

# MODEL E

## INSTALLATION & MAINTENANCE



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## DECLARATION OF INCORPORATION

Description and identification of the partly completed machinery:

**Rotary heat exchanger model E with casing and with a drive unit.**

The following essential requirements of EC Machinery Directive 2006/42/EC have been applied and fulfilled:

1.1.2, 1.2.1, 1.2.3, 1.2.4.1, 1.2.4.2, 1.2.4.3, 1.2.6, 1.3.1, 1.3.2, 1.3.4, 1.3.7, 1.3.8, 1.3.8.1, 1.3.8.2, 1.4.1, 1.4.2.1, 1.4.2.2, 1.4.2.3, 1.4.3, 1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.5.6, 1.6.1, 1.6.3, 1.7.1, 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2, 1.7.4.3

The relevant technical documentation has been compiled in accordance with Annex VII, Part B of EC Machinery Directive 2006/42/EC. We undertake, in response to a reasoned request, to supply it in electronic form to the market surveillance authorities within a reasonable period.

The party authorized to compile the technical documentation is:

Johan Gidner, R&D Manager

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive.

Malmö, 2015-06-18

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## 1. GENERAL

A rotary heat exchanger with casing and drive is “partly completed machinery” as defined in Directive 2006/42/EC. This product is delivered in compliance with the Directive 2006/42/EC but when installed in the complete machinery it is up to the installer to make sure that the final product complies with the directive.

Special attention should be paid to sharp edges (risk of cuts) and that when the wheel is rotating the rotating parts may cause injuries.

The surfaces of the drive motor and gear can be hot and attention should be paid to the risk of burn injuries.

The sound level from the heat exchanger is less than 70 dB (A).

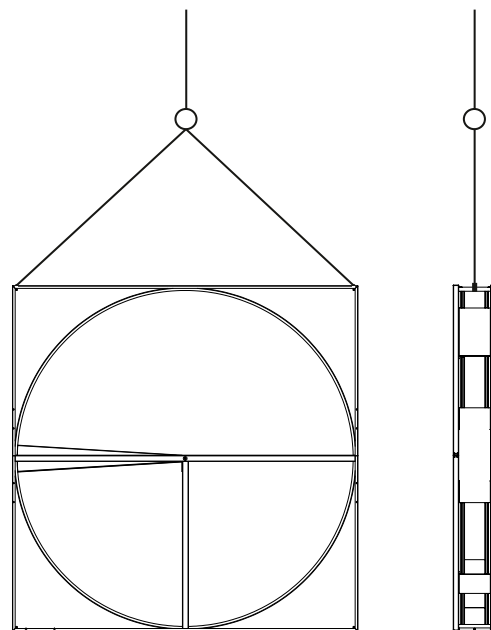
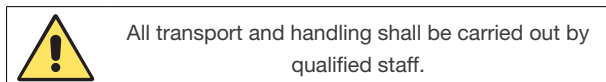
## 2. AT DELIVERY

Before installation, the following should be checked:

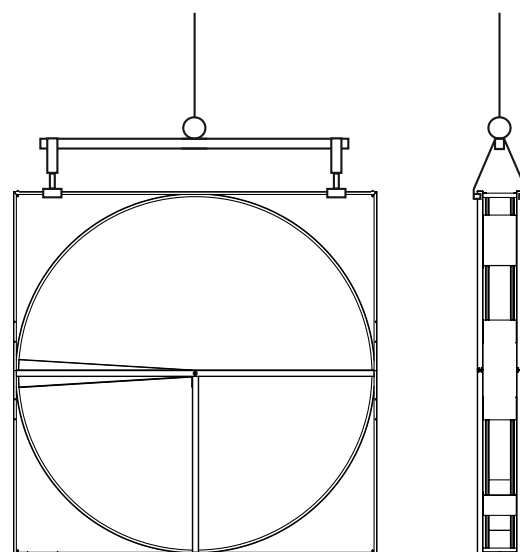
- Check if there are any signs of transport damage before accepting the goods.
- Has the right exchanger been delivered? Check type, design, size and options.<sup>1</sup>
- How is the exchanger to be positioned?
- In case of any damage, please report this in writing by email as soon as possible.

### 2.1. Transport

- Always transport the exchanger vertically.
- Lift the exchanger in the upper two corner distance pipes according to Picture 1. If the casing is covered, please lift at the gables according to Picture 2.
- It is important that all transport and handling is carried out by qualified staff.



Picture 1. Lift the casing at the corner distance pipes.



Picture 2. If the casing is covered, lift the casing at the gables.

