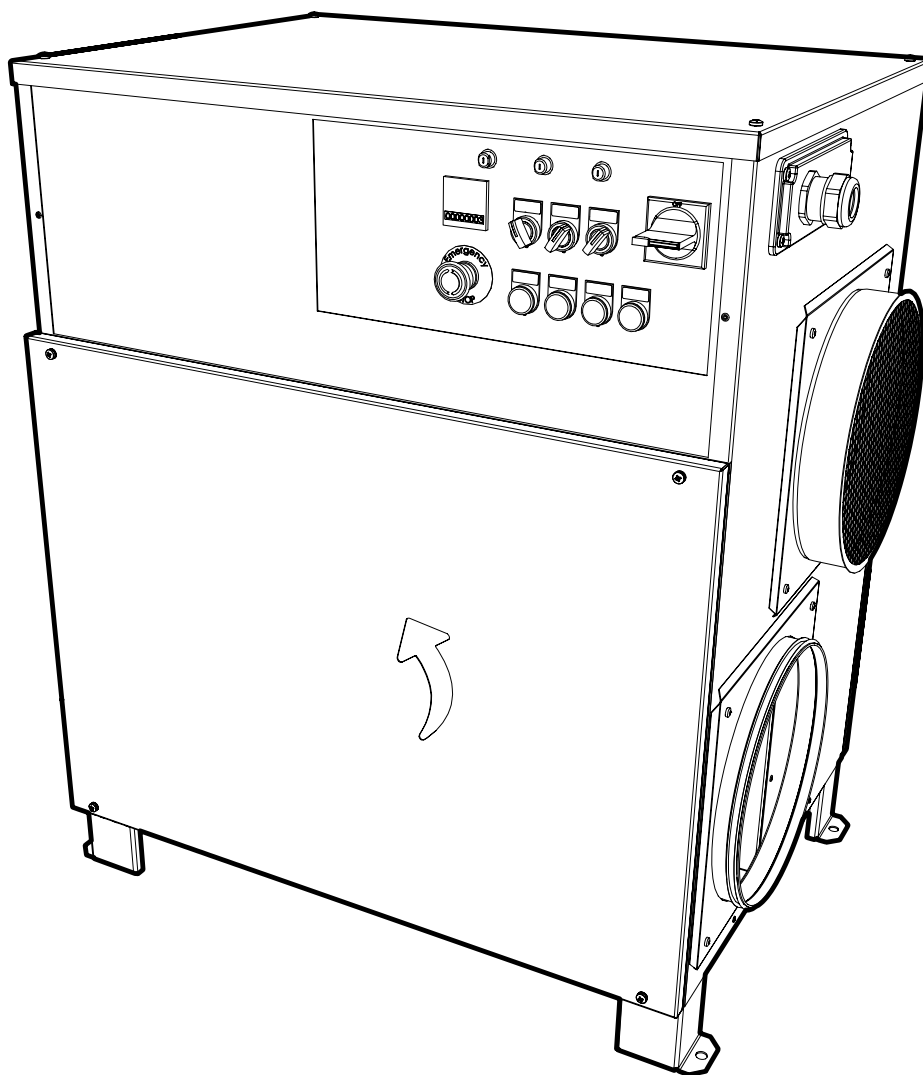


USER'S MANUAL

Document version: EN.04 16.10
Product: RL-61/61L



Desiccant dehumidifier

Product supplied may differ from that illustrated

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Contents

1. Safety.....	7	8.1 Filter guard	18
1.1 Aim of this documentation	7	8.2 Rotation guard.....	18
1.2 Accentuations in the text.....	7	8.3 Frequency converter to fans	18
1.3 Intended use.....	7	8.4 Insulation.....	18
1.3.1 Hazardous operating conditions	7	8.5 ICE-fan	18
1.3.2 Responsibilities of the operator	7	8.6 Energy saving.....	19
1.3.3 Minimising hazards	7	8.7 Electronic humidity controller and electronic humidistat	19
1.4 Safety	7	8.8 PLC - C4	19
1.5 Inspection of goods	7	9. Troubleshooting.....	20
1.6 Safety advice regarding transportation	7	9.1 Error codes	20
1.7 Installation	7	9.2 General troubleshooting.....	20
1.8 Electrical installation.....	8	9.3 Capacity troubleshooting	21
1.9 Commissioning	8	10. Maintenance	22
1.10 Operation	8	10.1 Regular service interval	22
1.11 Maintenance.....	8	10.2 Washing the rotor	22
1.12 Disposal/recycling.....	8	11. Technical data.....	23
2. Introduction	9		
2.1 Type plate overview	9		
2.2 Serial number structure	9		
2.3 Other unit information	9		
3. Product description	10		
3.1 Product overview.....	10		
3.2 Applications.....	10		
3.3 Principle of operation	10		
4. Installation	11		
4.1 Unit installation	11		
4.1.1 Fork lifting.....	11		
4.1.2 Transport.....	11		
4.1.3 Positioning	11		
4.2 General Duct work installation	11		
4.3 Humidistat/electronic controller installation	12		
4.4 Electrical connection	12		
4.4.1 Power supply.....	12		
4.4.2 Earth leakage circuit breaker	12		
4.4.3 Humidistat connections.....	12		
4.4.4 0-10VDC signal	12		
4.4.5 Remote control.....	12		
4.4.6 Potential-free signals	13		
5. Operation check & adjustment.....	14		
5.1 Pre-operation check	14		
5.2 Start-up test and adjustment.....	14		
6. Operating	15		
6.1 Control panel	15		
6.2 Start.....	15		
6.3 Stop	15		
6.4 Reset buttons & switches	15		
7. Functions.....	16		
7.1 Dehumidification function	16		
7.1.1 Automatic or Manual	16		
7.1.2 AUTO-VENT or AUTO-OFF	16		
7.1.3 Humidistat connection	16		
7.1.4 0-10VDC connection.....	17		
7.2 Remote control switch	17		
7.3 Delta-P Alarm	17		
8. Option & accessory.....	18		

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Appendix

1. Component list
2. Dimension
3. Harmful chemicals and solvents for rotors
4. CE-declaration

Electrical wiring diagram is stored in the document pocket, depending on the unit, inside or outside the electrical box. The electric diagram has a drawing number. This number should correspond to the sticker with a drawing number found inside the electric cabinet.

If applicable, separate users' manuals for components with separate controls are found in the document pocket.

Figures

FIGURE 1: Type plate.....	9
FIGURE 2: Serial number structure for a single-phase unit	9
FIGURE 3: Serial number structure for a three-phase unit.....	9
FIGURE 4: Product overview	10
FIGURE 5: Principle of operation & rotor	10
FIGURE 6: Forks in contact with both sides of the frame.....	11
FIGURE 7: Units with handles	11
FIGURE 8: Exercise caution when lifting and transport a unit	11
FIGURE 9: Humidistat positioning.....	12
FIGURE 10: Control panel.....	15
FIGURE 11: Illustration of automatic and manual functions	16
FIGURE 12: Sub-modes for automatic control	16
FIGURE 13: dP-Alarm guard -Adjustable	17
FIGURE 14: Electronic filter guard	18
FIGURE 15: Manometer - mechanical filter guard	18
FIGURE 16: Linearly control.....	19
FIGURE 17: EH3 T2	19
FIGURE 18: EH4	19
FIGURE 19: C4 PLC with 5.7 "color touchscreen	19
FIGURE 20: Troubleshooting table and solution	20
FIGURE 21: General troubleshooting table and solution	20
FIGURE 22: Capacity troubleshooting and solution table.....	21
FIGURE 23: Service chart	22

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1 SAFETY

1.1 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.

Noncompliance 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.

1.2 ACCENTUATIONS IN THE TEXT



Caution! Identifies hazards that could lead to damage of the equipment.



Warning! Indicates "potentially" hazardous situations, which could result in damage of the equipment, serious personal injury or death.



Danger! Indicates "imminently" hazardous situations, which could result in damage of the equipment, serious personal injury or death.



