

# HEAT EXCHANGERS

PRODUCT CATALOGUE



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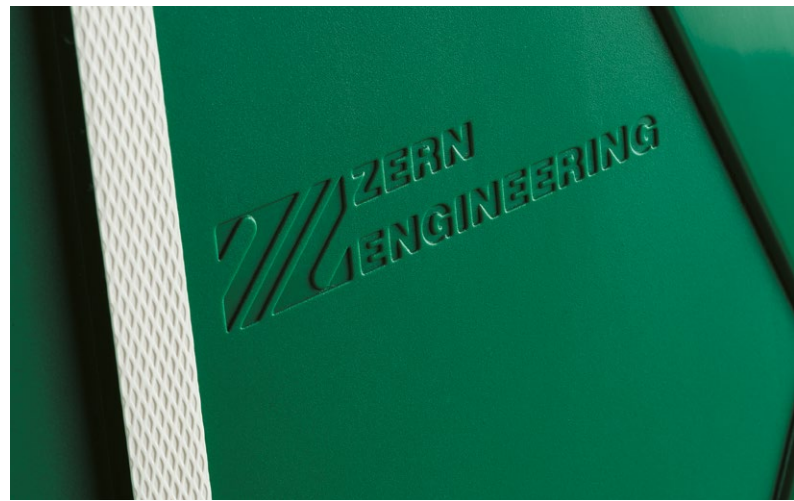


**ZERN ENGINEERING** is a company that transforms knowledge, innovation and experience into high-quality and competitive products. We are a customer-oriented company and it is important for us to satisfy demands of our customers and advise them anywhere in the world. Our product range includes counter-flow and cross-flow heat exchangers, their enthalpy variants, as well as a wide range of rotary regenerators.

The research centre, production sites and testing laboratories of Zern Engineering are located in Munich (Germany) and Kyiv (Ukraine).

Every day we work with all love and respect for technology and engineering to improve our products in order to keep up with customer expectations.

Keeping the traditional German quality, we are focused on the development of the latest technologies in production and products.



## OUR VALUES:

- preserving the resources of the planet and reducing energy costs
- clean environment
- healthy and comfortable microclimate

## OUR MISSION:

- energy efficiency and high quality products
- compliance of our products with international standards and regulations
- individual approach to each customer
- commitment for continuous development and innovation

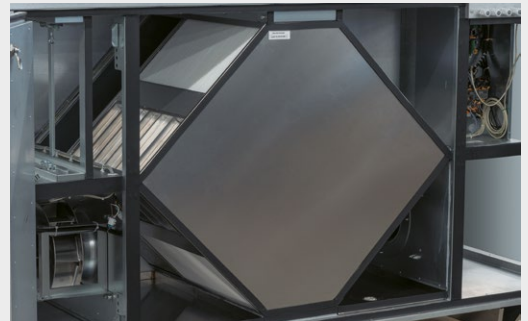
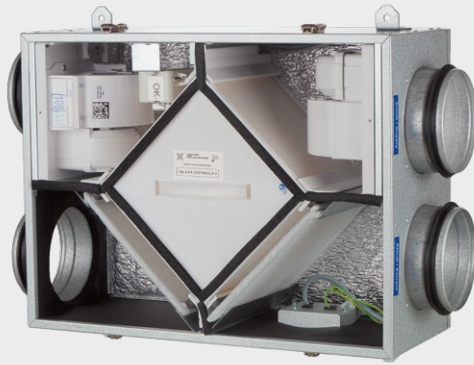








Our heat exchangers are used in modern air handling units, allowing to achieve high levels of energy efficiency.



Zern Engineering product range:

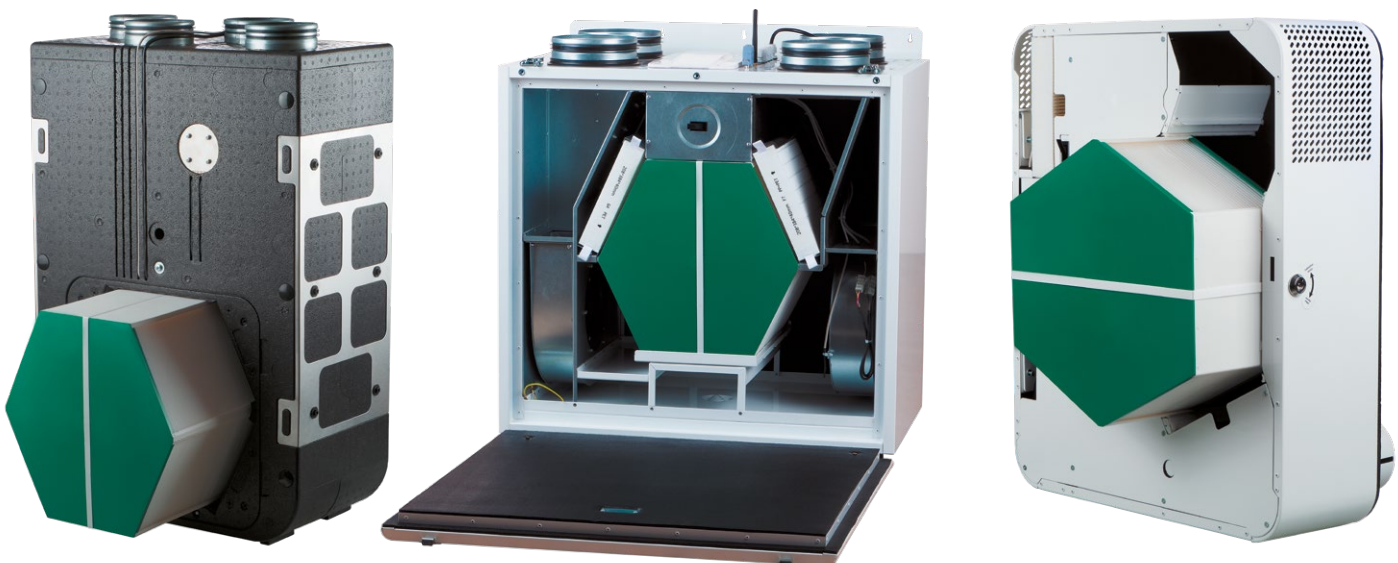
- polystyrene plate counter-flow heat exchangers
- enthalpy plate counter-flow heat exchangers
- polystyrene plate cross-flow heat exchangers
- enthalpy plate cross-flow heat exchangers
- condensing rotary heat exchangers
- enthalpy rotary heat exchangers
- sorption rotary heat exchangers
- rotary heat exchangers with epoxy coating

