and foot bolt-hole dimensions.

### 4.1.4 SECURING THE UNIT

To allow securing of the dehumidifier to the floor or to a pedestal, four brackets with pre-drilled bolt-holes are included with the unit.

At the delivery these are fixed onto the pallets to secure the unit during transportation. Do not discard the foot brackets (!) Remove and reuse them if necessary.

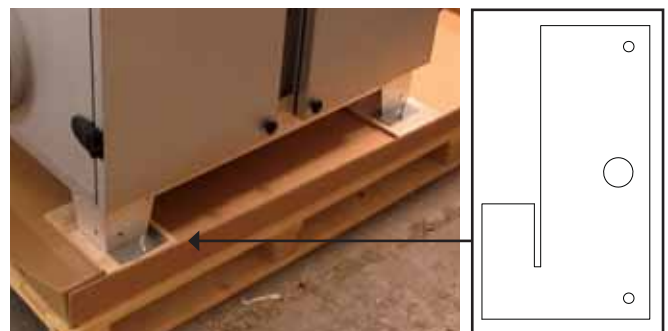


FIGURE 17: Foot brackets fixed on a pallet during transport

## 4.2 GENERAL DUCT WORK INSTALLATION

The intended area to be dehumidified may vary significantly in terms of size of the facility, the amount infiltration and other conditions. Use the recommendations below as a general guideline only. Consult your DST representative or local mechanical installation company for more information.

The guidelines are to assist the installers and operators to adjust the duct/dehumidifier installation and to maximize performance. Please follow the recommendations in order achieve maximum performance.

- To avoid recirculation, direct wet air out (3) away from the regeneration air in (4) of the unit. Same goes for process air in (1) and the dry air out (7).
- Check if the dry air (7) is well distributed in the dehumidified area.
- Adjust any dampers on process air in (1 & 2 ) and/or regeneration air in (4) according to the desired airflows and dehumidification need.
- Process air in (1 & 2) is taken from indoor area or ambient depending on the amount of infiltration. Installing an intersection piece with damper (8) will enable the unit to use air, simultaneous or separately, from indoor and ambient.
- The regeneration air in (4) and wet air out (3) has to be connected to outside.
- The position of the dampers (5, 8 & 6) may differ on-site.
- Use the installation principle as reference only. The position of the fan and in/outlets may vary.

### 4.2.1 INSTALLATION SETUP INSIDE A ROOM

When the unit is installed in the same room as the intended dehumidification area, use damper (5) to adjust the capacity.

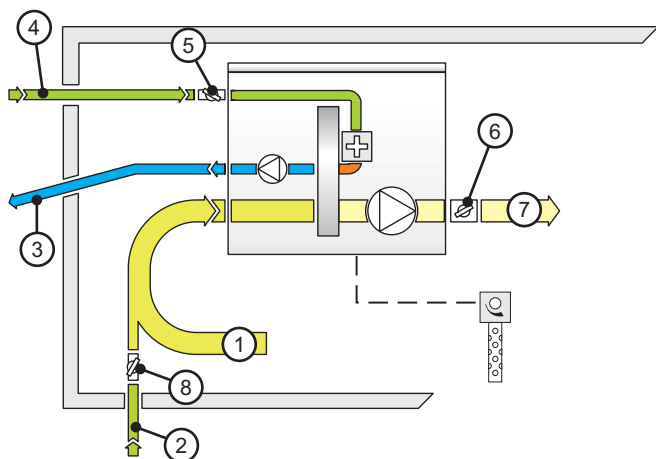


FIGURE 18: Dehumidifier placed inside a room

- |                             |  |                              |
|-----------------------------|--|------------------------------|
| 1. Process air in (indoor)  |  | Fan (blowing left)           |
| 2. Process air in (ambient) |  | Fan (blowing right)          |
| 3. Wet air out              |  | Humidity sensor / humidistat |
| 4. Regeneration air in      |  | Heater                       |
| 5. Regeneration air damper  |  | Damper                       |
| 6. Dry air damper           |  |                              |
| 7. Dry air out              |  |                              |
| 8. Process air damper       |  |                              |

### 4.2.2 INSTALLATION SETUP OUTSIDE A ROOM

If installed outside of the dehumidified room (in a separate room, e.g. plant room), the dehumidifier must be connected to the room via ducts with the process air in (1) and the dry air out (7).

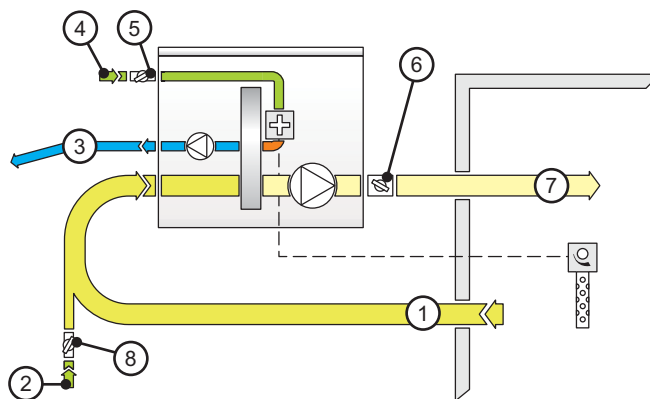


FIGURE 19: Dehumidifier placed outside the room

### 4.2.3 INFILTRATION

If necessary, use the damper on process air in (2) to create a overpressure in order to counteract the infiltration.

- An area with no or very little infiltration, does not require an additional ambient air. Doing so may cause an unnecessary overpressure and decreased performance.
- The area needs to be properly sealed in order to the minimize moisture load inside the dehumidified space.
- A room with high infiltration rate should have some ambient air into the room. Depending on the amount of infiltration, adjust the damper (8) on the process air in to create a sufficient mixture.

### 4.2.4 FRESH AIR DEHUMIDIFICATION

It is recommended to take the process air intake (1) and regeneration air in (4) from outside if:

- 1) The intended dehumidification area is polluted with harmful substances and other particles
- 2) It is not possible to use the return air from indoor by any other reasons.

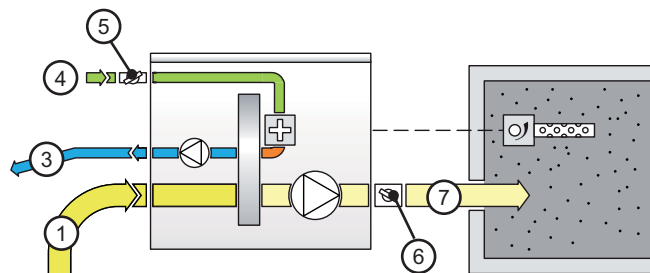


FIGURE 20: Return air taken from outside

### 4.2.5 WET AIR OUT

Additional installation remark regarding wet air out (3):

- It is recommended to insulate the wet air duct and have it installed at a sloping outwards angle, due to risk of condensation inside the ductwork. The setup will also prevent the condensate to flow back into the dehumidifier.
- If the duct must be installed higher than the outlet, a small drain hole is to be made for discharge of condensate at the lowest point in the ductwork.



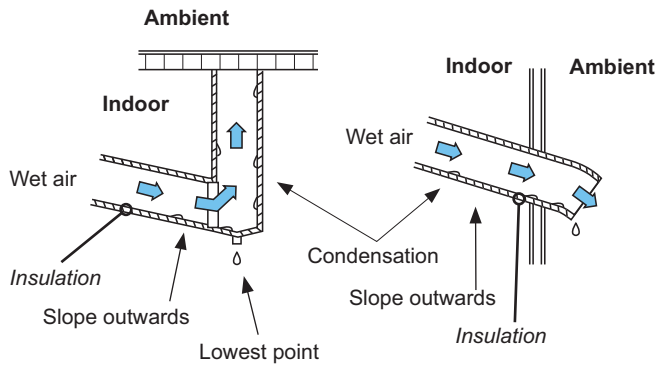


FIGURE 21: Installation of wet air out duct

### 4.2.6 REGENERATION AIR IN & WET AIR OUT

Installation remarks regarding regeneration air in (4):

- Avoid recirculation together with wet air out (3).
- The intake of regeneration air in (4) should be placed lower than the wet air out (3).
- Allow the wet air to disperse freely when exiting the duct.
- Avoid to forward the wet air against the back pressure of another air fan inside a duct. Chances are, the wet air will be rerouted to somewhere else than ambient.
- To increase the lifetime of the filter, it is recommended to intake regeneration air (4) from higher level where dust and other particles are kept at minimum.

### 4.2.7 PROCESS AIR IN & DRY AIR OUT

Installation remarks regarding process air in (1):

- Avoid recirculation together with regeneration air in (4).
- Install dry air out (7) duct/channel on a high level.
- To increase the lifetime of the filter, it is recommended to intake air from higher level where dust and other particles are kept at minimum.
- For potential infiltration, use the process air damper (8) to create a sufficient overpressure inside the room.
- If a certain dew point is desired, use dry air damper (6) to adjust the dry air flow.
- To maximize an absolute drying capacity of the system (in H<sub>2</sub>O kg/hour), the amount of the dry air has to be brought on the maximum value (free dry air outlet without reduction).

## 4.3 CONNECTING THE STEAM COIL

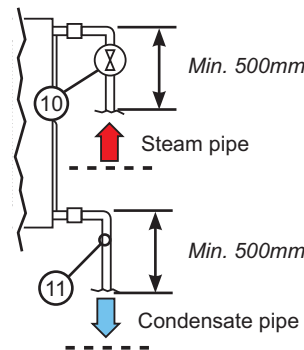
Follow the recommended steam coil and pipe installation, as well as the mandatory installation. Failure to do so, may damage the steam coil.

### Component description

1. Automatic air vent (vacuum valve Spirax sarco, type VB or equal)
2. Safety valve Type SC or equal
3. Pressure gauge
4. Motor valve on/off. Closed when the dehumidifier is not in operation. Type KE or equal
5. Separator
6. Filter. Type Fig or equal
7. Stop valve. Type BSA (mushroom valve alt. M10S (ball valve)

8. Condensate trap, ball float type, spirax sarco, type FT or equal
9. Non-return valve DCV (flange), LCV (thread) or equal
10. Control valve + actuator (optional)
11. Freezing protection device (optional)

### Mandatory component installation & setup on DST's steam coil



**!** During installation, the installers "MUST" configure the steam pipe and condensate pipe with vertical slope of >500mm to prevent condensate water flowing into the coil.