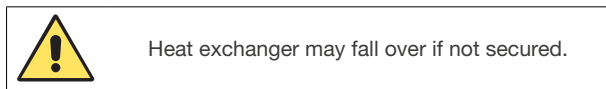
<sup>1</sup> Please note that for diameters between 500 mm (19.69”) and 900 mm (35.43”) the controller of the variable speed drive unit will be delivered separately.

### 3. STORAGE

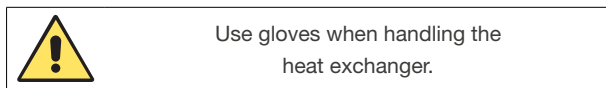
Aluminum wheels are sensitive for corrosion, epoxy wheels to sunlight and hybrid, as well as adsorption wheels, to moisture. Please make sure that you store the wheels to avoid the conditions described above.

Furthermore, the unit is to be placed on a horizontal and even surface. Please note that an uneven surface can warp the rotor and affect the factory adjustments.

Always make sure that the heat exchanger is supported and secured during transport, handling, storage and installation so it cannot fall over and cause damage or injuries.



Please observe that there may be sharp edges and a risk for cuts so we recommend that gloves should be used when the heat exchanger is handled.



Always make sure that the storage temperature is kept above 0°C (32°F).

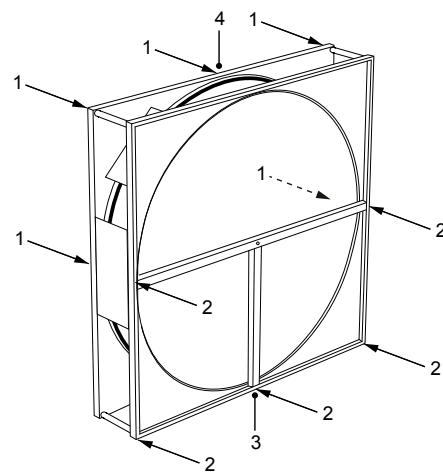
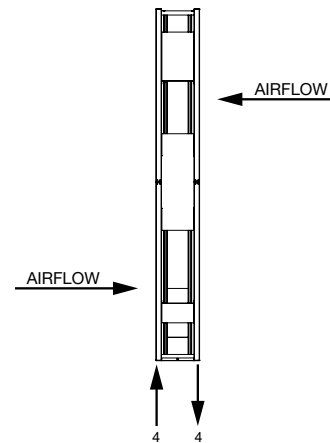
Rotors without casing (Model O), must be stored fully supported lying horizontally (as delivered) or hanging by their shaft.

### 4. INSTALLATION

- When designing the air handling unit and/or duct system, the system designer needs to make sure it is possible to remove/pull out the heat exchanger for inspection, maintenance, service, cleaning and disinfection. Furthermore, the system designer needs to consider enough space inside and outside of the system to make sure that it is possible to remove/pull out the heat exchanger.
- For bigger heat exchanger units it is required to add doors or hatches on all sides in the air-handling unit and/or duct system making it possible to access the heat exchanger for inspection, maintenance, service, cleaning and disinfection.
- In case condensate is present, it is required by the designer of the air handling unit and/

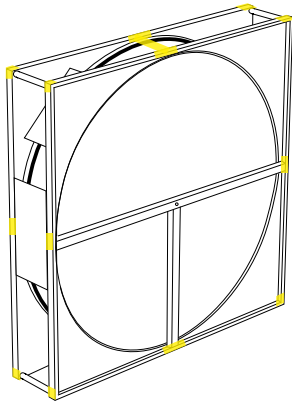
or duct system, to design and install a condensation tray according to the norm VDI 6022, chapter 4.3.16

- The casing is a built-in casing, which means that it needs to be attached to the Air Handling Unit (AHU). It needs to be attached to a rigid construction and fastened with screw or similar.
- To know where to fasten the casing in the AHU, please refer to the force schedule on Picture 3 and the fastening points in Picture 4. Please notice point 3 as it requires extra attention due to large force from rotor.
- Place the rotor on a horizontal surface since an uneven surface can warp the rotor and affect the factory adjustments.