Attention! Indicate important information or instruction that requires special attention.

1.3 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 (ATEX).
- Conditioning of air at elevated pressures.
- Air that enters the rotor is not properly filtered with at least G4 class.
- Compounds in the air that will possibly deteriorate the silica gel rotor. See appendix for detailed information.

1.3.1 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).

1.3.2 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.

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

1.3.3 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.

To ensure a failure-free operation:

- 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.

1.4 SAFETY

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.

1.5 INSPECTION OF GOODS

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.

1.6 SAFETY ADVICE REGARDING TRANSPORTATION



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



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



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



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

1.7 INSTALLATION



Attention! 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.




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



Caution! The air dryer or rotor cassette requires installing on a horizontal plane.

-  **Attention!** The air ducts must be vibration free and sizable enough to prevent pressure build-up when conveying the incoming and outgoing air from the unit. Do not support the full weight of the ducts onto the unit.
-  **Attention!** Wet air outlet duct must be insulated to prevent condensate and ice build-up during cold conditions.


1.8 ELECTRICAL INSTALLATION


-  **Attention!** 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 plants.
- Has completed the appropriate health and safety training.
- Has read and is familiar with the contents of this manual.

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

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

-  **Danger!** Electrical connections are to be made in accordance with local regulations.


-  **Attention!** Check incoming electrical supply conforms to the electrical wiring diagram and the manufacturer's type plate attached to the unit.

-  **Caution!!** 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.
- During maintenance.


-  **Caution!** 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, technical data or parameter list.


-  **Warning!** This equipment will contain high voltage electrical components!


1.9 COMMISSIONING

-  **Attention!** Equipment fans can produce noise levels above 80 dB (A). Use ear protection if remaining close to an operating machine for any length of time.

1.10 OPERATION


-  **Caution!** Use the normal shut down procedure as described in operation. 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.


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


-  **Caution!** Do not expose the unit to ambient temperature that exceeds 50°C/122°F (e.g inside a plant room) for longer period of time. This may damage the internal components!

-  **Caution!** Do not process air with temperature higher than 40°C/104°F. This may damage the internal components!


1.11 MAINTENANCE


-  **Caution!** 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.


-  **Caution!** For maintenance purposes, use the normal shut down procedure as described in operation and allow the system to cool down before attempting to access internal components.


-  **Danger!** To prevent unintentional restart, ensure that the main isolator switch is off and power isolated before servicing internal components.

-  **Attention!** Advise all operating & maintenance personnel regarding automatic restart function if applicable.


-  **Attention!** Pay attention to accessibility requirements for maintenance and service purposes.


-  **Danger!** Only certified personnel are allowed to adjust, repair and modify the unit's refrigerant system. Contact your DST representative for any questions (Econosorb & Frigosorb only).


-  **Caution!** 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).

-  **Caution!** Do not expose the unit to water jets during washing down procedure!

-  **Caution!** Do not wash the rotor!

-  **Warning!** Allow fans to come to a complete stop and the unit must be isolated from the electrical supply before removing any panels!

-  **Warning!** The unit is equipped with a heating element. Do not touch the equipment whilst it is hot. Allow the unit to cool for at least 30 minutes before any service or maintenance is performed.

-  **Danger!** The unit must be manually isolated from the electrical supply by turning the main isolator to "OFF" and secured with a lock pad before conducting any types of service and maintenance work on the unit.

1.12 DISPOSAL/RECYCLING

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

2 INTRODUCTION

2.1 TYPE PLATE OVERVIEW

The manufactured unit is identified by a type plate. The type plate is position on front or the right side of the unit. The type plate is structured as followed:

1. Model designation
2. Serial number
3. Electrical supply information
4. Regeneration heater power

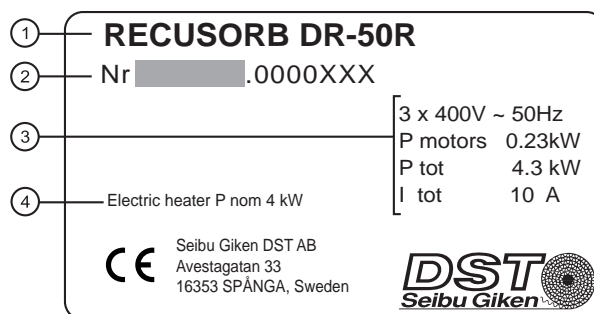


FIGURE 1: Type plate

2.2 SERIAL NUMBER STRUCTURE

The serial number printed on the type plate is composed of codes to enable a fast identification of the unit. Units manufactured pre 2006 use as modified serial number structure which does not match the current structure.

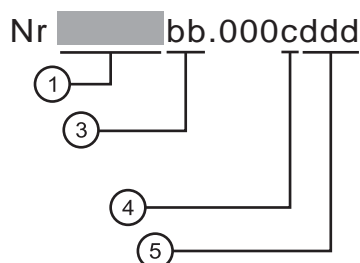


FIGURE 2: Serial number structure for a single-phase unit

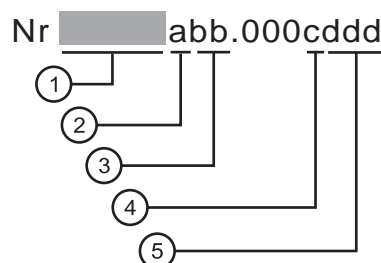


FIGURE 3: Serial number structure for a three-phase unit

1. Model designation
2. Regeneration heater (a) - the type of heater the unit is equipped with.

R = Resistive (electric)	HW = Hot water
G = Gas	WW = Warm water
S = Steam	D = Diesel
	O = Oil

3. Special unit (**bb**) - Code to indicate a special manufactured unit.

SP = Special

Note: The absent of "SP" will indicate it is a standard manufactured unit, e.g. DR-50RSP is a special manufactured unit. DR-50R is a standard manufactured unit.

4. Serial number (**c**) - To indicate if the unit belong to a special or standard manufactured series.

0 = Standard manufactured series

7 = Special manufactured series

5. Serial number (**ddd**) - Serial number for the manufactured unit (**ddd**).

001, 002, 003, 004...n

2.3 OTHER UNIT INFORMATION

In the appendix, a component list containing spare parts with articles numbers as well as the electrical diagram number for the electrical box. Special unit with custom installed components will have a list of installed options added on the same list.

3 PRODUCT DESCRIPTION

3.1 PRODUCT OVERVIEW

1. Regeneration fan
2. Control panel
3. Process fan
4. Dry air out
5. Process filter
6. Process air in
7. Regeneration heater
8. Rotor
9. Regeneration filter
10. Regeneration air in
11. Wet air out

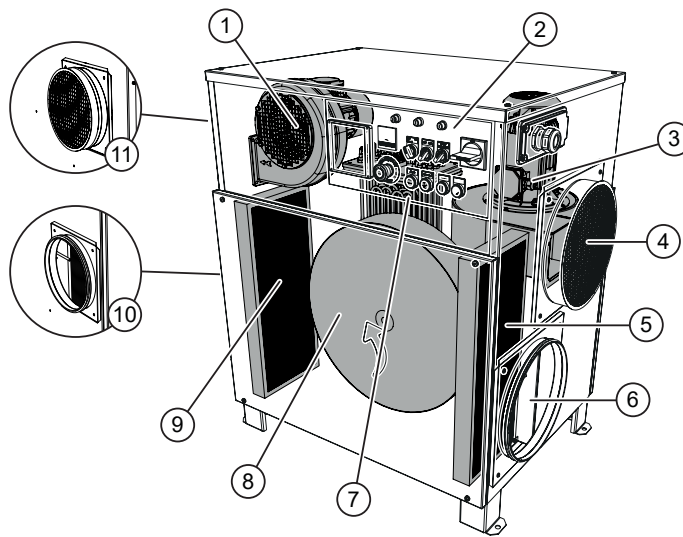


FIGURE 4: Product overview

Variation of installation and components may vary.