FIGURE 22: Steam coil installation

### DST's recommended pipe installation for external contractor

To ensure failure-free operation, DST recommends the external steam supply connection and setup as followed. Failure to follow the recommendation, DST will not be held accountable for any hardware damage that might occur.

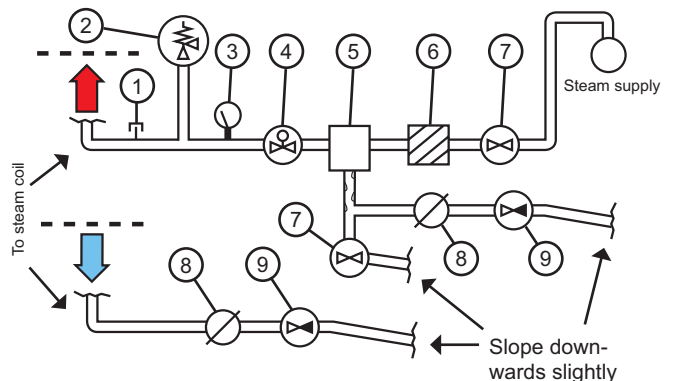


FIGURE 23: Recommended pipe installation



#### General information

- Maximum working pressure: 10 Bar
- Maximum temperature: 185°C
- Steam quality of 8-9 pH and oxygen free
- If the entering steam is <7°C, equip the steam coil with a freeze protection device.
- Test pressure: 13 Bar



Check and retighten the copper threaded pipes that are connected to the steam coil before start-up!

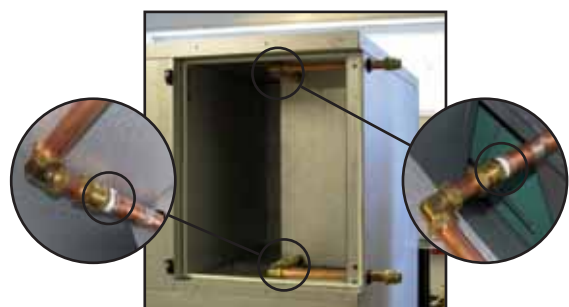


FIGURE 24: Retighten the steam coil connection

## 4.4 CONNECTING THE HOT WATER COIL

Connect the supply pipe to the inlet pipe towards the exiting air flow of the coil, and the return pipe to the outlet pipe towards the entering air flow. The unit is labelled for guidance. See illustration.

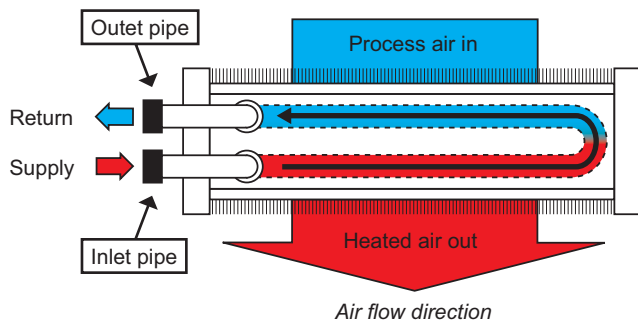


FIGURE 25: Hot water coil

## 4.5 CONNECTING THE COLD WATER COIL

Installation procedure for cold water coil is the same as the hot water coil installation. Supply connection on inlet pipe and return connection on outlet pipe.

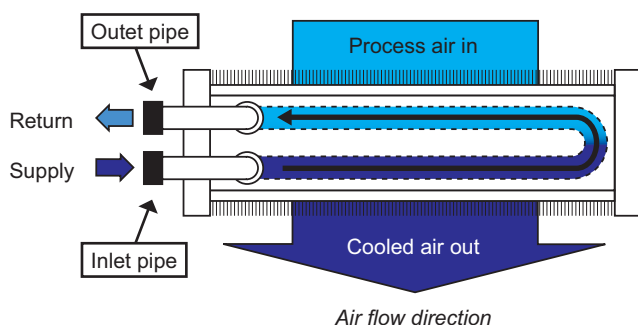


FIGURE 26: Cold water coil (Pre- or post-cooler)

## 4.6 HUMIDISTAT/HUMIDITY SENSOR INSTALLATION

Do not install the humidistat/humidity sensor too close to the dry air flow. It might pick up false readings from the dry air flow and thus shut down the dehumidifier prematurely.

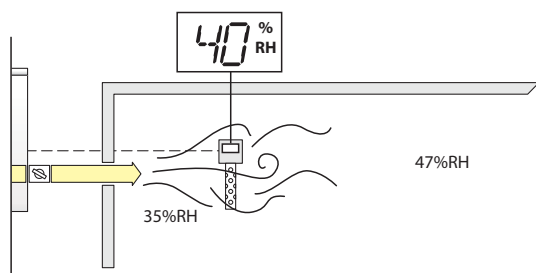


FIGURE 27: Humidistat positioning

## 4.7 ELECTRICAL CONNECTION

### 4.7.1 POWER SUPPLY

The incoming three-phase cable with L1, L2, L3 are to be directly connected to the main switch and PE-cable connected to the earthing bar.

The electrical feed must be provided on-site in accordance with the electrical diagram and local requirements.

See electrical diagram for a detailed layout and description.

### 4.7.2 HUMIDISTAT CONNECTIONS

The dehumidifier has a connection for a 1-step or 2-step humidistat.

See electrical diagram for connections.

See "7 Functionality & mode" for more details.

### 4.7.3 ELECTRONIC CONTROLLER / EXTERNAL REGULATOR

Units with optional connections points for electronic controller (EH3 or other external regulator) are marked on the electrical diagram.

Selecting a electronic controller, EH3, the dehumidification process, can be controlled binary or linearly.

See "7 Functionality & mode" for more details.

See electrical diagram for connections.

### 4.7.4 REMOTE CONTROL

The unit has a connection point for a remote switch.

See electrical diagram for connections details.

See "7 Functionality & mode" for more details.

### 4.7.5 POTENTIAL-FREE SIGNALS

Potential free contacts are marked on the electrical diagram to connect external indicators. These indicators are used to transmit signals to a remote centre, to indicate if unit/devices are still in operation.

#### Standard indicator

- Alarm indicator
- Run indicator
- Reg. fan indicator
- Process fan indicator

#### Optional indicators

- Filter guard (reg) indicator
- Filter guard (process) indicator
- MAN/AUTO indicator

Each indicator, standard or optional, are marked on the electrical diagram to indicate whether it is a normally closed or a normally opened circuit.

# 5 OPERATION CHECK & ADJUSTMENT

## 5.1 PRE-OPERATION CHECK



*The operator of the system has to assure, that all people, which are involved with installation, operation and maintenance or repairation of the machine, read the "1 Safety" parts of the manual.*

1. Inspect and clean the inside of the unit from foreign objects such as rags, tools, particles of metal, and such, that may pose damage to the inside of the unit.
2. If any, ensure that both air balance dampers are open and check that the air paths of the ductwork are not obstructed in any way.
3. Check that the filters are securely in place.
4. Check and retighten the copper threaded pipes that are connected to the steam coil! See "4 Installation" for more details regarding steam coil setup.
5. Check if the motor protector/fuses has been triggered and the setting on the thermostat and overheat protections are set correctly as shown in "10 Technical Data."
6. Inspect the wiring of incoming cable.
7. Check that the rating of the electrical supply fuses is correct, see wiring diagram.

## 5.2 START-UP TEST AND ADJUSTMENT

1. Close and secure all access doors
2. Switch the main switch to "I" and check for incoming current.
3. Briefly start the unit and then turn it off. Promptly check if the process fan is rotating in the correct direction. If incorrect check "6 Troubleshooting".

See "6 Operating" on "Start" and "Stop".

4. If any, balance the airflows, using the dampers in the ductwork (Use the dampers in the air duct to balance the airflow according to your need) or adjust the frequency of each frequency converter

For maximum dehumidifying both dampers should be open. If a greater reduction in moisture content is needed the process air damper should be throttled. If the wet air outlet gets very hot (more than 60°C) the regeneration damper should be throttled to nominal airflow or/and a heater step can be switched off.

5. Check the operation of fault alarms by temporarily reducing the set points of alarm giving thermostats and motor protectors. Do not forget to reset to the original settings according to component list.
6. Measure the current on both fans and compare the electrical specifications printed on the fans. If the current is too high, adjust and decrease the airflow.
7. If remote control is installed - Check remote control operation.