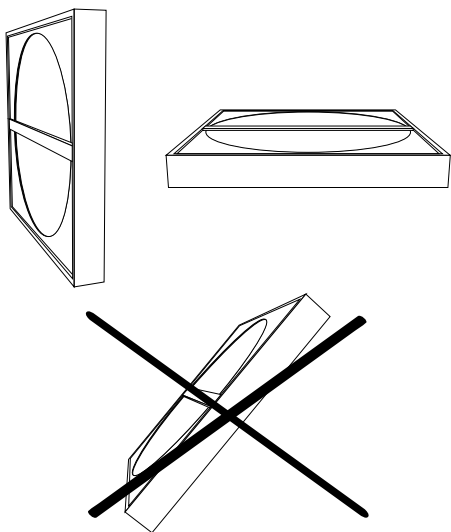
Picture 3. Force schedule.

| Force | Direction of force  | Ø 0-2500mm |
|-------|---------------------|------------|
| 1     | Against the airflow | 0.7 KN     |
| 2     | Against the airflow | 0.7 KN     |
| 3     | Vertically up       | 10.5 KN    |
| 4     | Vertically down/up  | 0.75 KN    |




Picture 4. Fastening points.


- Smaller wheels reaction force can be estimated with:  $F_D = F_{max} \cdot D^2 / 2500^2$
- Make sure that the front- and back plates of the casing are installed perpendicular to the horizontal bottom surface. If not the casing may interfere with the movement of the rotor wheel.
- When using a casing with vertical plane of intersection/side by side flow, special attention needs to be taken to the structure on the AHU side where the beam is fastened. This is due to that large part of the force 3 in picture 3 needs to be supported by the AHU side structure.
- In case of horizontal rotors, support is needed for the frame and center beam. Also, check that rotor is ordered and manufactured as a horizontal rotor. Rotor may only be installed either in a vertical or a horizontal position according to design, not tilted unless approved by Heatex.




Picture 5. Rotor positions.

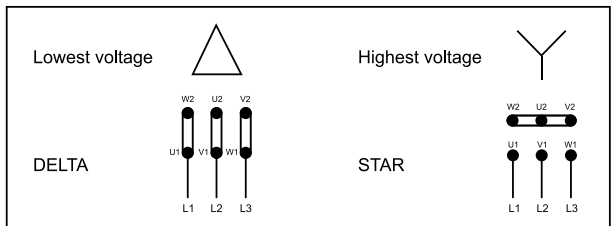
 In case of a horizontal rotor, support is needed for the frame and center beam.

- Avoid angular flow since this can affect the rotation and drive of the wheel. Heatex AB recommends the airflow to be perpendicular to the rotor.
- The rotor is designed for counter flow only; co-current flow will decrease efficiency and reduce the rotors self-cleaning ability.
- Prior to initial operation, please make sure no objects are blocking the rotors movement. The rotor should move evenly and smoothly around its shaft.

 Placing the unit on an uneven surface may warp the rotor.

- Drive motor if delivered with controller is pre-wired and 230V should just be wired to the controller. Constant speed motors are without wiring. It is important that all electrical work is carried out by qualified staff. Please see enclosed documentation and/or wiring Picture 6.

 **IMPORTANT!**  
All electrical work must be carried out by qualified staff.



Picture 6. Wiring diagram constant drive Δ/Y 220/380V.

- The motor and the controller should be easily accessible for service and maintenance.
- If the unit is delivered with a variable speed drive, read the corresponding controller documentation.
- Pressure difference and pressure drop should under no circumstances exceed the limits. Please refer to Application Limits for further information.
- The customer needs to make sure that the fans are placed in a way that an evenly distributed force is assured.

## 5. ADJUSTMENTS

- If necessary, adjust the brush sealing to minimize leakage.
- The special sealing does not need any adjustments.
- If the belt slides adjust belt tension.
- The round belt should have a tension of 3%. Powerbelt should have a tension of 1-2% (i.e. belt should be 1-2% shorter than the length it travels). For adjustments, see maintenance instructions below.

## 6. MAINTENANCE

### 6.1. Matrix

To secure the function and performance, the face of the rotor has to be inspected regularly for dust and dirt. In most cases, the rotor is self-cleaning due to counter flow and rotation of the matrix and this makes manual cleaning unnecessary. If the self-cleaning is insufficient dirt or/and dust can appear in the matrix.

Depending on the degree of soiling it is recommended to use following cleaning:

1. For only a small amount of easily removable dirt, Heatex recommends to use a vacuum cleaner.
2. For heavier dirt it is also possible to use compressed air but with caution.
3. Firmly attached dirt in the rotor is easiest removed by using hot water and a mild detergent. The mild detergent may be removed with high-pressure water cleaner with the nozzle placed 300 mm from the matrix.
4. If required, Heatex recommends disinfection with the substance known as LIV +45 (isopropanol based substance).

### 6.2. Adsorption and Enthalpy Wheels

The adsorption material is aluminum coated with silica gel or molecular sieve 3Å coating. There is a small amount of surplus material that might leave the matrix during the first usage. This will NOT affect the hygroscopic properties. The excess powder is harm-

less and easy to remove using a vacuum cleaner.