3.2 APPLICATIONS

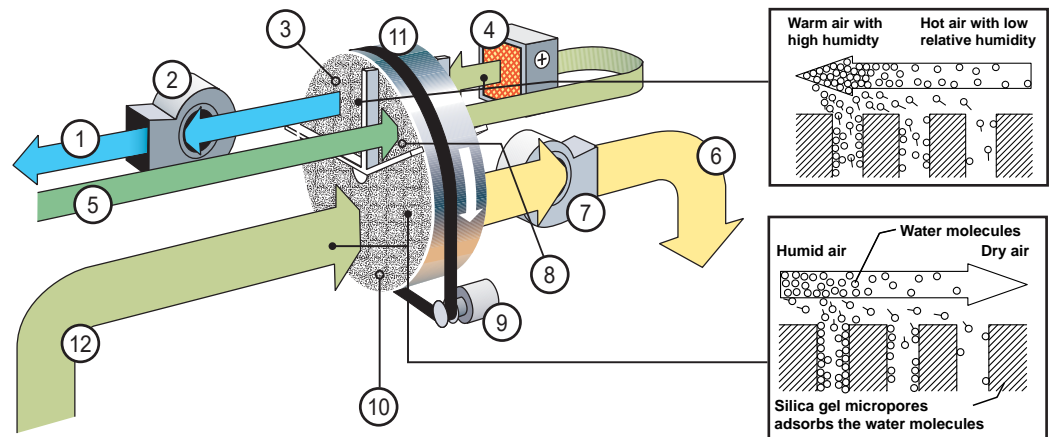
DST desiccant type dehumidifiers are normally used where dry air is essential to the various manufacturing processes used in chemical, pharmaceutical, food or confectionery industries, or where a dry environment is required for storing and handling of moisture sensitive products and raw materials.

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 dew points far lower than the effective operating range of refrigeration dehumidifiers.

3.3 PRINCIPLE OF OPERATION

It works on a continuous process with two air streams of different flow rates, normally having a flow ratio of approximately 3:1. 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 drive the adsorbed moisture vapour from the desiccant. The moisture which is removed from the process air, is transferred over to the other as the rotor turns slowly.

1. Wet air outlet
2. Regeneration air fan
3. Regeneration sector
4. Regeneration heater
5. Regeneration air in
6. Dry air outlet
7. Process air fan
8. Purge sector
9. Rotor motor
10. Process sector
11. Rotor
12. Process air inlet



RECUSORB Light is a continuous dehumidifier with internal energy recovery and able to reach very low dew points. During regeneration, sensible heat is adsorbed by the rotor material. The rotor rotates and enters a small purge sector where part of the incoming regeneration air is pre-heated. As a result, the regeneration air is pre-heated before the air enters the regeneration heater, thus reducing the amount of energy to heat the air in the regeneration heater. Purge sector will also desorb some of the water molecules before the rotor enters the process sector.

Now that the excess heat in the rotor material is reduced by the purge sector. This will reactivate the rotor materials to prepare it for adsorption. When the rotor finally enters the process sector, the adsorbing starts immediately until the rotor passes over to the regeneration sector. In this sector the hot air will heat the rotor materials and desorbs the water molecules in to the air and exits through the wet air outlet.

FIGURE 5: Principle of operation & rotor

4 INSTALLATION

4.1 UNIT INSTALLATION

Follow the directions regarding installation of heavy and medium weight dehumidifiers.

Note: Use the installation guidelines as a reference only.

4.1.1 FORK 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 using 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.
- Units equipped with handles are very heavy. Do not lift the unit single-handedly! Always ask for assistance or use lifting aid!

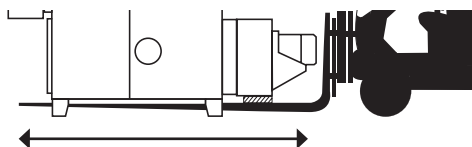


FIGURE 6: Forks in contact with both sides of the frame.

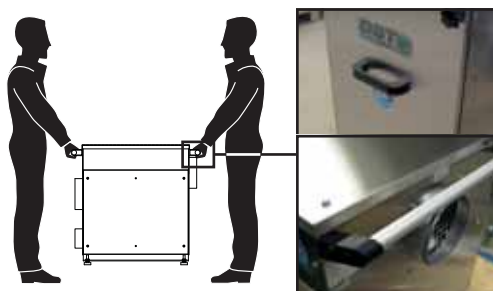


FIGURE 7: Units with handles

4.1.2 TRANSPORT

Dehumidifiers with external fans or a high centre of gravity runs the risk of tipping. Use caution when lifting and moving the dehumidifier.

Note:

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

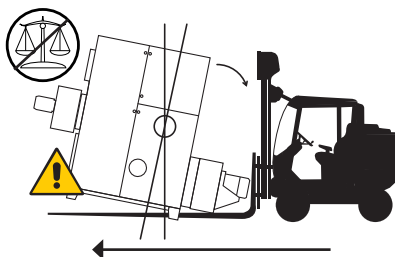


FIGURE 8: Exercise caution when lifting and transport a unit

If not balanced, the unit may run the risk of tipping during transport.

See "11 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 vary depending on the model. To avoid incorrect positioning, see the dimensional drawing in the appendix for service space and foot bolt-hole dimensions.

4.2 GENERAL DUCT WORK INSTALLATION

The guidelines are to assist the installers and operators to adjust the duct/dehumidifier installation. Consult your DST representative or local mechanical installation company for more information.

- Avoid recirculation from the separate airflows, direct entering and exiting airflow away from each other.
- Check if the dry air is well distributed in the dehumidified area.
- The regeneration air in and wet air out has to be connected to the outside of the dehumidified area, preferable outdoor.*
- To increase the lifetime of the filter, it is recommended taking air from a higher level where dust and other particles are kept at minimum.*

- Install dry air out duct/channel at a high level.
- To maximize the drying capacity, free blowing on dry air out without airflow reduction is recommended.
- Allow wet air to disperse freely when exiting the duct.*
- It is recommended to insulate the wet air duct.*
- The wet air duct must be installed at a sloping outwards angle, due to risk of condensation inside the duct work. The setup will also prevent condensation flowing back into the dehumidifier.*
- If the duct needs to be installed higher than the wet air outlet, fix a condensate drain at the lowest point of the duct.*
- Do not connect the air outlet to a ventilation system which can create pressure that will result in reverse airflow through the dehumidifier.

*N/A for F-31 and AQ-30/31.

4.3 HUMIDISTAT/ELECTRONIC CONTROLLER INSTALLATION

Install the humidistat/electronic controller away from the dry air out path to avoid false readings.

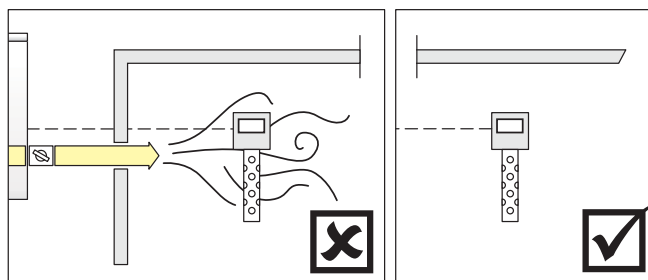


FIGURE 9: Humidistat positioning

4.4 ELECTRICAL CONNECTION

Electrical components should be connected to the supply according to the local regulations and requirements.

4.4.1 POWER SUPPLY

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

4.4.2 EARTH LEAKAGE CIRCUIT BREAKER

Due to the high capacitive currents present in the AC drive, earth leakage circuit breakers may not function properly.

Note: This is only applicable if the unit is equipped with a frequency converter.

4.4.3 HUMIDISTAT CONNECTIONS

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

See electrical diagram for connections.

See "7 Functions" for more details.

*For models with no selectable heater output.

** For models with at least two selectable heater output.

4.4.4 0-10VDC SIGNAL

Units with optional connections points for an electronic humidity controller or another regulator signal is marked on the electrical diagram.