# 6 OPERATING

## 6.1 KEYS

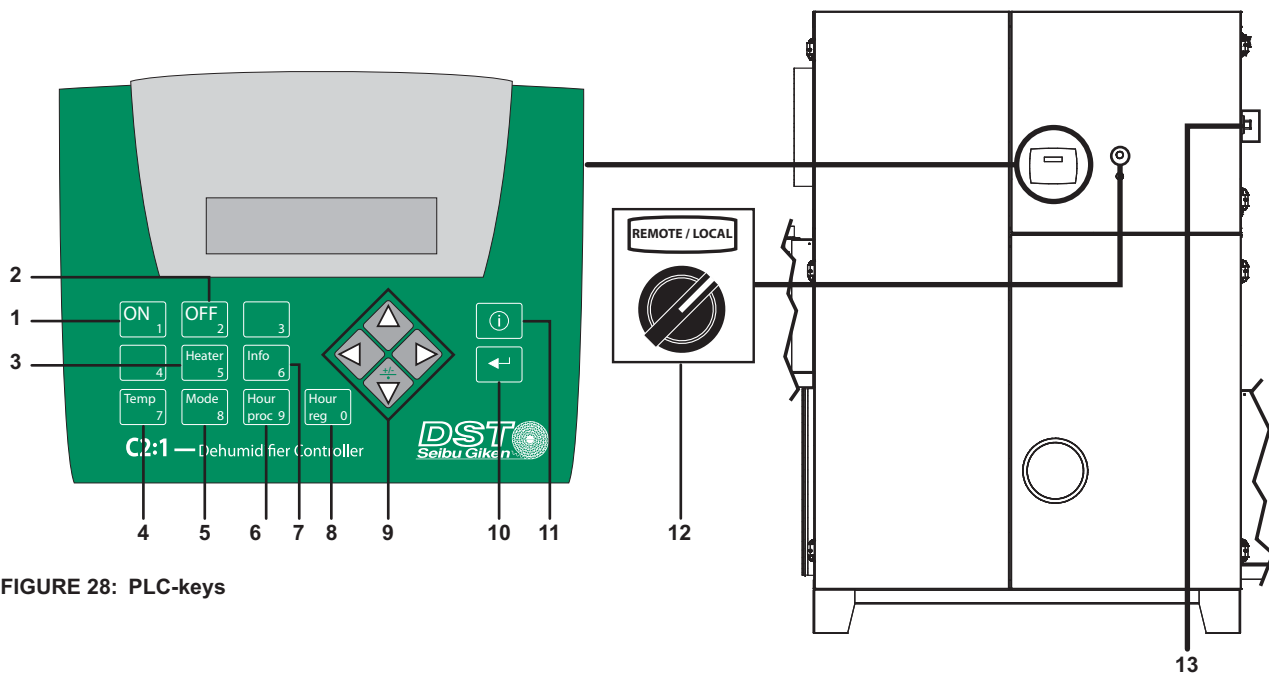


FIGURE 28: PLC-keys

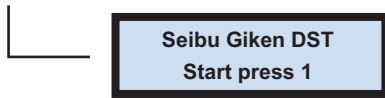
1.	[ON / 1] - Start	9.	<b>Navigation keys</b> [▲] - Present value, software version and browse up [▼] - Set points and browse down [▶] - Browse right [◀] - Browse left
2.	[OFF / 2] - Stop	10.	[-] - Select choice, confirm choice
3.	[Heater / 5] - Selecting the active heater steps for electric heater.	11.	[i] - Display firmware information
4.	[Temp / 7] - Temperature setting for TH2 and TH3	12.	[Local / Remote] - Enable or disable the humidistat/ external regulator control
5.	[Mode / 8] - Select different mode (AUTO-OFF or AUTO VENT)	13.	[I/O] - Electric Main switch
6.	[Hour-proc / 9] - Run time for process fan		
7.	[Info / 6] - Function description/Back		
8.	[Hour-reg / 0] - Total run time for regeneration heaters		

## 6.2 START

The unit will initiate starting sequence by activating the process fan, rotor motor, reg. fan and heaters.

- The start-up will last for 15 seconds.

- The ventilation mode can only be set when the unit is in standby-mode and when the PLC displays:



### OPERATING INSTRUCTION

1. Press **[Mode / 8]** to enter venting mode\*: Select "AUTO-VENT" or "AUTO-OFF" by entering "1" or "0", respectively. Confirm and exit by pressing **[↵]** twice.
2. Select mode\*: "LOCAL" or "REMOTE" on **[Local / Remote]** switch (Use "REMOTE" if a humidistat/external regulator is connected, use "LOCAL" if else).
3. Press **[ON / 1]**. Display shows "Start up" and the unit will initiate starting procedure.

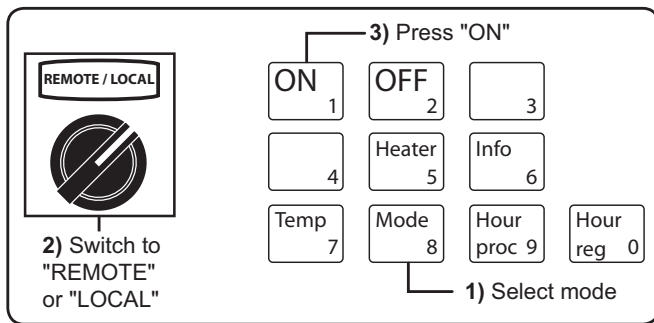


FIGURE 29: Starting the dehumidifier in AUTO/OFF or AUTO/ VENT

## 6.3 STOP

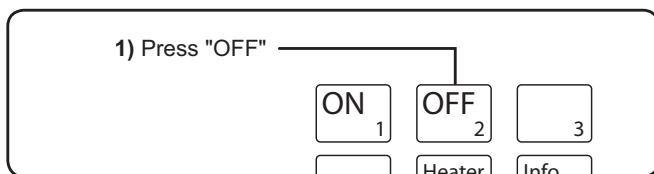
The unit will start to shut down and come to a complete stop.

- During shut down, the regeneration fan and rotor motor will continue to run for a pre-set time as a part of a cooling stage.

- During "REG FAN OFF DELAY", press **[↵]** to exit to standby-mode.

### OPERATING INSTRUCTION

1. Press **[OFF / 2]**



Always stop the unit according to above procedure. Use the "main switch" to shut down the unit in EMERGENCY-case only(!) If doing so, will deactivate the post-cooling procedure and may damage the rotor and the surrounding equipment due to heat build-up. See "1 Unit related safety chapter".

FIGURE 30: Stopping the dehumidifier

## 6.4 RUN TIME - HEATERS

Monitors the total running time for heaters.

- Can only be used during operation (Feature not available if the unit is equipped with hot water or steam heater).

### OPERATING INSTRUCTION

1. Press **[Hour-reg / 0]** once to view run time for heater group 1 , press the same key again to view the rest of the heater groups and to exit the menu.

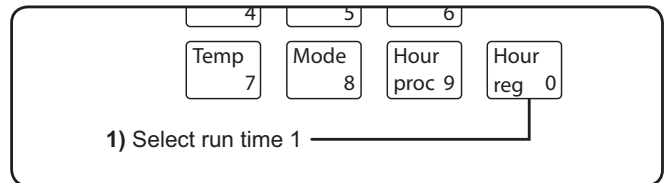


FIGURE 31: Run time for heaters

## 6.5 RUN TIME - PROCESS FAN

Monitors the running time for process fan.

- Can only be used during operation.

### OPERATING INSTRUCTION

1. Press **[Hour-proc / 9]** to display run time for process fan. Press **[Hour-proc / 9]** again to exit.

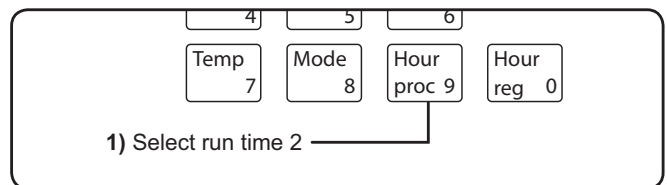


FIGURE 32: Run time for process fan in operation

## 6.6 ADJUSTING TH2 & TH3 SETPOINT

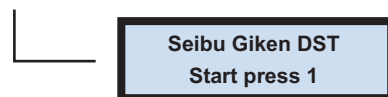
Adjusting the TH2 and TH3 through the PLC.

- The adjustment can only be performed during standby-mode.

- Unit with steam or hot water coil is not equipped with TH1, the menu will only display TH2 and TH3.

- TH1 is a mechanical overheat protector and is located inside the electrical cabinet.

- The setpoint mode can only be set when the unit is in standby-mode and when the PLC displays:



### OPERATING INSTRUCTION

1. Press and hold **[Temp / 7]** until the menu shows up.
2. Enter the password (1919) with the numerical keys and press **[↵]**.
3. Enter TH2 temperature setting by pressing the numerical keys. Press **[↵]** to confirm and **[↵]** again to continue.
4. Enter TH3 temperature setting by pressing the numerical keys. Press **[↵]** to confirm and **[↵]** again to exit.

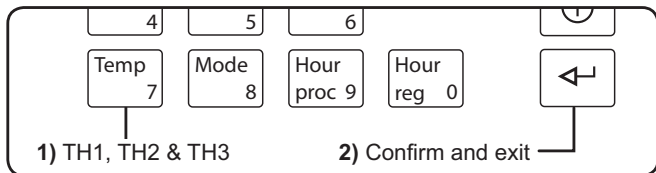


FIGURE 33: TH1, TH2 and TH3



Do not set TH1, TH2 and TH3 temperature setting above the recommended value stated in the technical data. Consult DST-representative before changing the setpoints.

## 6.7 SELECTING ACTIVE HEATER STEPS

Select the number of active heater steps.

- Feature not available if the unit is equipped with hot water or steam heater.

- The adjustment can only be performed in standby-mode.

### OPERATING INSTRUCTION

1. Press **[Heater / 5]** to enter menu.
2. Select the desired heater step by pressing the numerical keys. Press **[↵]** to confirm and **[↵]** again to exit.

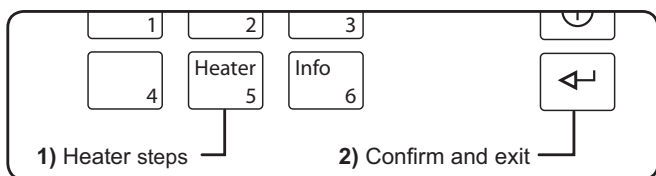


FIGURE 34: Active heater selection

## 6.8 RESET BUTTONS & SWITCHES

Fuses, overheat protections or motor protectors are found inside the electrical cabinet. The position and denotation of the devices may vary depending on the unit and configuration.

Reset the devices when asked by the PLC. See troubleshooting for more information.

See the electrical diagram for correct layout and information of the reset devices.

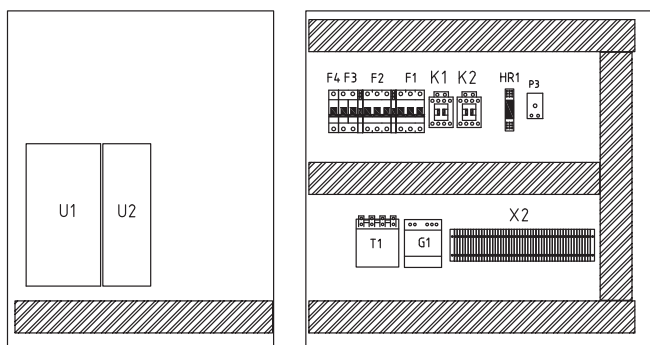


FIGURE 35: Example of a component layout inside an electrical cabinet.

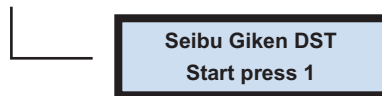


See the electrical diagram for correct layout and information of the reset devices.

## 6.9 RESET THE PLC & RESTART UNIT

Once the error has been corrected, use the PLC to reset itself and restart the unit. If the unit does not start up, check the display for errors and correct it.

- The unit can only start when the PLC displays:



### OPERATING INSTRUCTION

1. Press **[OFF / 2]** to remove the errors on the display.
2. Press **[Mode / 8]** to enter dehumidification mode\*: Select "AUTO/VENT" or "AUTO/OFF" by entering "1" or "0", respectively. Confirm and exit by pressing **[↵]** twice.
3. Select "REMOTE" or "LOCAL" on **[Local / Remote]** switch.
4. Press **[ON / 1]**. Display shows "Start up" and the unit will initiate starting procedure.