Zern Engineering products are suitable for all climate zones.

Our heat exchangers are used in a variety of products built by our clients – world-known manufacturers of heating, ventilation and cooling equipment.

**We are extremely proud of being part of their success.**

APPLICATION



## GENERAL DESCRIPTION

- The HU-EX6/HC-EX6/Combi HC-EX6 counter-flow heat exchangers are specifically developed for heat recovery in balanced ventilation systems. These heat exchangers allow efficient use of extract air energy for heating or cooling, thus optimizing ventilation and providing healthy indoor climate.
- Due to the unique heat exchanger design and the shape of the heat exchanging plates the heat exchange surface is maximized and the pressure losses are minimized. This heat exchanger type is compatible nearly with all ventilation systems.
- The supply and extract air streams move in opposite directions toward each other. The heat energy is transferred through the thin plates. Heat recovery efficiency exceeds 90 %.



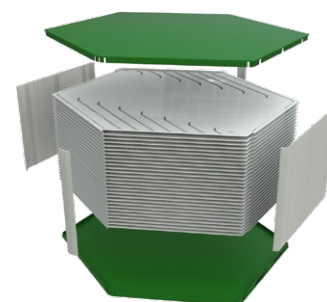
## APPLICATIONS

- Domestic ventilation units
- Heating and air conditioning systems
- Full separation of air streams
- Heat recovery in winter
- Cool recovery in summer
- Premises with no air circulation
- School premises
- Office buildings



## DESIGN #1 HU-EX6/HC-EX6

- The heat exchanger has a hexagonal shape with the overall dimensions of 366x366 mm, 172x397 mm, 230x455 mm, 232x461 mm, 271x496 mm, 312x537 mm, 394x619 mm, 477x700 mm and 533x758 mm (length and width).
- The maximum depth is 600 mm.
- The heat exchanger consists of a heat accumulating mass (a set of plates) and a casing. The assembled and interconnected plates build a heat exchanging stack with air channels. The extensional channels in the plates are parallel located. The air streams move in the channels and do not get mixed.
- The geometry and distance between the plates provide maximum efficiency with the lowest pressure differential.

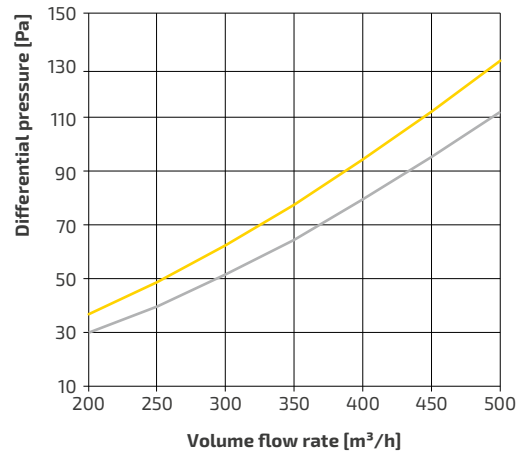
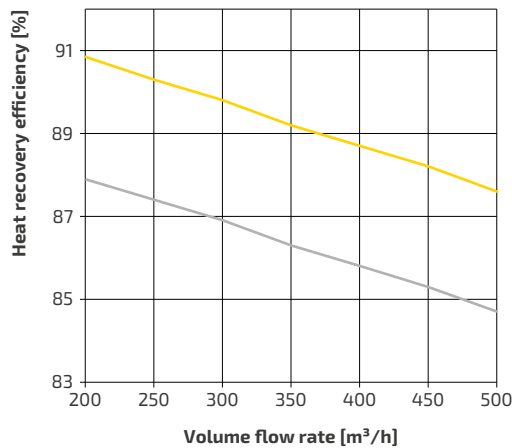


## NEW HU-EX6 366 SERIES

- The HU-EX6 366 is a counter-flow heat exchanger with improved heat recovery efficiency and reduced pressure differential compared to the HC-EX6 series.
- The improved performance of the new series has resulted in:
  - Higher heat transfer efficiency. 5% higher compared to the HC-EX6 series.
  - Lower pressure differential. The new model has the lowest pressure differential even with air flow rates exceeding 300 m<sup>3</sup>/h.



