# MODEL B
## TECHNICAL
## SPECIFICATION

AIR-TO-AIR HEAT EXCHANGERS

HEATEX

## ADDRESS AND CONTACT DATA

Heatex AB
Bronsyxegatan 13
S-213 75 MALMÖ
Sweden
Telephone: +46 410 710 500
info@heatex.com
www.heatex.com

## DISCLAIMER

Information in this document (including URL references and information from other external sources referred herein) is subject to change without notice. Owing to continued product development, Heatex reserves the right to introduce alterations in both design and prices without prior notice.

THIS DOCUMENT IS PROVIDED ”AS IS” WITH NO EXPRESSED OR IMPLIED WARRANTIES WHATSOEVER, INCLUDING ANY WARRANTY OF MERCHANTABILITY, NON-INFRINGEMENT, FITNESS FOR ANY PARTICULAR PURPOSE, OR OTHERWISE ANY WARRANTY ARISING OUT OF ANY PROPOSAL, SPECIFICATION OR SAMPLE. ALL LIABILITY, INCLUDING LIABILITY FOR INFRINGEMENT OF ANY PROPRIETARY RIGHTS, RELATING TO USE OF INFORMATION CONTAINED OR REFERENCED IN THIS DOCUMENT IS HEREBY EXPRESSLY DISCLAIMED.

## COPYRIGHT NOTICE

# CONTENT

# 1. WHEEL

## 1.1. Matrix Material

Our standard rotary heat exchanger Model B is available in four different standard materials: two condensation materials and two hygroscopic/enthalpy materials as well as a hybrid version.

### Aluminum - A

As standard, Heatex offers rotary heat exchangers in aluminum. The model B in aluminum are as standard available in sizes up to 2500 mm (98.43") and in width 200 mm (7.87").

### Epoxy - E

Heatex offer epoxy coated aluminum for use in corrosive environments. The material is of the same high standard as the uncoated aluminum covered with a self-sealing epoxy coating. The model B in epoxy is as standard available in sizes up to 2500 mm (98.43") and in width 200 mm (7.87").

### Adsorption - D (Silica Gel)

Our adsorption material is an enthalpy transferring material of high quality. The material consists of an aluminum core with a silica gel based coating that has a high moisture transfer capability. Model B in absorption material are as standard available in sizes from 500 mm (19.69") up to 2500 mm (98.43") and in width 200 mm (7.87"). A small amount of surplus material might leave the matrix during the first time of usage. This will NOT affect the hygroscopic properties.

### Adsorption - M (Molecular Sieve)

As above but the coating is molecular sieve 3 Angstrom.

### Hybrid - K

The matrix referred to as hybrid is a combination of a corrugated aluminum foil and a non-corrugated foil with a silica gel based coating that has a high moisture transfer capability. The hybrid matrix is available in model B and W in sizes from 500 mm (19.69") up to 2500 mm (98.43") and in width 200 mm (7.87"). A small amount of surplus material might leave the matrix during the first time of usage. This will NOT affect the hygroscopic properties.

## 1.2. Well Height (or Channel Height)

The wheel consists of two foils, one flat and one corrugated, glued together. The corrugated foil comes in four different well heights to suit different purposes:

### 1.5 mm (0.059") - Very High Efficiency

1.5 mm (0.059") well height, gives a high efficiency due to its large heat transferring surface but also a relatively high pressure drop, due to its small channels.

### 1.7 mm (0.067") - High Efficiency

1.7 mm (0.067") well height, gives a high efficiency due to its large heat transferring surface creates a pressure drop than the 1.5 mm (0.059") version.

### 2.0 (0.079") - Standard

2.0 mm (0.079") well height is our most common configuration due to its good balance between high efficiency and moderate pressure drop.

### 2.5 (0.098") - Low Pressure Drop

2.5 mm (0.098") well height is used when a low pressure drop is more important than high efficiency. This well height is not available for the adsorption matrix.

## 1.3. Wheel Construction

To secure stability in the wheel, aluminum spokes are welded in hub and wrap. The entire rotor (except bearings and shaft) is made of aluminum.