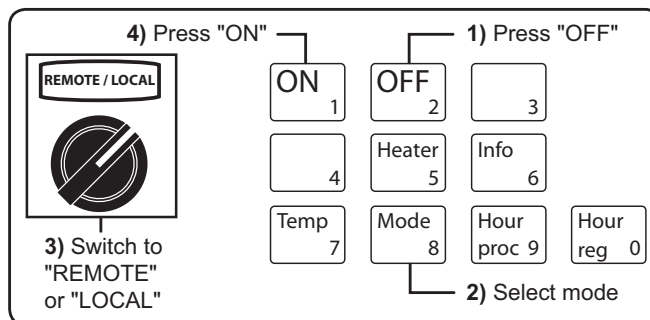
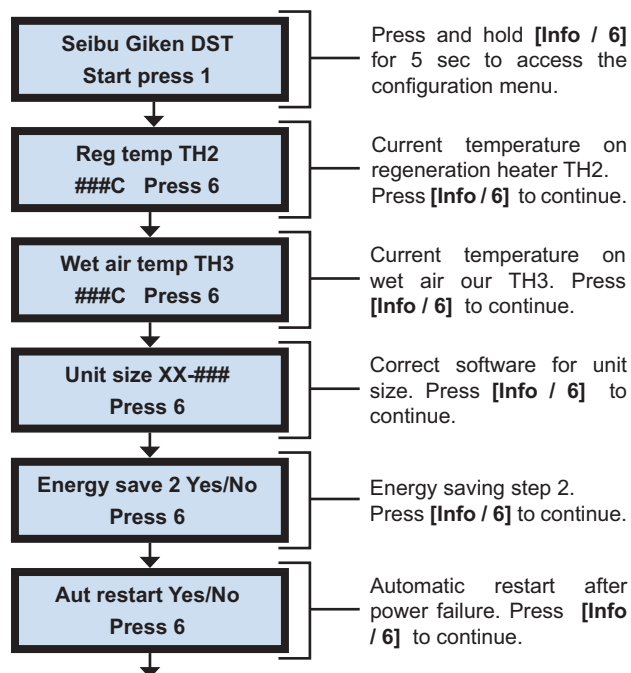


FIGURE 36: Reset PLC and restart the unit

## 6.10 CONFIGURATION CHECK

During pre-operation, check the configuration according to the specification.



Continue on next page.

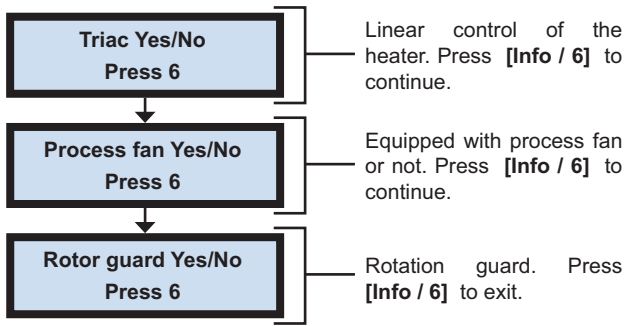


FIGURE 37: Unit configuration check



*When "Aut. Rest" is selected. The unit starts automatically after electric failure. It is up to DST's representatives to inform any parties that are involved with installation, operation, maintenance or reparation of the machine about this feature.*



# 7 FUNCTIONALITY & MODE

The unit is equipped with three different types of dehumidification modes

<b>REMOTE/ LOCAL</b>	Enable or disable the humidistat/ external regulator control.
<b>AUTO/VENT or AUTO/OFF</b>	Set the auto-mode to vent or stop.
<b>HUMIDISTAT 1 &amp; 2</b>	Controlling the heater power with a 1- or 2-step humidistat.

See detailed description of each mode on the following page.

## 7.1 REMOTE OR LOCAL

The switch will enable or disable the humidistat/external regulator connection. In "REMOTE"-mode, the humidistat register the actual %RH is below the setpoint and sends a signal to the PLC to stop the dehumidification process.

In "LOCAL"-mode, the signal from the humidistat/external regulator is blocked and the unit will continue the dehumidification process.

**Note:** In "LOCAL"-mode, the dehumidifier will run at the selected active heater step.

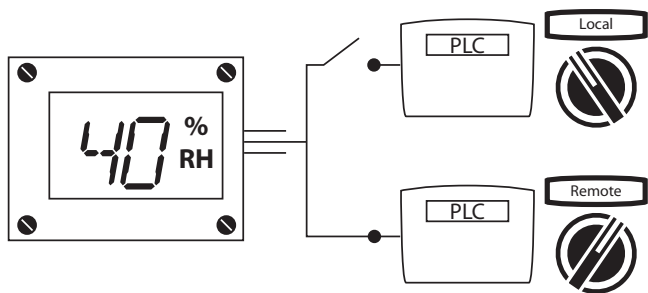


FIGURE 38: Remote/ Local

## 7.2 AUTO/VENT OR AUTO/OFF

There are two selectable ventilation mode (if an3 electronic controller or humidistat is connected) when the sensor shuts down the unit.

**Note:** The unit can also enter the ventilation mode when Humidistat contact 1 is opened or the external controller signal is less then 0.5V (With energy saving step 2 & 3 only):

In **AUTO/VENT**-mode, the PLC stops the dehumidification process by turning off the heater. Process fan and rotor motor will continue to be in operation continuously. The reg. fan will also continue to run, but only for a pre-set time before shutting down.

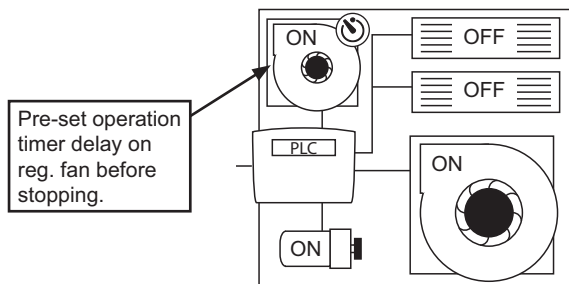


FIGURE 39: AUTO/VENT-mode

In **AUTO/OFF**-mode, the PLC stops the dehumidification process and shuts down the unit completely. The reg. fan and rotor motor will continue to run, but only for a preset time before shutting down.

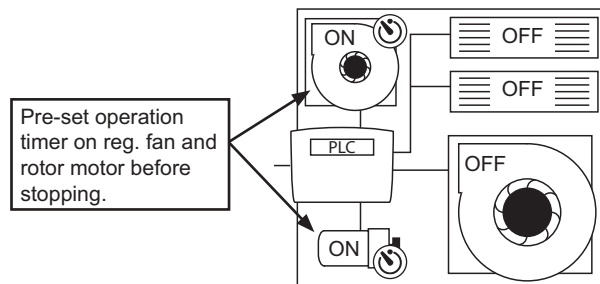


FIGURE 40: AUTO/OFF-mode

## 7.3 HUMIDISTAT 1&2

If linearly and binary control is not added (option), use the built-in Humidistat inputs to control the electrical heater using a one-step or two-step humidistat (the humidistat is optional).

If it is a one-step humidistat, it should be connected to humidistat 1, humidistat 2 should then be bridged.

**Note:** During test-run, check if the external humidistat has not opened Humidistat 1 & 2. The unit will not start-up unless they are closed.

See electrical diagram for details and connections.

See "10 Technical data" for humidistat 2 power.

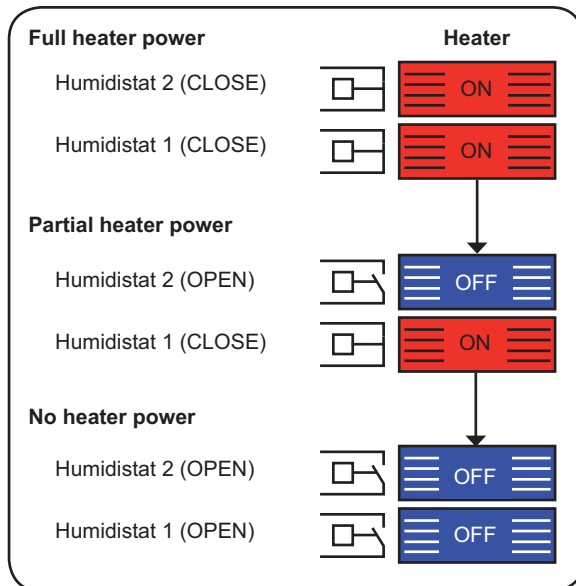


FIGURE 41: Humidistat connection

## 7.4 REMOTE OPERATION

A connected remote switch will act as a master switch and will shut down the unit (the PLC will display "UNIT STOPPED BY REMOTE CONTROL"). The dehumidifier cannot start-up on-site using the PLC or the control panel before the remote switch has been restored.

See electrical diagram for connections.

The remote connections is bridged upon delivery. When removing the remote connection, reinsert the terminal link wire.



## 7.5 START-UP PROCEDURE

During start-up, the unit will go through a series of activation. See illustration.

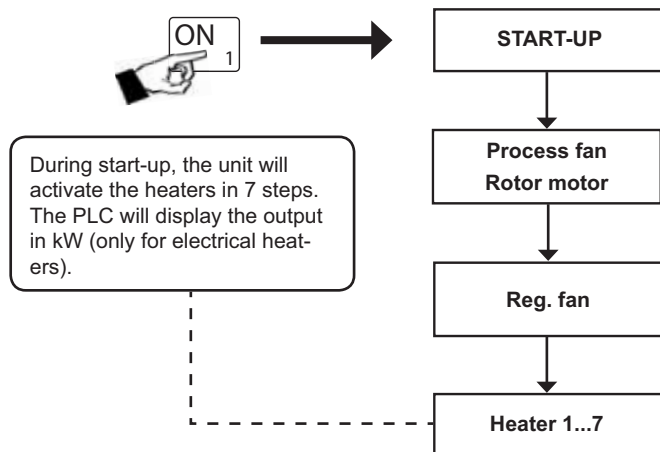


FIGURE 42: Start-up sequence

## 7.6 SHUT DOWN PROCEDURE

During shut down, the unit will incrementally deactivate each moving component. The post-cooling procedure will continue for a pre-set time.

The procedure applies when [OFF / 2] is pressed, remotely deactivated or when the mode is set to AUTO/OFF (controlled by a humidistat/ external regulator).