See "7 Functions" for more details.

See electrical diagram for connections.

4.4.5 REMOTE CONTROL

The unit has a connection point for a remote switch.

See electrical diagram for connections details.

See "7 Functions" for more details.

4.4.6 POTENTIAL-FREE SIGNALS

Potential free contacts are marked on the electrical diagram for connecting external indicators. These indicators are used to transmit signals to a remote centre, to indicate if unit or fans are still in operation.

Standard indicator

- Alarm indicator
- Run indicator*
- Regeneration fan indicator*
- Process fan indicator*

Optional indicators (N/A for certain units)

- Filter guard (regeneration) 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.

**Standard indicator may differ depending on model and configuration. See electrical diagram for more information.*

5 OPERATION CHECK & ADJUSTMENT

5.1 PRE-OPERATION CHECK



Danger!

The operator of the system has to ensure that all personnel who are involved with installation, operation and maintenance of the machine have read the "1 Safety" sections of this manual.

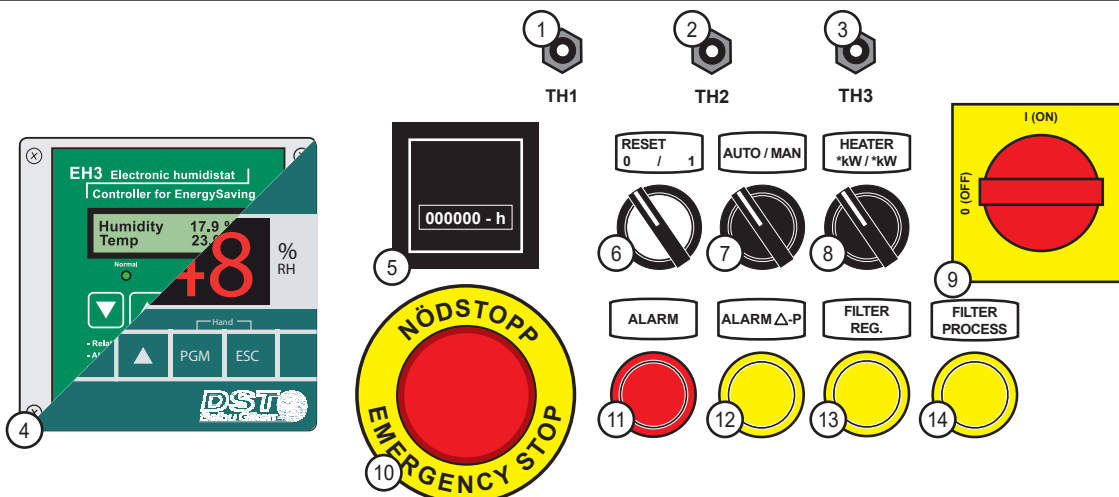
1. Inspect and clean the inside of the unit from foreign objects such as rags, tools, particles of metal, and such, that may pose damage to the inside of the unit.
2. If fitted, ensure that both air balance dampers are fully open and check that the air paths of the duct work are not obstructed in any way.
3. Check that the filters are securely in place.
4. Confirm both motor overload protectors are set to Start/On position.
5. If fitted with condenser or cooler, install a water trap.
6. Confirm thermostat and overheat protection settings are in accordance with table shown "11 Technical data".
7. Confirm the incoming electrical power cable is secure and ensure that live wires are securely located in the correct terminals. Ensure the earth wire is securely located onto the earth strap or earth terminal provided.
8. 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 the supply voltage is correct.
3. Briefly start the unit and then turn it off. Promptly check if the process fan and regeneration fan is rotating in the correct direction. If incorrect check "9 Troubleshooting". See "6 Operating" on "Start" and "Stop".
4. If fitted, balance the airflows, using the dampers in the duct work or adjust the frequency of each frequency converter to obtain the required values.
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 technical data and electrical diagram.
6. Measure the current on both fans and compare with the electrical specifications printed on the fan motor casing. If the current is too high, reduce the airflow slightly by closing down on the respective balance damper.
7. If connected, check remote control operation.
8. If connected, check remote alarm function (see 5 above).
9. If connected, check humidistat/electronic humidity controller function.

6 OPERATING

6.1 CONTROL PANEL



- | | |
|--|--|
| 1. [TH1] - Safety thermostat for regeneration heater - Reset switch | 9. [MAIN] - Main isolation switch |
| 2. [TH2] - Control thermostat for regeneration heater | 10. [EMERGENCY] - Emergency stop button |
| 3. [TH3] - Safety thermostat for wet air outlet - Reset switch | 11. [ALARM] - General alarm light |
| 4. Electronic controller* / Humidistat* | 12. [ALARM Δ-P] - Pressure balance alarm light (Unbalanced airflow between regeneration airflow and process airflow) |
| 5. Run time meter | 13. [FILTER PROCESS] - Warning light for filter guard on process air* |
| 6. [0 RESET/1] - Combined operating switch ("ON=1" or "OFF=0") and run light indicator. The switch also acts as a reset switch when the emergency stop button has been used. | 14. [FILTER REG] - Warning light for filter guard on regeneration air* |
| 7. [AUTO/MAN] - Mode switch for AUTO or MAN | |
| 8. [HEATER] - Switch for selecting heater power | |

* Option

FIGURE 10: Control panel

Note: Control panel layout - for guidance only. Panel supplied may differ from that shown.

6.2 START

Start the unit.

1. Turn [MAIN]-switch to "I".
2. Turn [AUTO/MAN]-switch to "MAN" for continuous dehumidification or "AUTO" for automatic-mode with connected humidistat/regulator signal.
3. Select capacity by choose the output on [Heater] switch*.
4. Turn [0/1] to "1" and the unit starts running.



Caution!

When "Automatic restart" selected. The unit starts automatically after a power failure. It is important that all personnel involved with installation, operation, maintenance and service of the unit are made aware of this function.

6.3 STOP

Unit will shut down.

-A timed cooling down period on the regeneration fan is initiated before turned off.

1. Turn [0/1] to "0".



Caution!

Do not use the main isolator switch to turn off the unit. Always use the described stop procedure to turn off the unit.

6.4 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 is only required when a operation is halted by hardware failure or triggered a safety mechanism. See troubleshooting for more information.

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

7 FUNCTIONS

7.1 DEHUMIDIFICATION FUNCTION

The unit is equipped with multiple modes to control the dehumidification. It allows automatic control with connected humidistat or regulator signal*, or manual override. A selectable option to set the ventilation modes during automatic mode is also possible.

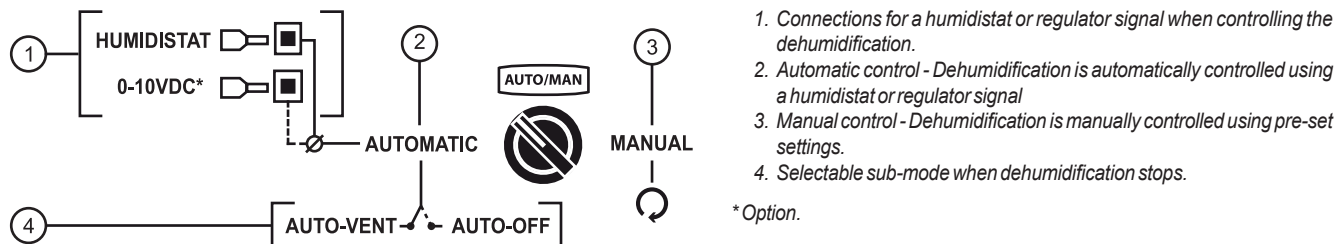


FIGURE 11: Illustration of automatic and manual functions

7.1.1 AUTOMATIC OR MANUAL

Main operation control is operated by selecting automatic or manual mode on the [AUTO/MAN]-switch.