### 1.3.1 Bearings

Heatex offers two different types of internal bearings: standard ball bearings for vertical applications and angular contact bearings for wheels in horizontal applications.

The bearings are chosen for their low maintenance and long lifetime. Normal usage exceeds a period of 10 years. In a scenario with the toughest conditions (a 2500 mm (98.43") wheel at constant 500 Pa (2" WC) pressure difference) we have estimated through calculation that the lifetime of the bearings should be 55 000 hours (well over 6 years). The construction with internal bearings (well protected against dirt) is chosen for its long lifetime and will keep maintenance needs at a low level. Bearings can be replaced if necessary.

# 2. CASING

The casing is made of rolled metal sheet and thus, does not require maintenance. The casing comes in vertical or horizontal configuration and for side by side or top/bottom ducts and in two different designs:

## 2.1. Casing Types

### 2.1.1. Standard Casing

The standard casing is made out of metal sheet (aluzinc 150g (5.29 oz)). Slide in configuration with uncovered sides, bottom and top. Available up to 2650x2650 mm (104.33x104.33").

### 2.1.2. Covered Casing

The covered casing is made out of metal sheet (aluzinc 150g (5.29 oz)) casing with covers on all sides, bottom and top. Equipped with an inspection hatch to facilitate access to the motor and controller. Available up to 2650x2650 mm (104.33x104.33").

## 2.2. Sealing System

All casings have adjustable brush sealants. The brush seal is made of a double layer of brush with an integrated plastic foil.

Figure 1. Brush sealant.

## 2.3. Purge Sector

The purpose of the purge sector is to empty the wheel from exhaust air before turning over to supply airside. This prevents exhaust air from leaking into the supply air (fresh). The purge sector is made of metal sheet growing at an angle of 5 degrees starting at center of the wheel. Brush sealants are assembled at the upper and lower side.

Figure 2. Purge sector.

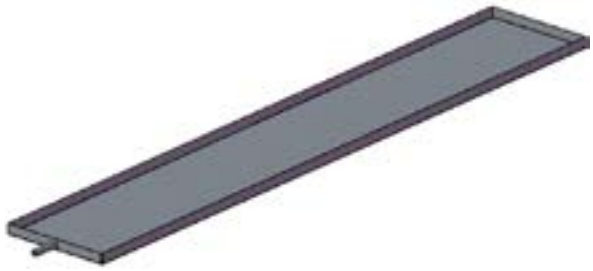
Purge sector is an option and can be positioned in all four positions according to customer's request.

The purge sector is only recommended for differential pressures (between supply air before rotor and exhaust air after rotor) between 200 Pa (0.8" WC) and 500 Pa (2" WC).

A purge sector is not recommended when the supply side fan is placed after the heat exchanger and the exhaust side fan is before the heat exchanger.

## 2.4. Condensing Tray (Optional)

With rising humidity the risk for condensation increases. The purpose of the stainless steel condensing tray is to gather the condensed water and easily transfer it to the outside of the AHU.



## 2.5. Drive

Heatex offers constant drive or variable drive for rotary heat exchangers in all sizes. Motor is placed in optional corner fully protected inside the casing. Transmission is made via an elastic round belt or Power belt. Neither belt type needs a tensioner. In rotors equipped with controller, the control-box is placed on the same side of the rotor but in the corner above the motor.

When casings are smaller than 900x900 mm (35.43x 35.43”), the control-box is delivered separately with 1 m (39.37”) cabling.

Figure 3. Drive.

## 2.6. Belt

### 2.6.1. Round Belt

Our elastic round belt is easy to use since it requires no maintenance or tension device. The hollow endless belt are joined together by welding or by using a special pin. The belt is 10 mm (0.39”) in diameter.

Figure 4. Round belt.

### 2.6.2. Power Belt

This belt is used without tensioning device and can be used at temperatures up to 110°C (230°F) and in humid climate. The belt is easily joined together without any tools or locks and is therefore easy to maintain. Powerbelt can be offered for all rotor diameters.

Figure 5. Power belt.