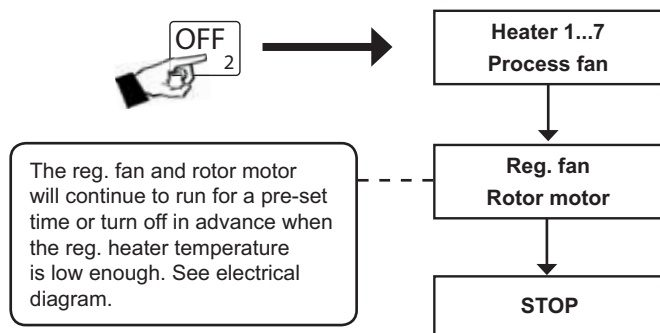


FIGURE 43: Shut down sequence

## 7.7 PLC OPERATION MESSAGES

During operation the following messages may appear on the PLC. These messages are not to be confused with ALARMS codes.

### LOW HUMID

When the attached external regulator is giving off a signal 0.5V or lower in a period 5 mins or more.

### UNIT STOPPED BY HUMIDISTAT

The unit is either running on Auto-On or Auto-Off, with both Humidistats 1 & 2 opened.

### OPERATION EH3

When the attached electric controller EH3 is giving off a signal of 0.5V or lower in a period 5 mins or more.

### REGFAN OFF DELAY

#### C #### s

During shut down or standby (if an external regulator is connected

or humidistat 1 & 2 is opened). The display will also show the current heater temperature and countdown until the reg. fan stops.

### HUMIDISTAT1 OPEN

If the %RH has dropped below setpoint 1 (Appears only if a humidistat is connected)

### STARTING UP SYSTEM OK

Initiating the start-up sequence. All system are fully operational.

### STARTING UP DIRTY PROCFILTER / DIRTY REGFILTER

Initiating the start-up sequence. Change process or reg. filter (Units with electronic filter guard).

### STARTING UP FILTERS OK

Initiating the start-up sequence and no filter changes is needed (Units with electronic filter guards)

### OPERATION ##kW

During normal operation The output will vary depending on the size of the unit.

### OPERATION

During normal operation. No output is displayed if the unit is installed with hot water or steam heaters.

### OPERATION TH2

#### Reg temp ##°C

When the maximum temperature of TH2 has been reached. The PLC deactivates the heater step by step to reduce the temperature.

### UNIT STOPPED BY REMOTE CONTROL

The connected remote has shut down the dehumidifier.

# 8 TROUBLESHOOTING

## 7.8 PLC-ERROR CODES

If an error occurs, the dehumidifier will shut down, but the reg. fan continues to operate in order to cool the regeneration heater for a preset time. See electrical diagram for time setting.

During operational error, the PLC will promptly display a code and shut down the dehumidifier. The table below displays the frequent error codes.

CODE	EXPLANATION	CAUSE	SOLUTION
Fuse F1 or F2	Process fan is non-functional (F1).	The fan is overloaded and/or is malfunctioning.	Readjust the airflow using dampers. Check fan. Check setpoint of F1/F2. Reset F1/F2.
	Reg. fan non-functional (F2).		
Fuse F3-5 or TH1	Overheat protection on reg heater tripped out (TH1).	Temperature is too high.	Check reg fan (F2). Check heater (F3-F5). Check TH1 temperature setting. Check for blockages & moisture load on regeneration airflow. Check regeneration filter. Check regeneration air inlet temperature and reduce the heater output. Check for airflow. Reset TH1 and/or F3-F5. <b>Note:</b> Triggered TH1 will also trigger F3-F5.
	Heater is non-functional (F3-F5).	Heater overload and/or malfunctioning.	
Frost guard GT81	Freeze protection has tripped and stopped the machine	Temperature on the hot water outlet / condensate outlet is below 7°C.	Check water supply and insulation for potential thermal loss.
Wet air temp TH3	Wet air thermostat tripped (TH3).	Temperature is too high.	Check TH3 temperature setting. Check and readjust the process air airflow. Check moisture level in process air flow and reduce the heater output. Adjust the dampers. Check the rotor motor, gear and belt/chain. Reset the TH3 and Fuse F1-F3. <b>Note:</b> Triggered TH3 will also trigger F3-F5.
Rotor stopped	Rotation guard sensor has detected no rotor rotation (E2).	Rotor motor and/or rotor gear failure.	Check the rotor motor and its gear.  Check if the belt intact or slipping on the belt pulley and/or rotor. Check the sensor for defect and adjust the distance to the contact screw.
		Belt transmission/slipping belt.  Sensor failure or distance too great between sensor and contact screw.	
Fr.converter U1-U2	Frequency converter alarm.	Frequency converter failure.	Read message on the converter display, check the frequency converter manual for troubleshooting.
Emergency stop	Emergency stop.	The emergency button is active.	Pull the emergency button to restore.

FIGURE 44: PLC-alarm table and solution



Once the error has been corrected, restart the unit (See "5 Operating" on "Reset button and switches" and "Reset the PLC" for instructions) .

## 8.1 GENERAL TROUBLESHOOTING

Check for following if the unit will not start-up and the PLC is not displaying an error code.

PROBLEM	CAUSE	SOLUTION
The dehumidifier will not start-up (RUN-light is lit/ the PLC is not displaying a error message).	The external humidistat has triggered the humidistat 1& 2 and stopped the unit or when the attached external regulator is giving off a signal of 0.5V or lower in a period 5 mins or more.	Readjust the setpoint on the humidistat (the actual RH% is lower than the pre-set setpoint). Check message on PLC and readjust the external regulator's setpoint (the actual RH% is lower than the pre-set setpoint).

FIGURE 45: General troubleshooting table and solution

## 8.2 CAPACITY TROUBLESHOOTING

The dehumidifier performance can be checked simply by checking the temperature of the uninsulated ductwork near the unit.

Normally with the unit working at nominal conditions (with process air at room temperature), the dry air duct should be warm (25-40°C) and the wet air duct should be warm or hot (30-60°C).

If the unit does not maintain the required humidity look for the following causes:

PROBLEM	CAUSE	SOLUTION
The unit does not maintain the desired %RH humidity despite operating at full capacity.	Dehumidification capacity is insufficient although both dry and wet air ducts are warm.	Check the real moisture load and compare to design data. Check the airflow volumes, filter and adjustment of dampers. Check the rotor for correct position and sealing alignment, and ensure that there is no infiltration.
	Both air ducts are cold.	Is the unit switched on? Is any of the motor protections activated? Check that the wet air damper is not closed. Check the regeneration filter. Check operation of the regeneration fan.
	Dry air duct is cold and wet air duct is very hot.	Check rotation of the rotor. Check process air fan. Check that the dry air damper is not closed. Check the process air filter.
The process fan is rotating in the opposite direction	The incoming phase supply wiring is incorrect.	Switch the main switch to "0" and switch off incoming voltage. Change over two of the three incoming phase supply wires.

FIGURE 46: Capacity troubleshooting and solution table

## 8.3 CAPACITY TEST

If no fault can be found after checking as troubleshooting table, a performance test should be carried out on the dehumidifier, proceeding as follows.

- The different moisture contents  $x$  (g/kg), in the four airflows, can be determined by using wet and dry thermometers or calibrated instruments for temp and humidity. To receive the moisture contents the measured temperatures shall be plotted in a psychometric chart.

Process air in:  $x_{PI}$

Process air out:  $x_{PO}$

Regeneration air in:  $x_{RI}$

Wet air out:  $x_{RO}$

- Calculate from the actual temperatures the density of the two outlet airflows  $D_{PO}$  (kg/m<sup>3</sup>) and  $D_{RO}$ .
- Measure the airflow rate in each duct, e.g using a Prandtl tube. The airflow rate is the dynamic pressure,  $\Delta p$  (Pa), which is measured by the difference between the total pressure and static pressure in the duct.

Measurements shall be done in a straight part of the ductwork. In order to avoid faulty measurements caused by turbulent flows, measurements should not be done close after a bend or a fan.

The flow rate in each duct can be calculated as:

$$w = (2 * \Delta p_d / D)^{1/2} \text{ (m/s)}$$

Where  $D$  is the density according to item 2.

Then calculate the volume air flows,  $V_{PO}$  (m<sup>3</sup>/h) for the dry air and  $V_{RO}$  for the wet air:

$$V = w * A * 3600 \text{ (m}^3\text{/h)}$$

Where  $A$  is the cross section area of each duct.

- Now determine the de-humidification capacity,  $Q$  (kg/h), by the following equation.

$$Q = (Q_P + Q_R) / 2 \text{ (kg/h)}$$

where

$$Q_P = V_{PO} * D_{PO} * (x_{PI} - x_{PO}) / 1000$$

and

$$Q_R = V_{RO} * D_{RO} * (x_{RO} - x_{RI}) / 1000$$

Compare this measured capacity to the capacity which can be calculated from the data sheet.

# 9 MAINTENANCE

Before dismantling the unit, for inspection or service, the following precautions should be noted:



*When dismantling the main switch shall be turned to "0".*

*If the unit has been in operation it should be left to cool off, for at least 30 minutes, before dismantling.*

*The wet air duct can be very hot if it is not insulated.*

DST dehumidifiers are designed to run for long periods with little maintenance requirements. The items listed below shall however be noted;

## 9.1 EXCHANGING FILTERS

The filters should be inspected at regular intervals, the frequency of which can best be judged by experience. In storage applications where clean air conditions normally exist, the filter will typically require changing only every six months. In process work and dusty environments, the filter may need to be changed more often.

A dirty filter will in time affect the drying performance of the dehumidifier.



*On no account should the unit be operated without the correct air filters installed!*

## 9.2 GENERAL MAINTENANCE

Every two years an inspection of all internal components of the dehumidifier should be carried out, the following items being blown with compressed air and cleaned with a vacuum cleaner.

1. Gear motor and belt transmission.
2. Fans.
3. Coils (heater or cooler)
4. Access doors, hinges, locks and rotor seals.
5. Electric equipment.

Depending on how dirty the dehumidifier was at the first general maintenance, the interval of inspection may be increased or decreased

## 9.3 WASHING THE ROTOR

The SSCR rotor contained in DST dehumidifiers has a distinct advantage over other types of desiccant rotors in that dust can be washed out of the material without any need for reimpregnation after the treatment.