**HU-EX6 366/400** **HC-EX6 366/400**



Test results of HU-EX6 366/400-2 and HC-EX6 366/400-2 models with a depth of 400 mm, test conditions according to DIN EN 13141-7 (as well as EN 308).

## ADVANTAGES

- High quality of materials and product assembly.
- 5% higher heat recovery efficiency compared to the HC-EX6 series.
- Reduced pressure differential.
- Operating modes: -25 °C + 50 °C.
- 100% tightness test.

## DESIGN #2 COMBI HC-EX6

- Combi HC-EX6 consist of two heat exchangers of the same size installed in parallel, assembled in a monolithic structure made of high quality aluminum alloy that provides maximum resistance to corrosion in humid environments. Counter-flow air flows pass in parallel through the two heat exchangers, distributing at the inlet in the ducts.
- Models available in this design:
  - Combi HC-EX6 815/...-3, which consists of two HC-EX6 394/...-3.
  - Combi HU-EX6 959/...-3, which consists of two HU-EX6 477/...-3.
  - Combi HC-EX6 1089/...-3, which consists of two HC-EX6 533/...-3.
- The maximum depth of the heat exchangers is 600 mm.



## APPLIED MATERIALS

- The heat accumulating mass is made of special impact-resistant polystyrene with the thickness of 0.2 up to 0.3 mm. This material is featured with high thermal conductivity and performance characteristics.
- All the casing components can be made of:
  - quality sheet metal (aluzinc)
  - impact-resistant polystyrene
  - high-strength aluminium alloy

## AIRTIGHT SEALING

- **Air sealing process is automated.**
- **High-quality hot-melt synthetic-base polymer adhesive used in food and pharmacy industries provides air tightness.**



## MODIFICATIONS

### HEAT EXCHANGER PLATES

#### Basic modification «Standard». HU-EX6/HC-EX6/Combi HC-EX6

The heat exchanger plates are made of polystyrene. Suitable for all types of counter-flow heat exchangers of the HU-EX6, HC-EX6 and Combi HC-EX6 series.

### CASING

#### Version 1. Aluzinc casing

The casing components are made of high-quality aluzinc plates. This version is used for the sizes 172x397 mm, 230x455 mm and 271x496 mm.

#### Version 1.1. Aluzinc casing with T-profile

All elements of the casing are made of aluzinc. T-profile is used instead of a standard profile. This profile is used in case of a special mounting in the air handling unit. This version is used for the sizes 172x397 mm, 230x455 mm and 271x496 mm.

#### Version 2. Plastic casing

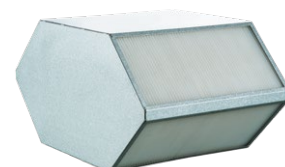
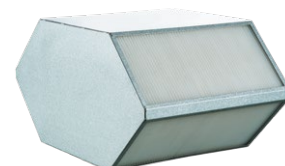
The head plates, side plates and the profiles are made of impact-resistant polystyrene. This modification is used for the sizes 366x366 mm, 230x455 mm and 232x461 mm.

#### Version 2.1. Plastic casing with T-profile

All the casing components are made of impact-resistant polystyrene. T-profile is used instead of a standard profile. This profile is used in case of a special mounting in the air handling unit. This version is used for the sizes 366x366 mm, 230x455 mm and 232x461 mm.

#### Version 3. Aluminium casing

The casing elements are made of high-quality aluminium alloy, which provides maximum protection against corrosion. This type of casing is used for the sizes 312x537 mm, 394x619 mm, 477x700 mm and 533x758 mm, as well as assembled combiblocks 815x1040 mm, 959x1182 mm and 1089x1314 mm.

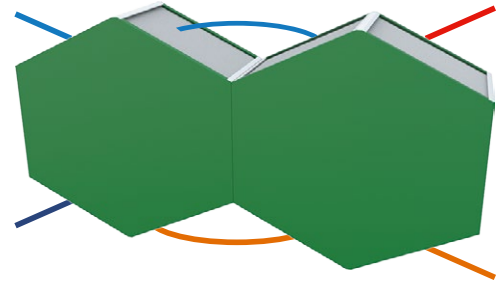


Name	Overall dimensions [mm]	Polystyrene	Casing modification
HU-EX6 366/...	366x366	+	2/2.1
HC-EX6 366/...	366x366	+	2/2.1
HU-EX6 172/...	172x397	+	1/1.1
HU-EX6 230/...	230x455	+	1/1.1/2/2.1
HU-EX6 232/...	232x461	+	2/2.1
HU-EX6 271/...	271x496	+	1/1.1
HU-EX6 312/...	312x537	+	3
HC-EX6 394/...	394x619	+	3
HU-EX6 477/...	477x700	+	3
HC-EX6 533/...	533x758	+	3
Combi HC-EX6 815/...	815x1040	+	3
Combi HU-EX6 959/...	959x1182	+	3
Combi HC-EX6 1089/...	1089x1314	+	3



## MOUNTING OPTIONS

Serial installation of several heat exchangers on counter-flow basis increases the heat recovery efficiency.



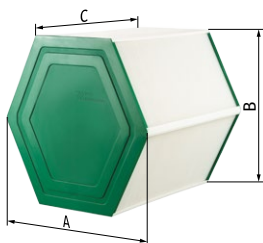
## OPERATION CONDITIONS

- The applied materials enable operation, storage and transportation of the heat exchangers in the temperature conditions from -25 up to +50 °C.
- Storage of heat exchangers in an exposed position in direct sunlight is forbidden.
- In winter season the air humidity is condensed on the heat recovery plates and the condensed water freezes at the temperature of -5 °C and lower.
- Heat recovery efficiency during these temperature conditions is slim to zero.
- Avoid condensate freezing on the heat exchanger plates.