- AUTOMATIC [AUTO]** - Dehumidification capacity is controlled automatically by a humidistat/regulator signal. A user selectable sub-mode is available as standard to save energy or to ventilate when the dehumidification need is achieved. See "7.1.2 AUTO-VENT or AUTO-OFF" to select sub-modes.
- MANUAL [MAN]** - The unit will run on selected settings until manually turned off. This mode will also prevent a humidistat or a regulator signal from shutting down the unit.

Note: Electrical heater output is selectable. Available for certain models only. See "6 Operating".

Note: AUTO-mode is only operable when a humidistat/regulator signal is connected.

Note: If the unit is fitted with energy saving, the regeneration heater will operate on full effect in MAN-mode.

7.1.2 AUTO-VENT OR AUTO-OFF

Automatic mode allows the user to select two sub-modes, when dehumidification stops. The unit will automatically start dehumidify again when the humidity rises above the setpoint on the humidistat or regulator signal.

- AUTO-VENT** is a ventilation mode that provides a constant airflow by keeping the process fan running.
- AUTO-OFF** is not a ventilation mode, unit stops all fans and is powered down to a sleep mode.

AUTO-VENT	AUTO-OFF

Note: When the dehumidification stops, a timed cooling down period on the regeneration fan will be initiated to remove potential residual heat from the heaters. See cooling down timer in "11 Technical data".

Note: Factory default setting on AUTO-VENT and AUTO-OFF varies among models. For units with PLC, view and change the mode in the PLC. For units without PLC, change the mode by changing the terminal link wire inside the electrical cabinet. See electrical diagram for default ventilation mode on the unit.



FIGURE 12: Sub-modes for automatic control

7.1.3 HUMIDISTAT CONNECTION

Standard units have the option to use the built-in Humidistat inputs to control the dehumidification using a 1-step or 2-step humidistat.

The built-in humidistat controls the dehumidification by reducing the regeneration heater in steps. Use a 2-step humidistat to control the heater output in three steps (maximum power, reduced power and zero power) or a 1-step humidistat for heating output in two steps (maximum power and zero power).

Mode	Two-step humidistat (Applies for electrical heater)		One-step humidistat (Applies for steam heater)	
	Humidistat inputs	Heater output	Humidistat input	Heater output
1	Humidistat step 2 (Closed) Humidistat step 1 (Closed)	Full power	Humidistat (Closed)	Full power
2	Humidistat step 2 (Opened) Humidistat step 1 (Closed)	Reduced power*	N/A	N/A
3	Humidistat step 2 (Opened) Humidistat step 1 (Opened)	Zero power**	Humidistat (Opened)	Zero power***

* See technical data for details on electrical heater output for reduced power.

** The unit enters a sub-mode.

See electrical diagram for details and connections.

7.1.4 0-10VDC CONNECTION

Note: Option

This feature replaces the standard built-in humidistat inputs when Energy saving 2 or 3* is fitted. A 0-10VDC regulator is used to control the dehumidification capacity on a precision level when the built-in Humidistat input feature is insufficient.

Electronic humidity controller	Regulator signal	Capacity output
EH3 T2/others	0...10VDC	0...100%

Note (For units without PLC): AUTO-OFF and AUTO-VENT feature is disabled when fitted with energy saving.

* N/A for R-51/60/61, RL-60/61/71.

See "8.6 Energy saving" for more feature description.

See electrical diagram for customer connection.

7.2 REMOTE CONTROL SWITCH

Connections for an external power switch is available as standard. The remote power switch allows the user to shut down or turn on the unit from another location.

Note: The external power switch overrides the manual and automatic mode and must be restored to start the unit.

See electrical diagram for connections.

7.3 DELTA-P ALARM

The separate alarm feature is to ensure there is a sufficient negative pressure on regeneration airflow chamber compared to the pressure in process airflow chamber. An alarm indicator lights up if the pressure is not adjusted. See troubleshooting for more information.

Note: The alarm will not stop the unit.

Note: If pressure is not properly adjusted, humid air from the regeneration airflow will infiltrate the process airflow and mix with the dry air.

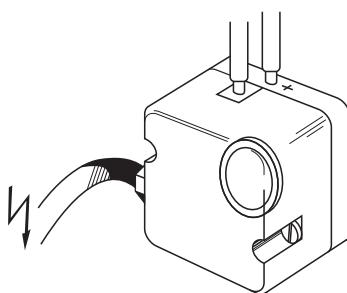


FIGURE 13: dP-Alarm guard - Adjustable

Pressure threshold is adjustable and is located inside the electrical box.

8 OPTION & ACCESSORY

8.1 FILTER GUARD

Filter guard is a pressure indicator which tells the condition of the filter. Different options are available for purchase and comes in different varieties, such as a mechanical (differential U-tube manometer) or an electronic filter guard.

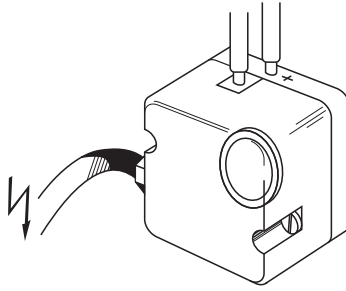


FIGURE 14: Electronic filter guard

If the differential pressure increases beyond the recommended value, the filter needs to be replaced as soon as possible. This is indicated by warning light or a message on the PLC.

See "11 Technical data" for recommended pressure for each filter type.

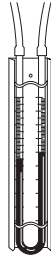


FIGURE 15: Manometer - mechanical filter guard

8.2 ROTATION GUARD

A safe guard feature that stops the unit from overheating in case of a sudden stop in the rotor rotation. The rotation guard will stop the unit and turn on an alarm indicator or display an error message on the PLC.

Note: Rotation guard is included in Energy saving 2 and 3.

8.3 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.

Note: Due to the high capacitive currents present in the AC drive, earth current leakage breaker may not function properly.

8.4 INSULATION

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

8.5 ICE-FAN

If an increased airflow is needed, the standard process can be replaced and fitted with a powerful ICE-fan.

Note: A frequency converter may be required for certain models.

Data flow and other technical data is located in the datasheet.

8.6 ENERGY SAVING

To save energy, the unit can be fitted with different “Energy saving” features.

Option Energy saving 1: The dehumidifier is controlled by a 1- or 2-step humidistat. E.g., an electric-mechanical HMH, or the electronic controllers EH3 T2 or EH4.

Option Energy saving 2: Controls the heater for units with electrical heater. The unit is fitted a linearly control, which controls the heater output linearly. The dehumidifier is controlled by an external signal 0-10VDC, e.g., from a electronic controller EH3 T2. See illustration below.

Note: Only applicable for electric heater.

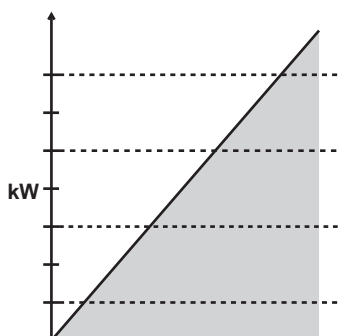


FIGURE 16: Linearly control

Example of linearly control for linear heater output.

8.7 ELECTRONIC HUMIDITY CONTROLLER AND ELECTRONIC HUMIDISTAT

Control the dehumidification process using the advanced electronic humidity controller EH3 T2 or the simpler electronic humidistat EH4. The devices can be built in the electrical box next to the control panel or loose device for on-site installation.

See “8.6 Energy saving” for more information on what features they can be installed on.

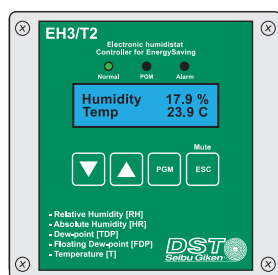


FIGURE 17: EH3 T2

Electronic humidity controller with multiple settings and advanced control for dehumidification,

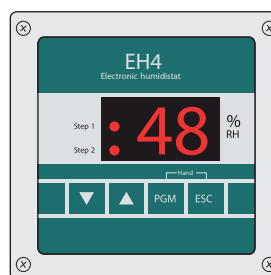


FIGURE 18: EH4

2-step humidistat for less demanding dehumidification control.