Before dismantling the unit, for inspection or service, the following precautions should be noted:

DST dehumidifiers are designed to run for long periods with little maintenance requirements. The items listed below shall however be noted;

1. Let the dehumidifier be shut-off for at least an hour.

2. Disconnect the rotor motor cables,
3. Carefully remove the rotor from the unit. The rotor is removed in the following way:
  - a. Remove the rotor motor and the belt tension device.
  - b. Loosen the two brackets that are holding the rotor shaft.
  - c. Support the rotor with a wooden plank and soft material to cushion the rotor, or similar. Push the rotor shaft from the rotor hub.
  - d. Carefully roll the rotor out from the unit, taking great care not to damage the delicate matrix.
4. Wet the rotor with water and a mild acid based detergent or with industrial alcohol and allow to soak for 30 minutes.
5. Rinse carefully with fresh water, pumped at low pressure through an ordinary hose.
6. Allow the liquid to drain from the rotor structure and blow the channels free with air. Do not to hold the air nozzle too close to the rotor surface.
7. Carefully refit the rotor and its transmission belt into the unit.
8. Ensure that all peripheral and radial seals are placed correctly.
9. Start the dehumidifier again and let it operate, with process fan and rotor motor only, for one hour without heater before the capacity is checked. Repeat the washing with a stronger (Non-alkaline) detergent if the performance has not recovered satisfactorily. Take action when the reactivation or process air in that enter the unit is not lower then 7°C.



*Never use a strong alkaline based detergent, as this may destroy the rotor!*

# 10 TECHNICAL DATA

Dehumidifier model CZ-								082	102	102L	104
Capacity [kg/h] <sup>1)</sup>								22	36	50	65
Nom dry air flow [m <sup>3</sup> /h] <sup>2)</sup>								3200	5200	7200	8000
External static pressure [Pa] <sup>3)</sup>								200	200	200	200
Nom wet air flow [m <sup>3</sup> /h] <sup>2)</sup>								850	1400	2000	2500
External static pressure [Pa] <sup>3)</sup>								200	200	200	200
Nom heater power [kW]								30	50	74	95
Electric heater steps [kW]								-	-	-	-
Supply pressure steam battery [bar] <sup>6)</sup>								6	6	6	6
Binary heating stages [kW] <sup>6)</sup>											
<b>STEP (1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>	<b>(7)</b>					
4.2	8.6	12.9	17.1	21.4	25.7	30	X	-	-	-	
7.1	14.3	21.4	28.6	35.7	42.9	50	-	X	-	-	
10.6	21.1	31.7	42.3	52.9	63.4	74	-	-	X	-	
13.7	27.4	41.1	54.9	68.6	82.3	95	-	-	-	X	
Linearly heating stages [kW] <sup>6)</sup>								0-30	0-50	0-74	0-95
Humidistat setpoint [%RH] Step 1								-	-	-	-
Humidistat setpoint [%RH] Step 2								-	-	-	-
Humidistat 1 opens and reduce the effect to [kW]								12.9	21.4	31.7	41.1
Motor power [kW]								4.1	4.5	7.7	11.5
Supply fuse 3x400V/50Hz [A]								63	100	160	200
Weight [kg]								300	380	400	560
Speed of rotor rotation [rph]								10	10	15	10
Noise level [dB(A)] <sup>4)</sup>								91	-	-	-
Air filter class (Process inlet/Reg. inlet)								G4/F7	G4/F7	G4/F7	G4/F7
Filter change at pressure (Process inlet/Reg. inlet) [Pa] <sup>5)</sup>								200/250	200/250	200/250	200/250
Electric compartment protection class								IP54	IP54	IP54	IP54
Humidistat connection								24vdc	24vdc	24vdc	24vdc
Setting overheat protection TH1 [°C]								150	150	150	150
Setting thermostat TH2 [°C]								140	140	140	140
Setting overheat protection TH3 [°C]								80	80	80	80

<sup>1)</sup> Valid for inlet conditions 20°C/ 60%RH. For other inlet conditions the capacity can be calculated by the correction factor from below diagram.

<sup>2)</sup> Volume flow for density 1,20 kg/m<sup>3</sup>.

<sup>3)</sup> If no data is stated here the volume flow above is given at free blowing airflow.

<sup>4)</sup> Unit connected to uninsulated ducts, nominal air flows.

<sup>5)</sup> Units with mechanical and electronic filter guards

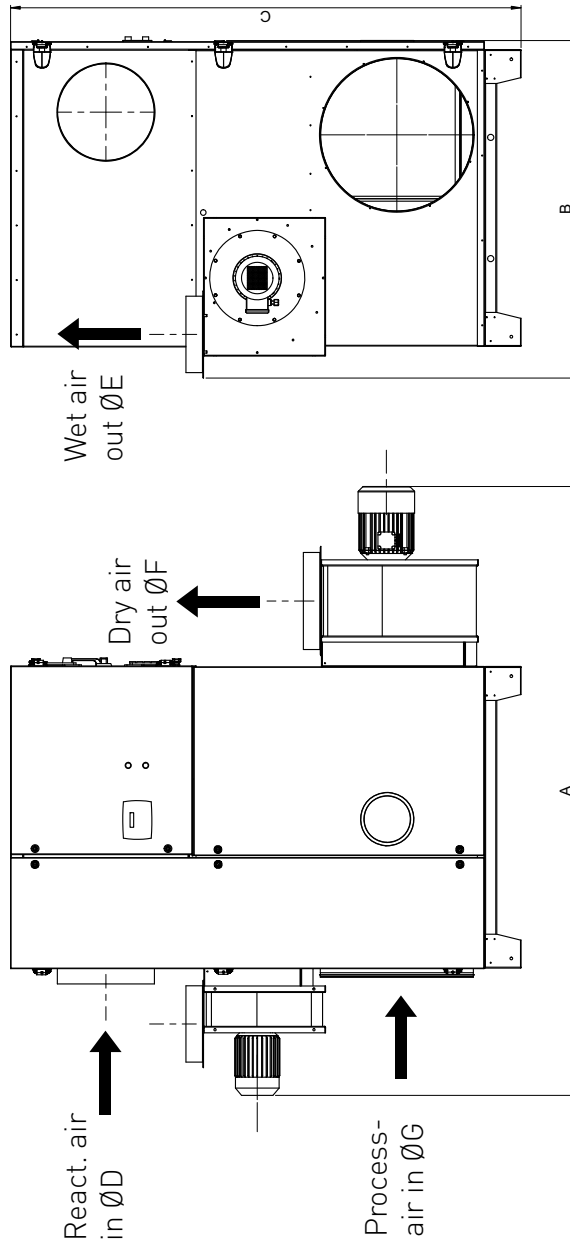
<sup>6)</sup> Applies for dehumidifiers with installed optional feature.

## Komponentlista / Component list CZ-82/102/102L/104

Description	Antal Qty.	Benämning	Typ, ritn nr o dyl Drwg No etc	Type,				Art. Nr Art No	Tillverkare / Leverantör Manufact. / Supplier	Anmärkningar Notes
				82	102	102L	104			
Rotor	1	Rotor	SSCR-U 770H20	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	105420	Seibu Giken /	
Rotor	1	Rotor	SSCR-U 965H20	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	105422	Seibu Giken /	
Rotor	1	Rotor	SSCR-U 965H40	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	107272	Seibu Giken /	
Rotormotor	1	Drivmotor	IHZ8PF25N-22; 23W; 1x230V 50HZ	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	105242		
Gearhead	1	Växel	8H10XFN 10:1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	103201		
Gearhead	1	Växel	8H60FBN 60:1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	106259		
Radial seal	3	Teflonremsa	0,35x35x1000mm; Teflon	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	105241		
Hose clamp	2	Slangklämma	2.5m	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	102179		
Hose clamp	2	Slangklämma	3.5m	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	102179		
Lock hose clamp	2	Slangklämma - Lås	9mm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	102180		
Belt tightener	1	Remspännare	Spännarm SE 11	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	101374		
Belt tightener	1	Remspännare	Rulle R 11	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	101375		
Beltpulley	1	Remskiva	z=16, DD=64,68; Type 075	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	107323	OEM motor	
Beltpulley	1	Remskiva	Z=19; DD=76.81; Type 075	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	106458	OEM motor	
Perifer seal	5m	Periferitätning	Felt+EPDM, 1x30x2500 (2st)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	103132		
Perifer seal	6.1m	Periferitätning	Felt+EPDM, 1x30x3060 (2st)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	103133		
Belt	1	Kilrem	H-1100; L=2794; B=19.1mm Type 075	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	106456	OEM motor	
Belt	1	Kilrem	H-1325; L=3365; B=19.1mm Type 075	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	106457	OEM motor	
<b>Fans Fläktar</b>										
Proc.fan	1	Processfläkt	GRF-4-315 / 143-300T; 3,0kW 3x230/400V 50Hz; 8,5/4,9A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	105662	Ventur	
Proc.fan	1	Processfläkt	GRF-4-400/183-550T; 3x400-690V 50Hz; 11,3A; 5,5kW	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	105211	Ventur	
Proc.fan	1	Processfläkt	RHAD45C-2 7,5kW 3x400V / 50Hz	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	107708	Zeihl-Abegg	
Reg.fan	1	Reg.fläkt	GMT-160 - 1.1 T; 1,1kW; 2800rpm; 3x230/400V / 50Hz; 3,7/2,5A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	104674	Ventur	
Reg.fan	1	Reg.fläkt	GMT300 - 150 T; 1,5kW; 3x230/400V 50Hz; 5,9/3,4A	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	103740	Ventur	
Reg.fan	1	Reg.fläkt	GMT-300T -2,2kW; 3x230/400V 50Hz;	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	106520	Ventur	
Reg.fan	1	Reg.fläkt	GMT500 300T-4,0kW; 3x230/400V 50Hz;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	106502	Ventur	
<b>Filter Filter</b>										
Filter proc.	2	Filter	Datapleat 495x495x45 G4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	106572	Camfil	200477
Filter proc.	2	Filter	Ecopleat 495x495x95 F7 (Option)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	106574	Camfil	302672
Filter proc.	2	Filter	Datapleat 595x595x48 G4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	106573	Camfil	200481
Filter proc.	2	Filter	Ecopleat 595x595x97 F7 (Option)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	106575	Camfil	304153
Filter reg.	1	Filter	Ecopleat 287x592x97 F7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	106576	Camfil	303355
Filter reg.	1	Filter	Ecopleat 592x490x97 F7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	106508	Camfil	307725
<b>Heater Värmare</b>										
Reg.heater	1	Reg. värmare	30kW; 3x400V	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	107600	Backer/Jevi	
Reg.heater	1	Reg. värmare	50kW; 3x400V	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	107553	Backer/Jevi	
Reg.heater	1	Reg. värmare	74kW; 3x400V	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	106246	Backer/Jevi	
Reg.heater	1	Reg. värmare	95kW; 3x400V	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	107497	Backer/Jevi	
Overheat protection	1	Överhettningsskydd	TH1: heaTHERM 160-200°C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	106157		
Sensor	2	Sensor	PT100 (included in the PLC)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	107674		
Reg.heater HW	1	Reg.värmare	QLHN-022-067-04-18-18 (Option)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	106570	Luvata	
Reg.heater HW	1	Reg.värmare	QLHN-042-067-06-18-18 (Option)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	106571	Luvata	
Reg.heater S	1	Reg.värmare	QLSK-048-080-02-18-25-25 (Option)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	106561	Luvata	
Reg.heater S	1	Reg.värmare	QLSK-048-100-02-18-25-25 (Option)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	106497	Luvata	
<b>Other Övrigt</b>										
Electric box	1	Elcentral	Dwg.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	106565	Järfälla Automtic	
Electric box	1	Elcentral	Dwg.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	106566	Järfälla Automtic	
Electric box	1	Elcentral	Dwg.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	106567	Järfälla Automtic	
Electric box	1	Elcentral	Dwg.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	106568	Järfälla Automtic	