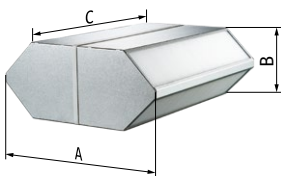
## TECHNICAL MAINTENANCE

The HU-EX6/HC-EX6/Combi HC-EX6 counter-flow heat exchangers have no movable parts and metal connections, therefore no mechanical maintenance is required. Slight contaminations are eliminated by compressed air jets or flushing with warm mild detergent solutions.

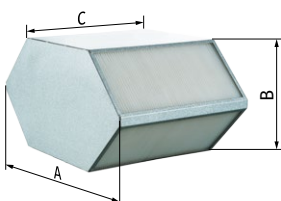
## MODEL LINE



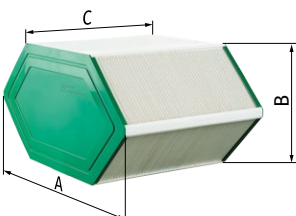
Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
HU-EX6 366	366	366	100...600	2/2.1
HC-EX6 366	366	366	100...600	2/2.1



Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
HU-EX6 172	397	172	100...600	1/1.1

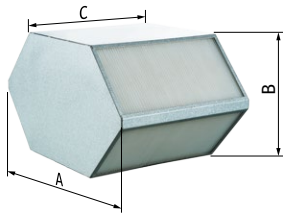


Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
HU-EX6 230	455	230	100...600	1/1.1/2/2.1

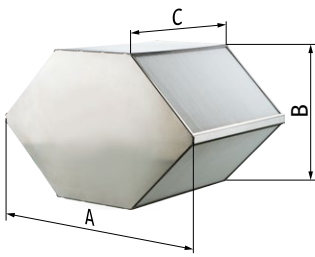


Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
HU-EX6 232	461	232	100...600	2/2.1

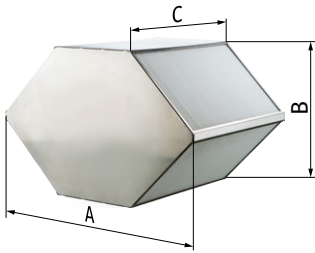
## MODEL LINE



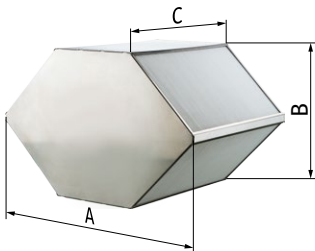
Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
HU-EX6 271	496	271	100...600	1/1.1



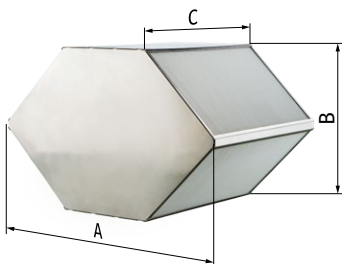
Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
HU-EX6 312	537	312	100...600	3



Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
HC-EX6 394	619	394	100...600	3



Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
HU-EX6 477	700	477	100...600	3

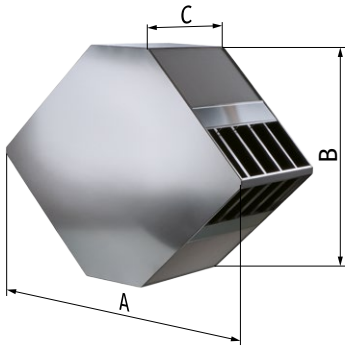


Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
HC-EX6 533	758	533	100...600	3

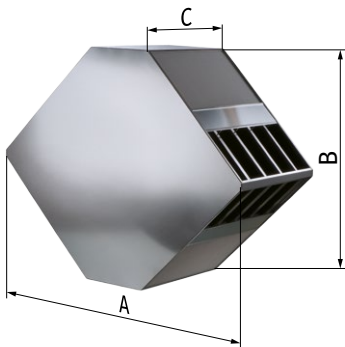
HU-EX6/HC-EX6/Combi HC-EX6 series



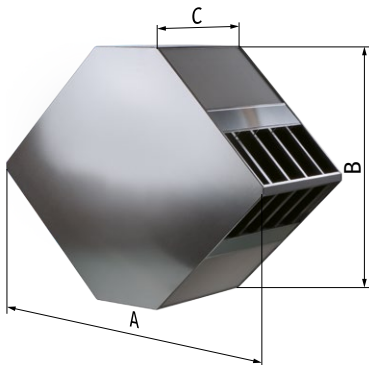
## MODEL LINE



Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
Combi HC-EX6 815	1040	815	100...600	3



Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
Combi HU-EX6 959	1182	959	100...600	3



Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
Combi HC-EX6 1089	1314	1089	100...600	3

## DESIGNATION KEY

HU-EX6 B/C - x

HC-EX6 B/C - x

Combi HC-EX6 B/C - x

**HU-EX6:** commercial group of monoblocks.**HC-EX6:** commercial group of monoblocks.**Combi HC-EX6:** commercial group of combiblocks.**B:** height [mm]: 366/172/230/232/271/312/394/477/533/815/959/1089**C:** depth [mm]: 100...600**x:** casing modification:

- 1: aluzinc
- 1.1: aluzinc with a T-profile
- 2: plastic
- 2.1: plastic with a T-profile
- **3: aluminium.**

\***A:** width [mm]: 366/397/455/461/496/537/619/700/758/1040/1182/1314 not indicated in the heat exchanger name.