Note: Data sheet and user's manual is available separately.

8.8 PLC - C4

The C4 is a touchscreen enabled PLC with multiple I/O and is installed with custom software that allows advanced dehumidification for a specific need.

Add-on modules allows, e.g. remote control using modbus, ethernet using TCP/IP modbus or modem control.

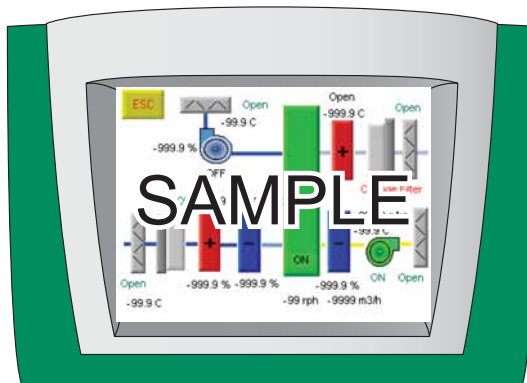


FIGURE 19: C4 PLC with 5.7 inch color touchscreen

Consult your DST representative for more information.

9 TROUBLESHOOTING

9.1 ERROR CODES

The dehumidifier will automatically shut down if an error is detected. During shut down, a timed cooling down period on the regeneration fan is initiated before turned off. See below for error codes.

CODE	EXPLANATION	CAUSE	SOLUTION
If the unit stops and the ALARM-light is lit.	Process fan overload. Regeneration fan overload.	Excessive airflow. Short-circuit or fan malfunction.	Check fan. Check setpoint of F1/F2 or Q1/Q2. Reset F1/Q1 or F2/Q2 – check and adjust airflow. Have a qualified electrical technician to investigate.
	Regeneration air thermostat TH1 has tripped. Regeneration heater overload. Note: Not applicable when fitted with steam.	TH1 setting incorrect. TH1 defective (fail safe). Incorrect shut down. Insufficient regeneration airflow. Excessive regeneration heater power. Regeneration heater malfunction.	Check TH1 setting. Check correct operation of TH1. Reset TH1 - reset F3 - F5. Check regeneration airflow and fan operation. Check TH2 setting. Check and replace heater.
	Overload in the transformer.	Short-circuit or transformer malfunction.	Check transformer.
	Wet air thermostat tripped (TH3).	TH3 setting incorrect. Excessive regeneration airflow. Excessive regeneration heater power. Incorrect or intermittent rotor rotation. Insufficient system moisture load.	Check TH3 setting. Check and adjust regeneration airflow. Check TH2 setting. Check rotor drive system. Check process airflow and fan operation. Check process inlet moisture content. Check RH controller set point/output control signal.
	Rotation guard sensor has not detected movement.	Rotor drive system failure. Sensor failure or incorrect clearance.	Check drive motor & transmission (correct belt tension). Check clearance gap between sensor and rotor marker. Turn the [0/1]-switch to "0"-position and main switch to "0/OFF"-position to restore.
	Frequency converter alarm.	Frequency converter internal alarm activated – fault code shown.	Refer to converter manual for fault code explanation.
EMERGENCY STOP BUTTON is lit.	Operation terminated.	Emergency button activated. [0/1]-switch is active (if fitted with auto restart).	Pull the emergency button to restore. Turn the [0/1]-switch to "0"-position to restore.
The unit is running and the ALARMΔP-light is lit. Note: Applicable for RL-61/71 only.	Internal pressure balance is not optimal.	The negative pressure on the regeneration air chamber is insufficient.	Throttle the damper on regeneration air in until ALARMΔP-light is turned off. Check the airflow guard. Check the airflow guard setting (recommended is 30Pa).

FIGURE 20: Troubleshooting table and solution

9.2 GENERAL TROUBLESHOOTING

Check for following if the unit will not start-up.

PROBLEM	CAUSE	SOLUTION
Unit will not start. None of the light indicators are on.	No power to unit. No power to control circuit. The emergency stop button is active.	Confirm electric supply and check local isolator is on. Check remote control is set to 'On/Run' position. Check all circuit breakers are set to 'Start/On' position. Have a qualified electrical technician to investigate. Pull the emergency stop button and then turn the operating switch to "0".
The ALARM-light is on but the unit will not start.	Alarm circuit is preventing start-up.	Check TH1 & TH3 thermostats are set. Check all circuit breakers are set to 'Start/On' position. Check fan motor overloads are set to 'Start/On' position.
The RUN-light is on, but the dehumidifier does not appear to be operating.	The measured value is below the control set point. Remote stop/start is disabled.	Operation can be checked by lowering control set point or switching to 'manual' operation. Check remote control is set to 'On/Run' position and if the cable is undamaged.
The RUN-light is on, but no regeneration airflow is detected. Note: Applicable for DC-50 only.	The flow guard has detected no airflow movement and deactivated the regeneration heater.	Remove blockages or open dampers on the regeneration airflow. Check regeneration fan.

FIGURE 21: General troubleshooting table and solution

9.3 CAPACITY TROUBLESHOOTING

The dehumidifier performance can be roughly checked by feeling the temperature of the uninsulated duct work near the unit.

PROBLEM	OBSERVATION	SOLUTION
The dehumidifier does not maintain required condition or achieve expected performance, despite being operated at full power.	Dry air outlet duct is warm and wet air outlet duct is very warm (normal operation).	<ul style="list-style-type: none"> Check actual moisture load against calculated design moisture load. Check controller set point/output signal. Check airflows are set as specified, adjust as necessary. Check air filters. Check dehumidifier casing and duct work for air leakage. Check rotor alignment and condition of radial and peripheral rotor seals.
	Both outlet air ducts are cold (no alarm).	<ul style="list-style-type: none"> Check regeneration airflow and fan operation. Check regeneration heater operation. Check controller set point/output signal. Check TH2 setting.
	Dry air outlet duct is cold, wet air outlet duct is hot (no alarm).	<ul style="list-style-type: none"> Check rotor rotation. Check process airflow and fan operation.
Measured airflows are lower than specified.	Fan is not rotating in direction indicated by arrow on fan motor casing. The incoming phase supply is incorrect.	<ul style="list-style-type: none"> Isolate mains electrical power supply to the unit. Change over two of the three incoming phase supply wires. Re-check fan rotation.

FIGURE 22: Capacity troubleshooting and solution table

10 MAINTENANCE

10.1 REGULAR SERVICE INTERVAL

Service time	Run time in hours (x1000)	0	4'	8'	12'	16'	20'	24'	28'	32'	36'	40'	44'	48'
	Calendar time in months	0	6	12	18	24	30	36	42	48	54	60	66	72
Inspect filter - replace if necessary		X	X	X	X	X	X	X	X	X	X	X	X	X
Clean and inspect the unit				X		X		X		X		X		X
Inspect fan - replace if necessary				X		X		X		X		X		X
Inspect features and functionality		X		X		X		X		X		X		X
Inspect electric, feature, cables and electrical components - replace if worn or damaged				X		X		X		X		X		X
Inspect access panels, locks and panel seals - replace if necessary				X				X				X		
Inspect duct and duct connections		X				X				X				X
Inspect heater and cooler				X		X		X		X		X		X
Inspect humidistat/humidity sensor - replace if necessary				X		X		X		X		X		X
Inspect rotor motor - replace if necessary				X		X		X		X		X		X
Inspect radial & peripheral seals - replace if worn or damaged				X		X		X		X		X		X
Check operation of geared drive motor, drive pulley, belt/chain, rotor - adjust as necessary*				X		X		X		X		X		X
Inspect rotor for contamination or damage - clean/repair (contact DST)		X		X		X		X		X		X		X
Inspect condenser*														
Inspect evaporator*														
Inspect compressor*														
Inspect cooling system*														

Safety feature check (if fitted)														
Function test on thermostats			X		X		X					X		X
Function test on the freeze alarm	X		X		X		X		X		X		X	X
Function test on rotation guard alarm, check and adjust sensor clearance	X		X				X					X		
Function test on damper, actuator and valves	X		X		X		X		X		X		X	X
Function test on post-cooling function	X		X		X		X		X		X		X	X

FIGURE 23: Service chart

This is a general service chart and the time interval vary depending on the operating condition. Some options listed here may not be installed or available for this specific unit.