The enthalpy wheel properties are obtained by a combination of adsorption material consisting of silica gel coated aluminum and a corrugated aluminum strip. Just as for the adsorption wheel, a small amount of surplus material might leave the matrix during the first usage.

### 6.3. Powerbelt

The Powerbelt must be positioned so that the thinner side of the belt is in constant contact with the inside of the pulley.



When the belt runs over the rotor surface, position is not important.





The Powerbelt is subject to natural stretching which may require shortening of the belt. Tension of the belt must be checked after the first 24-48 hours in operation to secure the rotational function of the wheel.

The belt is made of links that can easily be added or removed without any tools. By just twisting the belt, it is possible to open it and remove links to shorten the belt until correct length and belt tension is obtained. Belt tension should be 1-2% (i.e. belt length 1-2% shorter than travelled length). For Powerbelt remove one link per meter belt to get correct tension.

## 6.4. Round Belt

In addition, the round belt may need adjustment during its lifetime. When delivered from factory the belt is welded together. If adjustment is needed the belt must be cut, shortened and joined together again with a special joining pin, which is attached on the casing (see Picture 7). Belt tension should be 3%.



Picture 7. Joining pin.

## 6.5. Brush Sealings

Tightness between brush sealings and casing has to be checked during inspection. The brush sealings are easily adjusted by unscrewing the screws and moving the brush sealing into the right position.

## 6.6. Special Seals

- The tightness of the special sealing is adapted at the Heatex factory and is not possible to

readjust on site. The new seal design makes it possible for Heatex to deliver a tight seal to every customer despite the conditions.

- Yearly inspections are needed to verify the conditions of the seals.
- In case it is needed, replacement can be ordered from Heatex.

## 6.7. Purge Sector

Purge sector can be pre-mounted if a position is chosen while ordering the heat exchanger or it can also be mounted later when preconditions are known. The Purge Sector is designed to fit in four different positions and the position of the Purge Sector can be change whenever it is required. For further information regarding how to mount the Purge Sector refer to *Mounting of loose Purge Sector (Separate document)*.

There are three different angle sizes (7°, 10° and 15°) for Purge Sector which depends on the rotation speed of the rotor:

12RPM = 7°

17RPM = 10°

25RPM = 15°

## 6.8. Controller

For further information regarding rotary heat exchanger equipped with controller, please see corresponding controller instructions.

## 6.9. Application Limits

Recommended temperature limits for rotary heat exchanger Model E are  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) to  $+65^{\circ}\text{C}$  ( $149^{\circ}\text{F}$ ).

It is however important not to exceed the temperature limits on mounted components:

| Component                             | Min   | Max   |
|---------------------------------------|---|---|
| Bearings                              | $-40^{\circ}\text{C}$ ( $-40^{\circ}\text{F}$ ) | $110^{\circ}\text{C}$ ( $230^{\circ}\text{F}$ ) |
| Yellow belt                           | $-30^{\circ}\text{C}$ ( $-22^{\circ}\text{F}$ ) | $66^{\circ}\text{C}$ ( $150^{\circ}\text{F}$ )  |
| Power belt                            | $-40^{\circ}\text{C}$ ( $-40^{\circ}\text{F}$ ) | $110^{\circ}\text{C}$ ( $230^{\circ}\text{F}$ ) |
| Constant motor                        | $-10^{\circ}\text{C}$ ( $14^{\circ}\text{F}$ )  | $40^{\circ}\text{C}$ ( $104^{\circ}\text{F}$ )  |
| Varimax step motor and control        | $-30^{\circ}\text{C}$ ( $-22^{\circ}\text{F}$ ) | $45^{\circ}\text{C}$ ( $113^{\circ}\text{F}$ )  |
| OJ step motor and control with modbus | $-40^{\circ}\text{C}$ ( $-40^{\circ}\text{F}$ ) | $40^{\circ}\text{C}$ ( $104^{\circ}\text{F}$ )  |
| Standard seals                        | $-25^{\circ}\text{C}$ ( $13^{\circ}\text{F}$ )  | $90^{\circ}\text{C}$ ( $190^{\circ}\text{F}$ )  |
| Special seals                         | $-25^{\circ}\text{C}$ ( $13^{\circ}\text{F}$ )  | $90^{\circ}\text{C}$ ( $190^{\circ}\text{F}$ )  |



NOTE! The temperature inside the casing is approximately the mean temperature of supply and exhaust air temperatures.