## GENERAL DESCRIPTION

- The new generation of enthalpy counter-flow heat exchangers of the EC-EX6 series is an ideal alternative to standard heat exchangers. In residential premises with low humidity they are ideal for maintaining a comfortable microclimate by recovering humidity from the extract air.
- This process is possible due to the unique polymer membrane with a microporous structure that enables transition of water vapour molecules, but blocks transition of bacteria, germs, mould, gases and smells. This design enables to keep high hygienic standards also in sanitary areas, kitchen and laboratories and other premises with permanent sources of air pollution. No transition of smells and toxins. Only warmth and water vapours are allowed.
- The supply and extract air streams are moved in the air channels of the heat exchanger plates toward each other. The sensible and latent heat energy is transferred through the heat exchanger membrane.
- The comparison of the standard plate heat exchangers (HU-EX6/HC-EX6 series) and the enthalpy heat exchanger (EC-EX6 series) shows that the standard heat exchangers have higher sensible heat recovery efficiency as compared to the enthalpy heat exchangers, but the enthalpy heat exchangers of EC-EX6 series have higher total heat recovery efficiency due to the latent heat recovery from water vapour.



## APPLICATIONS

- Central ventilation
- Single-room ventilation
- Heat recovery with air humidification in winter
- Cool recovery with air dehumidification in summer
- School premises
- Health care buildings
- Office buildings

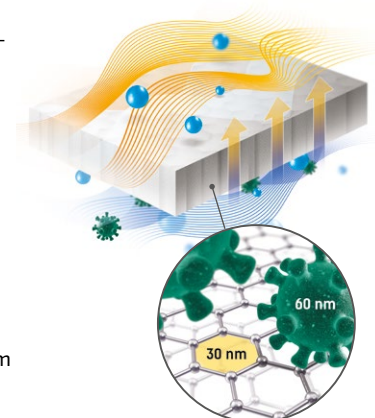


## DESIGN

- The heat exchanger has a hexagonal shape with the overall dimensions of 366x366 mm, 230x455 mm and 232x461 mm (length and width).
- The maximum depth is 600 mm.
- The heat accumulating mass consists of special plates laid as channels to enable moving of air streams toward each other.
- The ultrathin membrane is used as a barrier in the heat exchanger.
- The rigid airtight casing is protected against mechanical influence.

## MEMBRANE

- The membrane is a polymer material with a high coefficient of thermal conductivity and moisture transfer. The membrane enables transition of water vapour but blocks transition of biological contaminants, viruses, gases and foreign smells.
- The membrane has a special coating that is resistant to acids, alkalis and salts. This coating is necessary to ensure stable operation during membrane application.
- The membrane is both tear-resistant and puncture-resistant.
- The membrane has excellent resistance to environmental influences and temperature drops from -25 °C to +50 °C.
- The membrane ensures low air leakage (<1%).
- The membrane protects the premises from the penetration of the SARS-CoV-2 virus, bacteria, mould spores, gases (CO<sub>2</sub>/SF<sub>6</sub>) and various smells due to its structure. The membrane blocks the penetration of particles >30 nm in diameter. For reference: the diameter of the SARS-CoV-2 virus ranges from 60 nm to 140 nm.





## ENTHALPY PLATE COUNTER-FLOW HEAT EXCHANGERS

### APPLIED MATERIALS

- The membrane is made of microporous polymer with an antibacterial coating.
- All elements of the casing are made of:
  - Quality sheet metal (aluzinc);
  - high-impact polystyrene.

### AIRTIGHT SEALING

- Air sealing process is automated.
- High-quality hot-melt synthetic-base polymer adhesive used in food and pharmacy industries provides air tightness.

### MODIFICATIONS

Two different casing designs are available for this heat exchanger series.

#### Version 1. Aluzinc casing

The casing components are made of high-quality aluzinc plates. This modification is used for the size 230x455 mm only.

#### Version 1.1. Aluzinc casing with T-profile

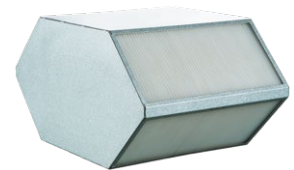
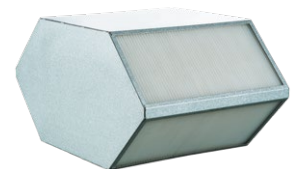
All the casing components are made of aluzinc. T-profile is used instead of a standard profile. This profile is used in case of a special mounting in the air handling unit. This version is used only for the size 230x455 mm.

#### Version 2. Plastic casing

The head plates, side plates and the profiles are made of impact-resistant polystyrene. This modification is used for the sizes 366x366 mm, 230x455 mm and 232x461 mm.

#### Version 2.1. Plastic casing with T-profile

All the casing components are made of impact-resistant polystyrene. T-profile is used instead of a standard profile. This profile is used in case of a special mounting in the air handling unit. This version is used for sizes 366x366 mm, 230x455 mm and 232x461 mm.