# DIMENSIONS

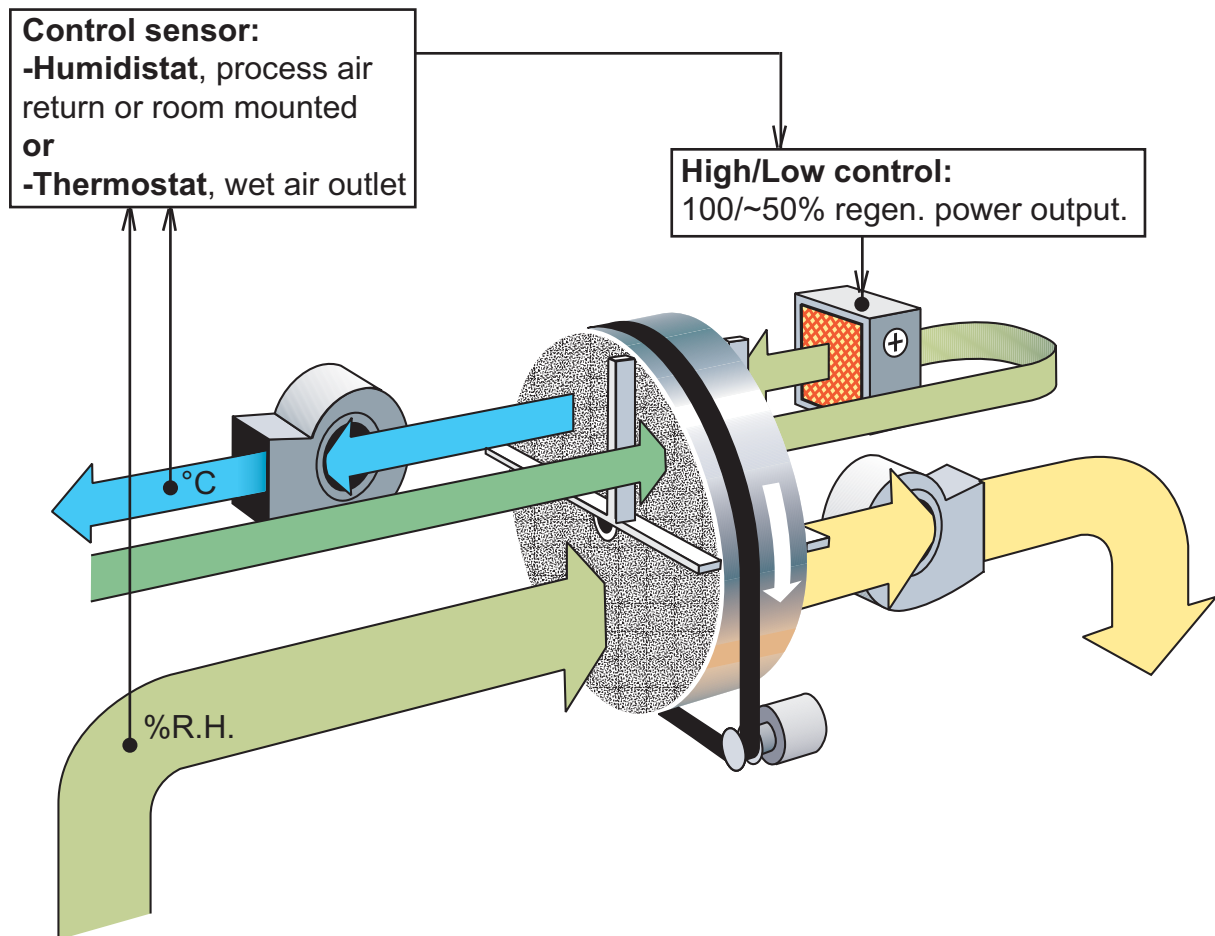
CZ	82	102	102L	104
A	2370	2510	2510	2890
B	1065	1375	1375	1265
C	1905	2105	2105	2105
D	Ø250	Ø400	Ø400	Ø400
E	Ø160	Ø315	Ø315	Ø315
F	Ø400	Ø400	400x940	350x840
G	Ø400	Ø630	Ø630	Ø630



# Energy saving



## STEP 1



### Optional power output control, step 1.

During low load conditions the control sensor automatically reduces the dehumidifier capacity by approximately 50%. Control can be by humidistat or thermostat.

#### Humidistat sensor

A two step humidistat is recommended, the upper set point reducing the dehumidifying capacity to around 50%, the lower set point reducing the capacity to zero.

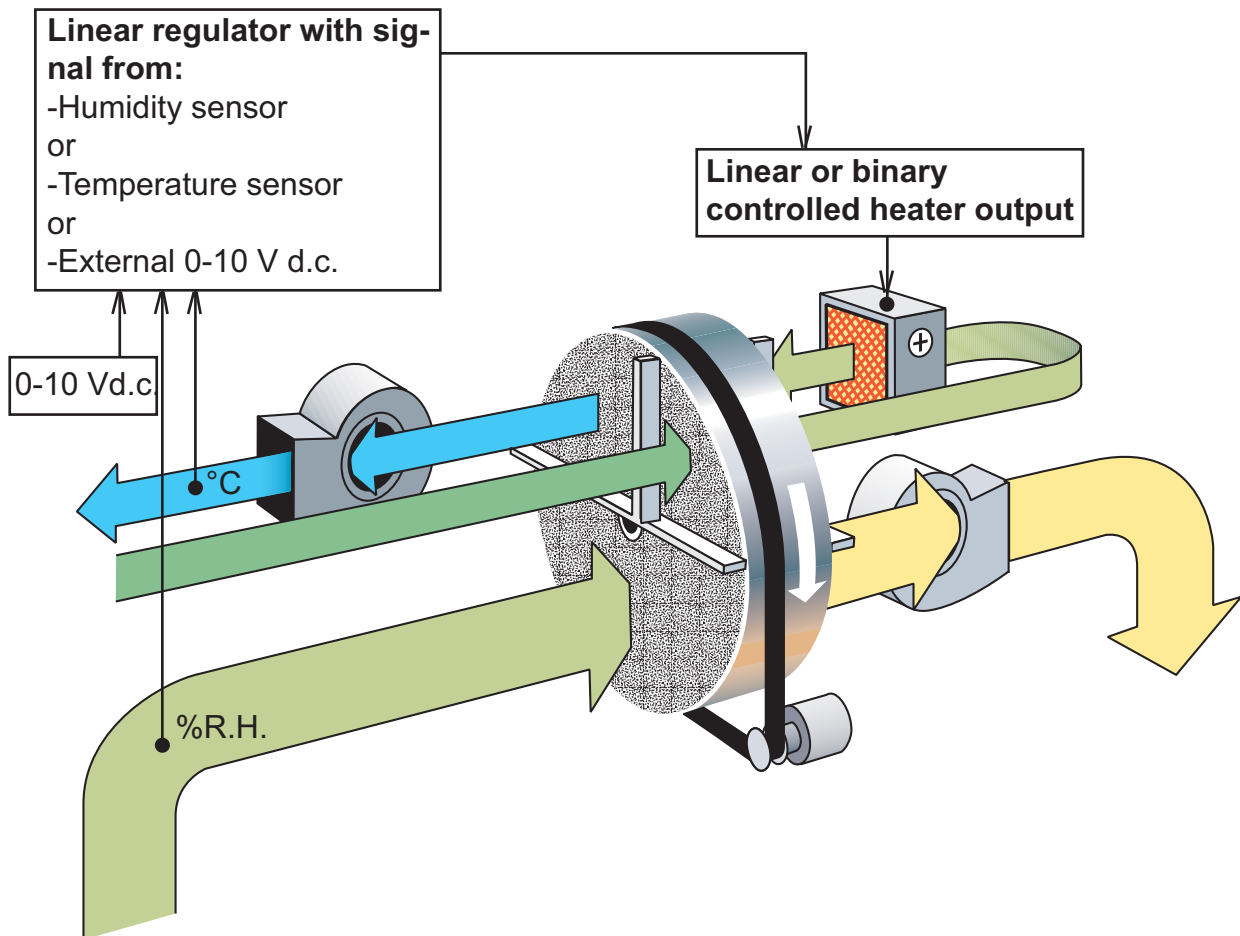
In applications where there is no process pre-cooling or mixing with ambient air, the humidistat can be mounted inside the unit (factory-mounted) sensing the process air return condition. In other applications the humidistat is normally mounted within the conditioned area.

#### Thermostat sensor

On applications where a humidistat is not used, the unit can be delivered with a single step thermostat installed in the wet air outlet to provide capacity control. During low load conditions the wet air outlet temperature increases. When the thermostat set point, factory set at 60°C, is reached the dehumidifying capacity is automatically reduced to 50%.



## STEP 2



## Optional power output control, step 2.

In response to load changes, the dehumidifying capacity is automatically adjusted to between zero and full power. With the binary version the heater power is divided into equal steps, the number of stages in operation determined by the regulator signal. With the linear version the heater is triac controlled (on/off within a 60 s period) and is able to provide linear output across the full power range.