Maximum and recommended pressure drop as well as differential pressure for rotary heat exchanger:

- Pressure drop max 300 Pa (1.2" WC) up to outer diameter 1600 mm (62.99") and pressure drop max 250 Pa (1" WC) up to outer diameter 2575 mm (101.38"), even during start up and maintenance.
- Recommended pressure drop 100-200 Pa (0.4-0.8" WC) (normal operation).
- Differential pressure max 600 Pa (2.4" WC).

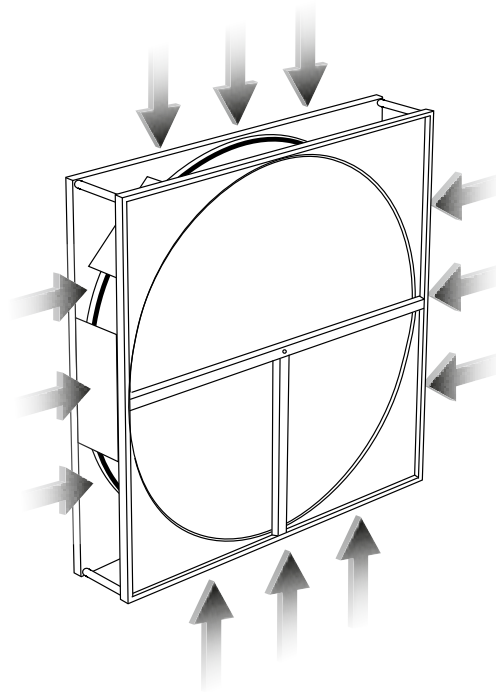
## 6.10. Troubleshooting

If the rotary heat exchanger does not rotate properly, please follow these steps to solve/locate the problem.

1. If the motor runs properly, please jump to step 5.
2. If there is a controller installed please check controller technical specifications, chapter trouble shooting.
3. If there is a constant drive installed: Please check that the drive is correctly connected. Note that all electrical maintenance and installation must be performed by qualified personal.
4. The position of the pulley should be placed as near the center of the rotor as possible.
5. Disconnect the belt. Is the motor running correctly?
6. If the belt is sliding, please tighten the belt according to maintenance instruction.
7. Rotate the wheel by hand in the indicated direction (belt disconnected from the motor). Is it possible to smoothly rotate the wheel or does the wheel interact with the casing? If there is excessive friction between the wheel and the casing (making it hard to rotate), please locate the position.
8. Make sure the connected ducts do not press on the casing making it squeeze against the wheel. Make sure the diagonal measures of the casing side where the motor is positioned are equal.
9. If the rotor with special seals doesn't rotate, please follow these steps. First, before turning on the drive system, rotate the wheel manually a couple of times in the same direction that it is supposed to rotate. The brushes of the seal need to adapt to the rotating direction.  
Then, turn on the drive and make sure that the direction of rotation is the same as when the wheel was rotated manually.

## 6.11. Conditions to Fulfill the Hygiene Certification Requirements

- Purge sector is required in order to make sure that less carry-over than 3% is reached.
- The AHU needs to be designed with hatches or openings towards all 4 open sides of the rotary heat exchanger. The heat exchanger itself has all 4 sides open according to the picture 8.
- All surfaces inside and outside of the rotor casing, especially the bottom surface and around the motor should be reachable for maintenance, cleaning and disinfection. Meaning that the openings or hatches mentioned in the item above need to be of sufficient size to fulfilling the cleaning and disinfection requirements.
- The AHU needs to be designed in such a way that the rotary heat exchanger is possible to slide out for cleaning and disinfection.
- Cleaning and disinfection of the heat exchanger should be done in accordance with Heatex cleaning and disinfection instructions with the cleaning and disinfection substances prescribed by Heatex (see Maintenance chapter).
- When condensation is present, the AHU installer needs to make sure that condensation trays are installed beneath the heat exchanger. These trays need regular inspection, cleaning and disinfection.
- The trays should be designed and installed with sufficient drainage in accordance with the hygiene standard VDI 6022, chapter 4.3.16.
- The heat exchangers are not certified for installation in exhaust classes ETA 3 and ETA 4 according to EN 13779 (09/2007).



Picture 8. All 4 sides are open on the heat exchanger. The AHU designer and installer need to have openings or hatches on all of these 4 sides in the AHU for easy access during maintenance, cleaning and disinfection of the heat exchanger.

## 7. SUPPORT

For questions or information regarding this product, please communicate your order number and product code along with your message. Heatex is available for support during office hours: 8 am – 4.30 pm (GMT +1) on weekdays. Contact information can be found on [Heatex.com/contact](https://www.heatex.com/contact)