EC-EX6 series

Name	Overall dimensions [mm]	Casing modification
EC-EX6 366/...	366x366	2/2.1
EC-EX6 230/...	230x455	1/1.1/2/2.1
EC-EX6 232/...	232x461	2/2.1

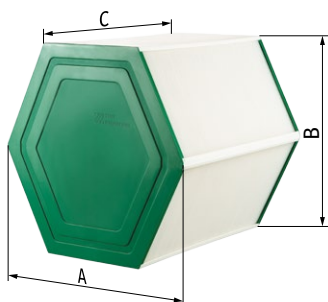
### OPERATION CONDITIONS

- The applied materials enable operation, storage and transportation of the heat exchangers in the temperature conditions from -25 up to +50 °C.
- Storage of heat exchangers in an exposed position in direct sunlight is forbidden.
- The EC-EX6 enthalpy heat exchangers are not subjected to freezing in case of normal operation conditions in winter.

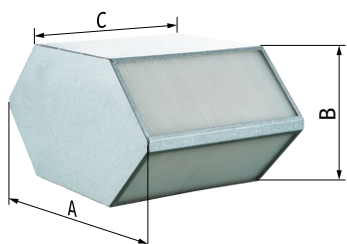
## TECHNICAL MAINTENANCE

- Regular check-up of filters is required to keep the heat exchangers and the supply filter clean. The filters must be cleaned or replaced as required.
- To remove the contaminations flush the heat exchanger with warm water up to 30 °C.
- Do not use high pressure water jet for cleaning of the heat exchanger because it may damage the ultrathin membrane.

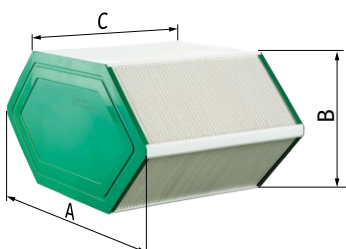
## MODEL LINE



Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
EC-EX 366	366	366	100...600	2/2.1



Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
EC-EX 230	455	230	100...600	1/1.1/2/2.1



Name	A: width [mm]	B: height [mm]	C: depth [mm]	x: casing modification
EC-EX 232	461	232	100...600	2/2.1

## DESIGNATION KEY

### EC-EX6 B/C - x

EC-EX6: commercial group.

B: height [mm]: 366/230/232

C: depth [mm]: 100...600

x: casing modification:

- **1: aluzinc**
- **1.1: aluzinc with a T-profile**
- **2: plastic**
- **2.1: plastic with a T-profile**

\*A: width [mm]: 366/455/461 not indicated in the heat exchanger name.

## GENERAL DESCRIPTION

- Hp-EX4 plate heat exchangers are highly efficient heat exchangers that allow to save and reuse thermal energy of air flows, which qualitatively increases the efficiency of the system itself. The cross flows of extract and supply air are separated by the walls of the heat exchanger plates, which prevents the transfer of contaminants, dust particles, moisture, etc. from one flow to another.
- Heat transfer efficiency is up to 80%. It is achieved due to the unique design and shape of the heat exchanger plates, in the stack of which heat exchange takes place. The use of polystyrene as a plate material allows for maximum heat transfer compared to similar aluminum plates.



## APPLICATIONS

- Heat recovery in winter and cool recovery in summer
- Heating and air conditioning systems
- Ventilation of premises
- Separation of air streams
- Heat removal in control boards.



## DESIGN

- The heat exchanger has a square shape with the overall dimensions of 200x200 mm, 250x250 mm and 300x300 mm. The heat exchanger depth is from 100 up to 400 mm.
- The heat exchanger consists of a heat accumulating mass (a set of plates) and a casing. The assembled and interconnected plates build a heat exchanging stack with many air channels. The air channels are crossed at 90° angle. The two air streams moving in the air channels do not get mixed.
- The distance between the plates of 2.4, 2.7 or 3.0 mm provides combination of the maximum efficiency and the lowest pressure differential.





## APPLIED MATERIALS

- The heat exchanging plates are made of special impact-resistant polystyrene with the thickness of 0.2 up to 0.3 mm. This material is featured with high thermal conductivity and high performance characteristics.
- All the casing components are made of impact-resistant polystyrene.

## AIRTIGHT SEALING

- Air sealing process is automated.
- High-quality hot-melt synthetic-base polymer adhesive used in food and pharmacy industries provides air tightness.



## MODIFICATIONS

Plastic casing designs are available for this heat exchanger series.

### Version 2. Plastic casing

The head plates and profiles are made of impact-resistant polystyrene. The upper head plate is supplied with a transport polypropylene holder. The dimensions of the heat exchangers in this casing are 200x200 mm, 250x250 mm and 300x300 mm.



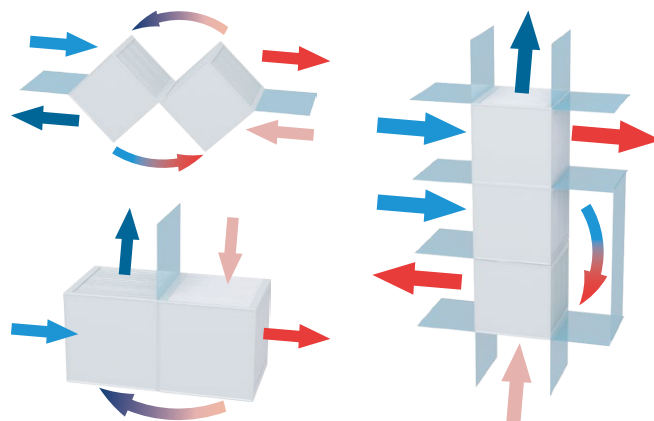
### Version 2.1. Plastic casing with T-profile

The head plates and profiles are made of impact-resistant polystyrene. The upper head plate is supplied with a transport polypropylene holder. T-profile with an inner extensional groove is used instead of a standard profile in case of special mounting in a mounting seat of an air handling unit.