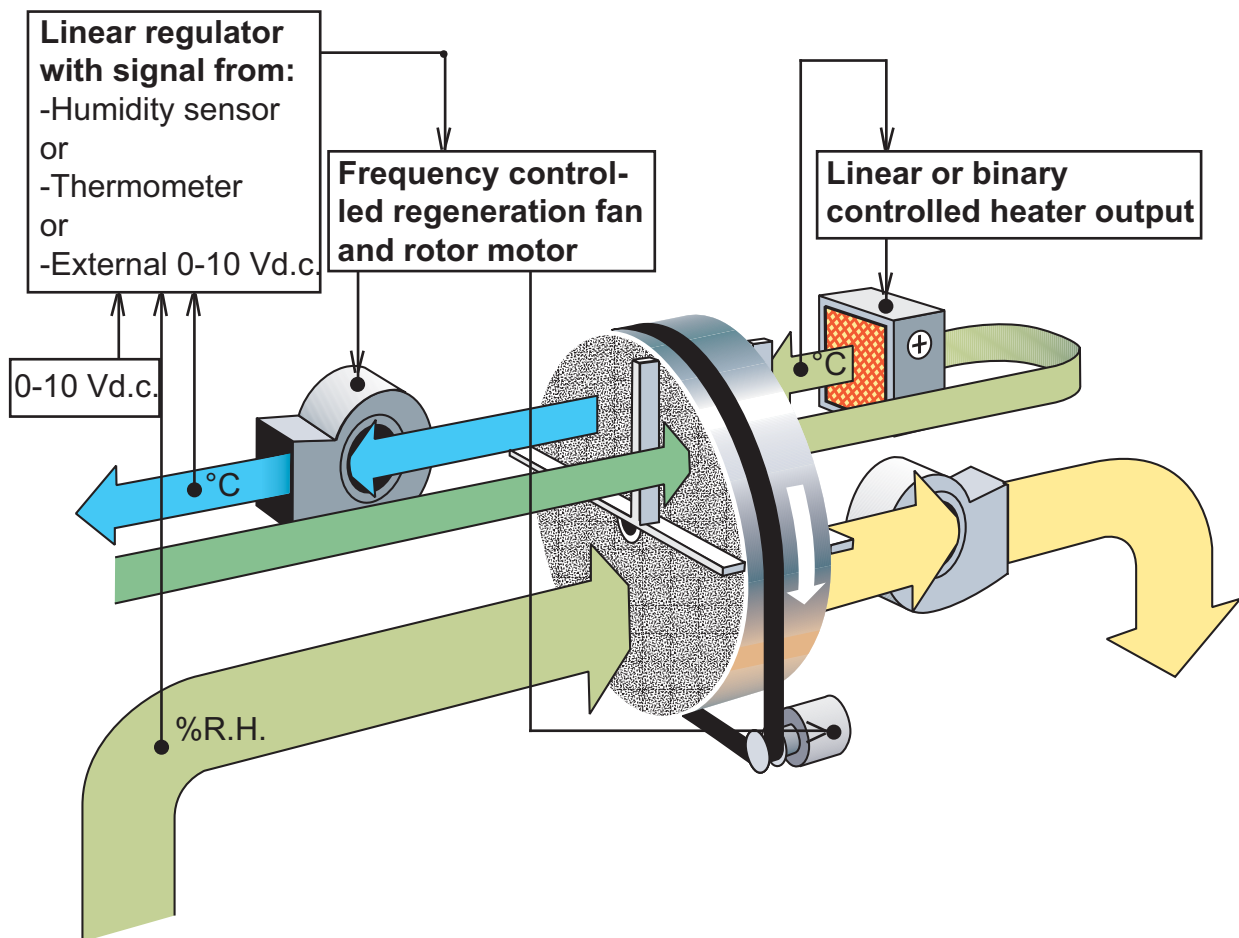
Control can be from a humidity or a temperature sensor or a 0-10 Vdc signal from an external system. In applications where there is no pre-cooling or mixing with ambient air, the humidity sensor can be mounted inside the unit (factory mounted) sensing the process air inlet condition. In other applications the humidity sensor is normally mounted within the conditioned area. On applications where a humidity sensor is not used, less accurate control can be achieved using a temperature sensor installed in the wet air outlet.

To monitor rotor operation, proximity sensor is included in Step 2.

# Energy saving



## STEP 3



### Optional power output control, step 3.

A control system regulates the capacity from zero up to full capacity. Regeneration air flow, rotor speed and heater output is controlled giving a better energy efficiency than controlling the heater output only.

The heater output is controlled either binary or linear to give a regeneration temperature of 140°C. With the binary version the heater power is divided into equal steps, the number of stages in operation determined by the regulator signal. With the linear version the heater is triac controlled (on/off within a 60 s period) and is able to provide linear output across the full power range.

Control can be from a humidity or a temperature sensor or a 0-10 Vd.c. signal from an external system. In applications where there is no pre-cooling or mixing with ambient air, the humidity sensor can be mounted inside the unit (factory mounted) sensing the process air inlet condition. In other applications the humidity sensor is normally mounted within the conditioned area. On applications where a humidity sensor is not used, less accurate control can be achieved using a temperature sensor installed in the wet air outlet. To monitor rotor operation, proximity sensor is included in Step 3.

# EC declaration of conformity

## Manufacturer:

Seibu Giken DST AB  
Avestagatan 33  
S-163 53 SPÅNGA  
Sweden  
Tel: ...46 8 445 77 20 Fax: ...46 8 445 77 39

## Hereby confirms that:

Machinery type CZ-082, 102, 102L, 104

- a) is manufactured in compliance with DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)
- b) is manufactured in compliance with the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC
- c) is manufactured in compliance with European Standards EN 60204-1:2006, EN ISO 12100-1, EN 12100-2, EN ISO 13857, EN 61000-6-3, and EN 61000-6-1
- d) is manufactured in compliance with European Directive 2002/95/EC for Restriction of Hazardous Substance (RoHS).

  
\_\_\_\_\_  
Anders Kristoferson, Managing Director

Spånga DEC 2<sup>nd</sup> 2010



DST sales representatives:

Austria  
K.I.R.S.C.H. GmbH  
Tel.: +43 (1) 997 16 14  
www.kirsch-tec.at

Australia  
AAAT - Air And Aqua Tech Pty Ltd.  
Brisbane Melbourne Sydney  
Tel +61 (0) 2 9948 0336

Bangladesh  
Airy International  
Tel. +880-2-934 6385  
www.airybd.com/

Belgium  
BEPA  
Tel +32071750601  
http://www.bepa.be

China mainland  
Seibu Giken DST China  
Tel. +86 (0) 21 623 605 36  
www.dst.cn

Croatia and Slovenia  
K.I.R.S.C.H.Croatia  
Tel +385 (0) 52 647 048  
www.kirsch-tec.at

Czech Republic  
Flair, A.S.  
Tel+420 (241) 774 105  
www.flair.cz

Czech Republic  
Filco spol s.r.c.  
Tel +420 (495) 453 085  
www.filco.cz

Denmark  
DST Danmark ApS  
Tel +45 (75) 73 25 23  
www.dst-danmark.dk

Egypt  
Proservice  
Tel +202 2743595

Estonia  
Kliimaseade  
Tel +372 (6) 550 116  
www.kliimaseade.ee

Finland  
Kryotherm Oy  
Tel +358-207 418 850  
www.kryotherm.fi

France  
C.B.K. L'Air Sec  
Tel +33 1342 001 37  
www.cbk.fr

Germany  
FREY-Aufbereitungstechnik für Gase  
Tel +49 4193 75 560  
www.ffrey.de

Greece  
AAC-Gerasimos G. Kalavrias  
tel +30 (21) 0699 8953  
www.kalavrias.gr

Hong Kong

Kai Mei Environmental Co.Ltd  
Tel. +852 2407 5190  
www.e-iaq.com/

Iceland  
Vélaverk HF  
Tel +354 568 3536  
www.velaverk.is

Ireland  
Coolair Ltd  
Tel +353-1-451 12 44  
www.coolair.ie

Italy  
Angelantoni Industrie SpA  
Tel +39 02 25 51 941  
www.angelantoni.it

Japan  
SEIBU GIKEN CO., LTD.  
Tel +81-929 425 711  
www.seibu-giken.co.jp

Korea  
Korhex Engineering Co. Ltd.  
Tel +82231425658  
www.korhex.co.kr

Lithuania  
NIT Ltd.  
Tel. +370 (5) 27 28 552  
www.nit.lt

Malaysia  
AAQ  
Tel +603 4295 3295  
www.aaq.com.my

Netherlands  
D&F Techniek  
Tel +31 161 453098  
www.dftechniek.nl

Norway  
Alfsen og Gunderson A/S  
Tel +47 22 70 77 65  
www.ag.no

Pakistan  
National Engineering Enterprises  
Tel +92 (21) 5888298  
www.nee.com.pk

Poland  
DST Polska  
Tel +48 56 46 81 177  
www.dst-polska.com.pl

Portugal  
Humitek Ingenieros, S.L. Madrid  
+34 609020303  
www.humitek.es

Russia  
Arktika  
Tel +7 (495) 787 68 01  
www.arktika.ru

Saudi Arabia & GCC Countries  
Tamkeen  
Tel +966 2 653 3395  
www.exactair-sa.com/

Singapore

Way Technovation  
Tel +65-68410060  
www.way-technovation.com

Slovak Republic  
Flair, a.s.  
Tel +421 2 44632567  
www.flair.sk

South Africa  
Dry Air Solutions  
Tel +27 (21) 789 23 08

Spain  
Humitek Ingenieros, S.L. Madrid  
Tel. +34 609020303

Spain Delegación Barcelona:  
Tel. +34 (93) 798 62 72  
www.humitek.es

Sweden  
West: Fuktbehandling AB  
Tel 0300 164 08  
www.fuktbehandling.se

East: Garnsviken Fukt & Energiteknik AB  
Tel 08 514 50 390  
www.garnsviken.se

North: Polair Luftteknik AB  
Tel 060-12 80 90  
www.polair.se

South: SkandiluftAB  
Tel 040 414770  
www.skandiluft.se

Switzerland  
Delta-E AG Lufttrocknung  
Tel +41 41 281 30 40  
www.delta-e.ch

Thailand  
Satisfy All Co.,Ltd.  
Tel 66 02-995 5351 -2  
www.satisfy.co.th

Turkey  
Tetisan  
Tel +90 212 623 2015  
www.tetisan.com

Ukraine  
Pentagra, AS  
Tel/Fax: 6 576 050  
www.pentagra.ee/

United Kingdom  
Humidity Control Systems Ltd  
Tel +44 1522 753 722  
www.humiditycontrol.co.uk

USA  
SGAmerica  
Tel +1 240 379 7330  
www.sgamerica.com

Vietnam  
Minhhaiviet Co. Ltd.  
Tel. +84 8 3845 4818