Danger!

All personnel involved with installation, operation and maintenance of this unit should familiarise themselves with the safety section of this manual.

*Applies for Frigosorb and Econosorb.

10.2 WASHING THE ROTOR

The D-MAX rotor has a distinct advantage over other types of desiccant rotors in that dust and grease can be washed out of the material without the need for reimpregnation after treatment. In all normal applications however it must be emphasised that washing of the rotor should be considered as a last resort having alleviated all other possible defects first.



Caution!

Please contact a DST-representative before attempting to wash the rotor!

11 TECHNICAL DATA

RL-61 RL-61L

Capacity		
Capacity [kg/h] 1)	7.5	11
Nominal dry air flow [m ³ /h] 2)	1300	1800
External static pressure dry air [Pa] 2)	200	200
Nominal wet air flow [m ³ /h] 2)	280	420
External static pressure wet air [Pa] 2)	300	300
Regeneration heater - Electric		
Heater power [kW]	9	13.5
Number of electric heater steps	2	2
Heating power in steps [kW]	1/2 - 4,5 2/2 - 9	1/2 - 9 2/2 - 13.5
Heating power with linear control [kW] 4)	0-9	0-13.5
Humidistat 2 opens and reduce the effect to [kW]	4.5	9
Total power - Electrical		
Total motor power [kW]	1.12	2.05
Total power [kW]	10.12	15.55
Other electrical information		
Supply fuse (Electric) 3x400V/50Hz [A]	20	25
Humidistat connection	230VAC	230VAC
Humidistat supply current [A] 5)	< 1	< 1
Temperature setpoint settings		
Overheat protection TH1 [C]	190	190
Thermostat TH2 [C]	160	160
Overheat protection TH3 [C]	80	80
Other technical data		
Air filter class (regeneration/process)	F7/F7	F7/F7
Filter change at pressure (G4/F7) [Pa]	200/250	200/250
Differential pressure switch - Regeneration airflow [Pa]	30	30
Noise level [dB(A)] 3)	-	-
Regeneration air fan delay [min]	12	12
Weight [kg]	130	132

1) Valid for inlet conditions 20°C/60%RH (equal 1.2 kg/m³).

2) If no data is stated here the volume flow above is given at free blowing airflow.

3) Unit connected to uninsulated ducts. Nominal airflows.

4) Applies for dehumidifiers with installed optional feature.

5) The current provided by the humidistat connection. Only use humidistats that are capable of this load current.

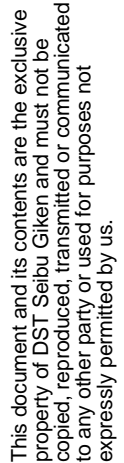
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Seibu Giken DST AB, ATT: Documentation, Avestagatan 33, 163 53 SPÅNGA, SWEDEN.

E-mail: info@dst-sg.com, subject: Documentation.

Komponentlista / Component list RL-61

Description	Antal Qty.	Benämning	Typ, ritn nr o dyl Type, Drwg No etc	61	61L	Art. Nr Art No	Anmärkingar Notes
Rotor unit Rotorenhet							
Rotor	1	Rotor	DMR-550H10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	108256	
Radial seal	1,5	Teflonremsa	0,35x35x1000mm; Teflon	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	105241	
Periferal seal	2	Periferitätning	Felt+EPDM 1750x25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	103131	
Hose clamp	2	Slangklämma	Nemo-9 60-650	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	100275	
Seal wet air box	0,8 m	Silikontätning våtluftslåda	Tätningslist DST-2 15 mm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	100217	
Brusch seal	0,2 m	Borsttätning	Tätning borst -23mm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	107922	
Rotormotor	1	Drivmotor	Robase 34.2-G250.F-X; 230V 50-60Hz; 0,5uF; 9W; 6rpm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	110230	
Belpulley	1	Remskiva	30 5M 09 d=8	<input type="checkbox"/>	<input checked="" type="checkbox"/>	100642	
Belpulley	1	Remskiva	15 5M 09 d=8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	102583	
Belt	1	Drivrem	1870 5M 09	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	104654	
Fans Fläktar							
Proc.fan	1	Processfläkt	GSF-2-180/85-075T; 3x400V 0,75kW 1,8A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	104659	
Proc.fan	1	Processfläkt	GSF-2-200/50 -150T; 3x400V 1,5kW 3,3A	<input type="checkbox"/>	<input checked="" type="checkbox"/>	110243	
Reg.fan	1	Reg.fläkt	GSF-2-160/62-037T; 3x400V 0,37kW, 1A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	108450	
Reg.fan	1	Reg.fläkt	GSF-2-180/62-055T 3x400V 0,55kW 1,5A	<input type="checkbox"/>	<input checked="" type="checkbox"/>	109045	
Filter Filter							
Filter	1	Filter	EP 600x240x50 F7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	108897	Process
Filter	1	Filter	EP 600x240x50 F7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	108897	Regeneration
Regeneration heater - Resistive heater Regenereringsvärmare - Resistivvärmare							
Reg.heater	1	Reg. värmare	9kW (4,5+4,5); 3x400V	<input checked="" type="checkbox"/>	<input type="checkbox"/>	106292	
Reg.heater	1	Reg. värmare	13,5 kW (9+4,5); 3x400V	<input type="checkbox"/>	<input checked="" type="checkbox"/>	100910	
Overheat protection	1	Överhettningsskydd	TH1: heaTHERM 160-200°C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	106157	
Electric box	1	Elcentral	Dwg: 10680-00	<input checked="" type="checkbox"/>	<input type="checkbox"/>	108937	
Electric box	1	Elcentral	Dwg: 11000-00	<input type="checkbox"/>	<input checked="" type="checkbox"/>	110272	
Other Övrigt							
Overheat protection	1	Överhettningsskydd	TH3: heaTHERM 50-100°C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	106158	
Thermostat	1	Termostat	TH2: heaTHERM 0-200°C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	106159	



CE-DECLARATION

(Conformité Européenne)



- | | | |
|--------------------------------------|-------------------------------------|-------------------------------------|
| 1. (S) FÖRSÄKRAN OM ÖVERENSSTÄMMELSE | 6. (DE) KONFORMITÄTSERKLÄRUNG | 11. (DE) DECLARACION DE CONFORMIDAD |
| 2. (CZ) PROHLÁŠENÍ O SHODĚ | 7. (IT) DICHIARAZIONE DI CONFORMITÀ | 12. (GB) DECLARATION OF CONFORMITY |
| 3. (DK) OPFYLDELSESERKLÆRING | 8. (NL) CONFORMITEITSVERKLARING | 13. (EE) VASTAVUSDEKLARATSIOON |
| 4. (FI) VAKUUTUS YHDENMUKAISUUDESTA | 9. (NO) SAMSVARSEKLERING | 14. (PL) DEKLARACJA ZGODNOŚCI |
| 5. (FR) DECLARATION DE CONFORMITE | 10. (SK) VYHLÁSENIE ZHODY | 15. (PT) DECLARAÇÃO DE CONFORMIDADE |

- Härmed intygas att maskintypen:
- Tímto pohlašujeme, že zařízení typu:
- Hermed erklæres at maskintypen:
- Täten todistamme, että kojetyypit:
- Confirmons par la présente que ces matériels de type :
- Hiermit erklären wir, dass die Maschinentypen:
- Si conferma che l'apparecchiatura modello:
- Bevestigd hierbij dat adsorptieluchtdroger type:
- Herved erklæres at maskintypen:
- Týmto prehlasujeme, že zariadenie typu:
- Confirmo que las maquinas tipo:
- Hereby confirms that machinery type:
- Käesolevaga kinnitame, et seadmed:

- Niniejszym potwierdza, że typ maszyny:
- Confirma-se, pela presente, que os tipos de máquina:

AQ-30/31	DC-10	RL-60/60L/61/61L (A)
CS-5/5L	DC-20	RL-71 (A/B/E)
DR-010B	DC-30 T10/T16	RL-71L (A)
DR-010B MH1/V3	DC-31 T10/T16	RZ-071/081/82/101/102/104
DR-20B/30D	DC-50 (A)	(A/B/C/D/E)
DR-31 T10	F-31	RLZ-82/104 (A/B/C/D/E)
DR-40 T10/T16	R-060BR (A)	CZ-082/102/102L/104 (A/B/C/D/E)
DR-50 (A)	R-51/61 (A/B/E)	EF/FF-81/82/101/152

- är utförd i överensstämmelse med och följer följande standard(er) eller andra normgivande dokument, under förutsättning att användning sker i överensstämmelse med våra instruktioner:
- je v souladu s následujícími standardy nebo dalšími normami a předpisy při použití podle našich pokynů:
- er udført i overensstemmelse med og følger følgende standard (er) eller andre normgivende dokumenter, under forudsætning af at anvendelse sker i henhold til vore instruktioner:
- on toteutettu noudattaen seuraavaa (via) standardia (eja) tai muita ohjeellisia dokumentteja, edellyttäen, että käyttö tapahtuu meidän ohjeita noudattaen.
- sont conformes à la (aux) norme(s) suivante(s) ou autre(s) document(s) normatif(s), à condition que ceux-ci soient utilisés conformément à nos instructions
- mit den folgenden Richtlinien und Normen konform sind, wobei ein bestimmungsgemäßer Gebrauch in Übereinstimmung mit der jeweils gültigen Betriebsanleitung vorausgesetzt wird.
- è conforme alle seguenti norme armonizzate, rispettando le nostre istruzioni d'uso:
- in overeenstemming is met de volgende norm(en) en voorschrift(en),

- vooropgesteld dat deze worden toegepast/gebruikt volgens onze instructies:
- er i samsvar med følgende standard(er) eller andre normgivende dokument(er) forutsatt at anvendelse skjer i henhold til våre instruksjoner:
- je v soulade s následujícími štandardami alebo ďalšími normami a predpismi pri použití podľa našich pokynov:
- están en conformidad con los siguientes estándares o cualquier otra normativa documental, que indique que estos se usan de acuerdo a nuestras instrucciones:
- are in conformity with the following standard(s) or other normative document(s), provided that these are used in accordance with our instructions.
- vastavad järgmisele(tele) standardile(tele) või normatiividele, eeldades, et kasutamine toimub vastavalt meiepoolsetele juhistele:
- Są w zgodności z wymaganymi normami lub innymi dokumentami normatywnymi pod warunkiem, że są one wykorzystywane zgodnie z instrukcją obsługi:
- estão em conformidade com a(s) seguinte(s) norma(s) ou outro(s) documento(s) normativo(s), desde que estas sejam utilizadas em conformidade com as nossas instruções:

Machinery directive (2006/42/EC)
Electromagnetic compatibility (2004/108/EC)
Restriction of Hazardous Substances 2 (2011/65/EC)
Pressure equipment directive (97/23/EC)
EN ISO 12100:2010
EN ISO 62061-1
EN 1886:2007
EN 60439-1
EN 60204-1
EN 62491



Avestagatan 33, S-163 53, SPÅNGA, Sweden

29/9 2016
Anders Kristoferson
Managing Director
Spånga
Date

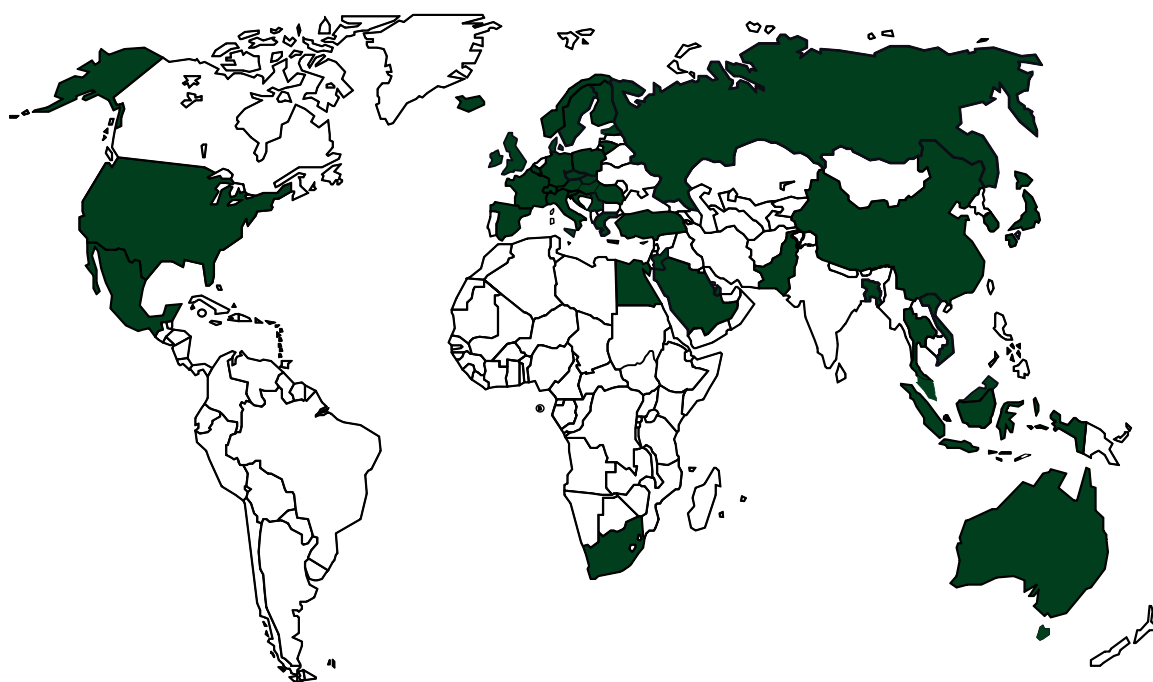
Harmful chemicals and solvents for rotors

SEIBU GIKEN CO.,LTD.

Reduced performance and/or rotor degradation is possible when adsorbing the following substances.

	Substance	Note	Chemical formula	Cause
1	Oil vapor		N/A	Cloggs the micro pores on the silica gel/zeolite.
2	Ammonia	2ppm and above, prolonged exposure	NH ₃	
3	Amine		RNH ₂	Degrades the silica gel/zeolite.
4	Hydrogen fluoride		HF	Corrodes the silica gel/zeolite.
5	Sodium hydroxide	High concentration	NaOH	Dissolves the silica gel/zeolite.
6	Potassium hydrate	High concentration	KOH	
7	Lithium chloride		LiCl	
8	Sodium chloride		NaCl	
9	Potassium chloride		KCl	
10	Calcium chloride		CaCl	Cloggs the micro pores on the silica gel/zeolite.
11	Magnesium chloride		MgCl	
12	Aluminum chloride		AlCl ₃	
13	Seawater		N/A	
14	Strong acid	pH=3 and below	N/A	Deteriorates the honeycomb's physical structure.
15	Plasticizer		N/A	Cloggs the micro pores on the silica gel/zeolite.
16	Nitrogen oxides	High concentration, excessive exposure	NO _x	
17	Sulfur oxides	High concentration, excessive exposure	SO _x	Deteriorates the honeycomb's physical structure.
18	High-temperature steam	Exposod to vapor of 100 and above.	N/A	Cracks occurs on the honyecomb.
19	Heat solubility dust		N/A	Dust covers the silica gel/zeolite surface.

There is no guarantee that other substances beyond this list may reduce the dehumidification performance or damage the silica gel/zeolite.



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