## MOUNTING OPTIONS

Depending on the task (project), several Hp-EX4 cross-flow plate heat exchangers can be installed in series or connected to modular units with the size, for example 1000x1000 mm.



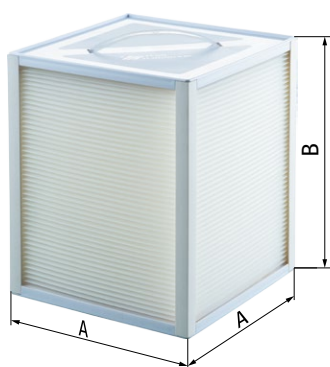
## OPERATION CONDITIONS

- The applied materials enable operation, storage and transportation of the heat exchangers in the temperature conditions from -25 up to +50 °C. Storage of heat exchangers in an exposed position in direct sunlight is forbidden.
- In winter season the air moisture is condensed on the heat recovery plates and the condensed water freezes at the temperature of -5 °C and lower. Heat recovery efficiency during these temperature conditions is slim to zero. Avoid condensate freezing on the heat exchanger plates.

## TECHNICAL MAINTENANCE

The Hp-EX4 cross-flow heat exchangers have no movable parts and metal connections, therefore no mechanical maintenance is required. Slight contaminations are eliminated by compressed air jets or flushing with warm mild detergent solutions.

## MODEL LINE



Name	A: width [mm]	B: depth [mm]	h: distance between plates [mm]	x: casing modification
Hp-EX4 200	200	100...400	2.4	2/2.1
Hp-EX4 250	250	100...400	2.7	2/2.1
Hp-EX4 300	300	100...400	3.0	2/2.1

## DESIGNATION KEY

## Hp-EX4 A/B/h - x

**Hp-EX4:** commercial group.

**A:** width, length [mm]: 200/250/300

**B:** height [mm]: 100...400

**h:** distance between plates [mm]: 2.4/2.7/3.0

**x:** casing modification:

- **2: plastic**
- **2.1: plastic with a T-profile**

## GENERAL DESCRIPTION

- E-EX4 cross-flow enthalpy heat exchangers are used to transfer both apparent and latent heat energy from one air flow to another.
- In the enthalpy heat exchangers of this series an ultrathin polymer membrane is used as a separating barrier between the flows, which allows through diffusion to transfer not only heat but also moisture.
- Due to its atomic structure, the membrane allows only water vapor to penetrate through it, while blocking the transfer of gases, pollution, odors, microorganisms and prevents the spread of viruses.
- The enthalpy heat exchangers keep the balanced comfortable indoor humidity in dry winter and hot humid outside conditions.



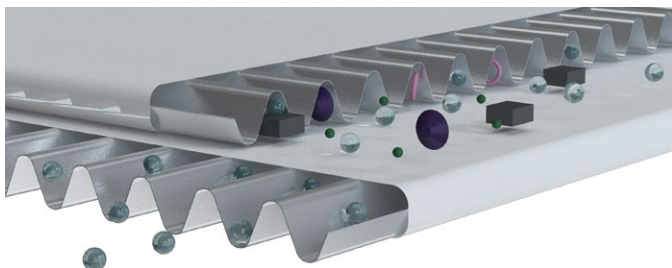
## APPLICATIONS

- Ventilation and air conditioning systems
- Heat recovery ventilation in residential premises
- School premises
- Hospitals
- Office buildings



## DESIGN

- The heat exchangers are available with face dimensions of 200x200 mm, 250x250 mm, 300x300 mm, 400x400 mm and 500x500 mm. The heat exchanging plates have the installation depth from 100 mm up to 400 mm.
- The accumulating mass consists of aluminium waveform plates, that are laid perpendicular to the channel direction. The wave height is 2.7, 4.5 and 6.0 mm.
- The vapour-permeable membrane is located between the aluminium plates. This design keeps the two air streams fully separated.
- The casing has no movable parts and is made of various materials.





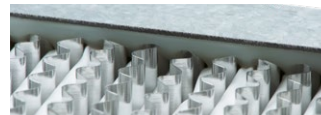
## APPLIED MATERIALS

- The heat exchanging plates are made of high-quality aluminium foil with the thickness from 0.07 mm.
- The membrane is made of polymer with microporous structure and has antibacterial coating.
- All the casing components can be made of:
  - quality sheet metal (aluzinc);
  - high-strength aluminium alloy.



## AIRTIGHT SEALING

- Air sealing process is automated.
- High-quality hot-melt synthetic-base polymer adhesive used in food and pharmacy industries provides air tightness.



## MODIFICATIONS

Two different casing designs are available for this heat exchanger series.

### Version 1. Aluzinc casing

The head plates and profiles are made of high-quality sheet metal – aluzinc. Typically applied for E-EX4 200/..., E-EX4 250/... and E-EX4 300/... heat exchangers.