## 2.7 Drive Options

### 2.7.1. Constant Drive

Depending on size and rotation speed (10 rpm for condensation/hygroscopic, 17 rpm for adsorption silica gel and 25 rpm for adsorption molecular sieve) the motor is either an AC-motor (15 - 40 W) or an induction motor (90 - 370W). All motors are equipped with a thermo contact.

| Condensation & hygroscopic rotor | Adsorption rotor | Nominal power | Supply (V/Hz) | Nominal speed (RPM) | Nominal current (A) | Pole number | Iso class | IP class | Mass with gear |
|---|---|---|---|---|---|---|---|---|---|
| -900 mm (-35.43") | -600 mm (-23.62") | 25 W | 1x230/50 | 1200 | 0.23 | 4 | - | IP54 | 2.1 kg (4.63 lb) |
| | | | 3x230/50 | 1350 | 0.28 | 4 | - | IP54 | 2.1 kg (4.63 lb) |
| | | | 3x400/50 | 1250 | 0.14 | 4 | - | IP54 | 2.1 kg (4.63 lb) |
| 901-1100 mm (35.47-43.31") | 601-1100 mm (23.66-43.31") | 40 W | 1x230/50 | 1250 | 037 | 4 | - | IP54 | 4.1 kg (9.04 lb) |
| | | | 3x230/50 | 1350 | 0.39 | 4 | - | IP54 | 4.1 kg (9.04 lb) |
| | | | 3x400/50 | 1300 | 0.21 | 4 | - | IP54 | 4.1 kg (9.04 lb) |
| 1101-1500 mm (43.35-59.06") | 1101-1300 mm (43.35-51.18") | 90 W | 3x400/50 | 1350 | 0.29 | 4 | 56 | IP55 | 3.9 kg (8.60 lb) |
| 1501-2100 mm (59.09-82.68") | - | 180W | 3x400/50 | 1350 | 0.58 | 4 | 63 | IP55 | 5.1 kg (11.24 lb) |
| - | 1301-1700 mm (51.22-66.93") | | 3x400/50 | 2820 | 0.5 | 2 | 63 | IP55 | 4.5 kg (9.92 lb) |
| 2101-2500 mm (82.72-98.43") | 1701-2500 mm (66.97-98.43") | 370 W | 3x400/50 | 2740 | 1.0 | 2 | 71 | IP55 | 7.6 kg (16.76 lb) |

Table 1. Constant drive.

### 2.7.2. Variable Drive

EMX-R is a new generation of speed controllers specially developed for controlling rotary heat exchangers. The unit includes motor and control unit with integrated rotation detector. Due to its technique with Switched Reluctance motors, this system requires no gear.

- Motor without gear and fan
- High efficiency
- IP54
- Easy to use without any needs of adjustments.

EMX-R is available for all sizes.

#### 2.7.2.1. MicroMax

The MicroMax unit includes motor, rotation detector and frequency controller. The controller allows the use of standard 3-phase motors.

- Standard motors
- IP54
- Alarm indication

The MicroMax – series is available for all size rotors.

| Controller | MicroMax | MicroMax 180 | MicroMax 370 | MicroMax 750 |
|---|---|---|---|---|
| Power Max | 90W | 180W | 370W | 750W |
| Supply | 1 x 230VAC 50/60Hz | 1 x 230VAC 50/60Hz | 1 x 230VAC 50/60Hz | 1 x 230VAC 50/60Hz |
| Output | 3 x 0-230V | 3 x 0-230V | 3 x 0-230V | 3 x 0-230V |
| Temp. min-max | 0-45°C (32°-113°F) | 0-45°C (32°-113°F) | 0-45°C (32°-113°F) | 0-45°C (32°-113°F) |
| Weight | 1,4 kg (3.09 lb) | 1,4 kg (3.09 lb) | 1,4 kg (3.09 lb) | 1,4 kg (3.09 lb) |
| IP class | IP54 | IP54 | IP54 | IP54 |

Table 2. MicroMax.

| Condensation & hygroscopic rotor | Adsorption rotor | Nominal power | Supply (V/Hz) | Nominal speed (RPM) | Nominal current (A) | Pole number | Iso class | IP class | Mass with gear |
|---|---|---|---|---|---|---|---|---|---|
| -800 | -700 | 25 W | 3x230/50 | 1350 | 0.28 | 4 | - | IP54 | 2.1 kg (4.63 lb) |
| 801-1100 | 701-1100 | 40 W | 3x230/50 | 1350 | 0.39 | 4 | - | IP54 | 4.1 kg (9.04 lb) |
| 1101-1500 | 1101-1300 | 90 W | 3x230/50 | 1350 | 0.8 | 4 | 56 | IP55 | 3.9 kg (8.60 lb) |
| 1501-2100 | 1301-1700 | 180W | 3x230/50 | 1350 | 1.2 | 4 | 63 | IP55 | 5.1 kg (11.24 lb) |
| 2101-2500 | 1701-2500 | 370 W | 3x230/50 | 1350 | 2.1 | 4 | 71 | IP55 | 7.9 kg (17.42 lb) |

Table 3. Constant drive.

# 3. APPLICATION LIMITS

## 3.1. Temperature Limits

Recommended temperature limits for rotary heat exchanger:

- Min: -40°C
- Max: 65°C

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

| Component | Min | Max |
|---|---|---|
| Bearing temp. | -40°C (-40°F) | 110°C (230°F) |
| Belt temp.* | -40°C (-40°F) | 66°C (150°F) |
| Motor temp.** | -10°C (14°F) | 40°C (104°F) |
| EMX-R Controller | -30°C (-22°F) | 40°C (104°F) |
| Standard Controller | 0°C (32°F) | 45°C (113°F) |

* Power belt max 110°C (230°F).
**Thermo contacts cut off at 150°C (302°F) inner temperature.

Table 4. Temperature limits components.

Temperature inside the casing is approximately the mean temperature of supply and exhaust air temperatures.

## 3.2. Pressure Drop Limits

Recommended pressure drop and differential pressure for rotary heat exchanger:

- Pressure drop max 300 Pa (1.2" WC) (Start up and maintenance.)
- Pressure drop recommended 100 - 200 Pa (0.4 - 0.8" WC) (Normal running conditions.)
- Differential pressure max 600 Pa (2.4" WC)

The maximum recommended pressure difference (between supply air inlet and exhaust air outlet) based on the life time expectations of the bearings is 500 Pa (2" WC) but should be kept to a minimum since otherwise wear of bearings and brush seals will be high and the leakage rate will also increase with pressure difference. A high-pressure difference may also cause the casing to deflect. Please be aware of that for the purge sector to work the pressure difference should be higher than about 200 Pa (0.8" WC) and lower than about 500 Pa (2" WC).

Recommended fan configuration is to have both fans on the exit sides of the heat exchanger and to always make sure that pressure is higher on the supply side than on the exhaust side. This way leakage will be from the fresh airside to the exhaust side, not affecting the indoor air quality.

# 4. INSTALLATION ISSUES

## 4.1. Rotor Positioning

The rotor must be installed so that all angles must be either zero or ninety degrees in relation to surface normal.

## 4.2. Typical Airflows

The rotor is designed to handle typical airflows of 5 000 to 50 000 cubic meters per hour (Nm3/h). For larger airflows, see Model Q2.

## 4.3. Freezing

### 4.3.1. Freezing Process

Mean temperature of supply and exhaust inlet temperatures below 0°C does not necessary cause a freezing problem. The freezing process depends on the level of condensation building up and freezing when the matrix is below freezing temperature. Frost becomes a problem when it builds up faster than it melts. This process normally takes many hours. It is important to be observant if the pressure drop increases during long periods of cold inlet temperatures. Frost building up in the matrix can cause high-pressure differences leading to severe damage on bearings.

### 4.3.2. Preventive Measures

There are several methods to prevent frost to build up.

- Preheating of the outdoor air to a temperature that prevents the exhaust air from intersecting with the saturation line.
- Varying the rotor speed to reduce the moisture transfer. Exhaust air temperature and supply air temperature will approach each other when the rotor speed is reduced.
- By using a bypass to reduce the transfer rate to a point when the air from intersecting with the saturation line.

# 5. SUPPORT

For questions or other requirements regarding this product, please state order number, product name and message.

Heatex is available for support during office hours 8 am – 4.30 pm (GMT +1) on weekdays.