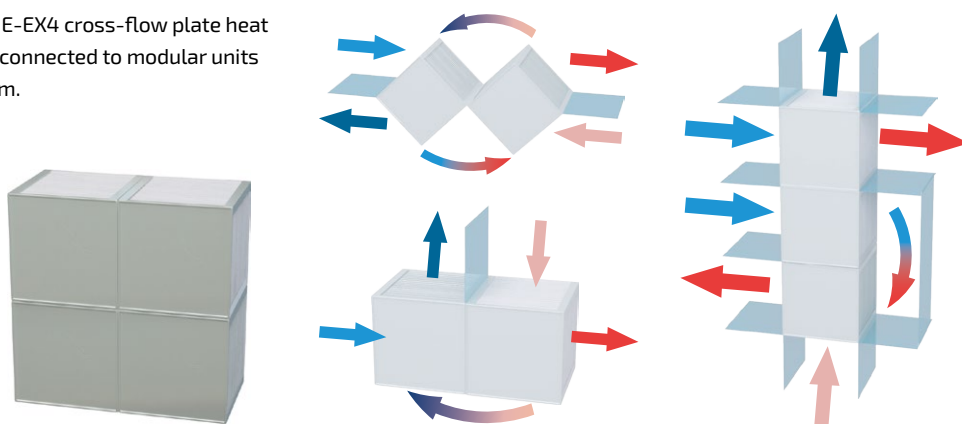
### Version 3. Aluminium casing

All the casing components are made of high quality aluminium sheet, which provides corrosion protection and has a low specific weight. Typically applied for E-EX4 400/... and E-EX4 500/... heat exchangers. It is possible to use aluminium on other types of heat exchangers of this series.



## MOUNTING OPTIONS

Depending on the task (project), several E-EX4 cross-flow plate heat exchangers can be installed in series or connected to modular units with the size, for example 1000x1000 mm.



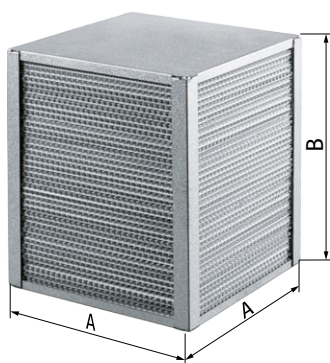
## OPERATION CONDITIONS

- The applied materials enable operation, storage and transportation of the heat exchangers in the temperature conditions from -25 up to +50 °C.
- Storage of heat exchangers in an exposed position in direct sunlight is forbidden.
- The E-EX4 enthalpy heat exchangers are not subjected to freezing in case of normal operation conditions in winter.

## TECHNICAL MAINTENANCE

- Regular check-up of filters is required to keep the heat exchangers and the supply filter clean. The filters must be cleaned or replaced as required.
- To remove the contaminations flush the heat exchanger with warm water up to 30 °C.
- Do not use high pressure water jet for cleaning of the heat exchanger because it may damage the ultrathin membrane.

## MODEL LINE



Name	A: width [mm]	B: depth [mm]	h: distance between plates [mm]	x: casing modification
E-EX4 200	200	100...400	2.7/4.5	1
E-EX4 250	250	100...400	2.7/4.5	1
E-EX4 300	300	100...400	2.7/4.5/6.0	1
E-EX4 400	400	100...400	2.7/4.5/6.0	3
E-EX4 500	500	100...400	2.7/4.5/6.0	3

## DESIGNATION KEY

### E-EX4 A/B/h - x

**E-EX4:** commercial group.

**A:** width, length [mm]: 200/250/300/400/500

**B:** depth [mm]: 100...400

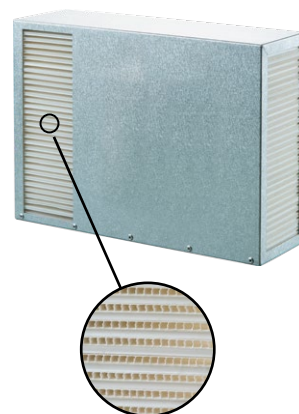
**h:** distance between plates [mm]: 2.7/4.5/6.0

**x:** casing modification:

- **1: aluzinc**
- **3: aluminum.**

## GENERAL DESCRIPTION

- The HC-EX4 counter-flow heat exchangers have a very simple design and contain no movable parts.
- The heat exchangers of this series are made of polystyrene plates with cellular structure, which are interconnected with a special glue. The plate height is from 3 to 4 mm.
- The warm extract and cold intake air streams are separated with the plate walls and do not come in contact with each other. This design solution excludes transfer of humidity, contaminants, smells and microbes from one air stream to another. Heat recovery efficiency reaches 79 %.
- The accumulating mass is assembled into a rigid aluzinc casing.
- The applied heat exchanger material enables operation in the temperature conditions from -25 up to +50 °C.
- The heat exchangers are frost-resistant and keep the high performance after defrosting.
- The heat exchangers require low maintenance. Water flushing is used for cleaning.

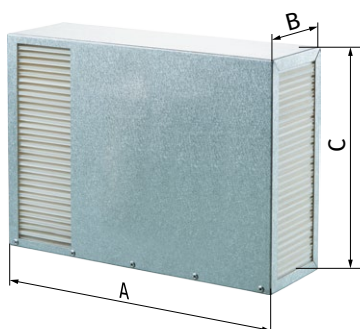


## FUNCTIONING

- The outside intake air flows through the filter and the heat exchanger and is moved to the room with the supply fan.
- The warm extract air flows through the filter and the heat exchanger and is exhausted outside by the extract fan.
- In the heat exchanger the heat extracted from the warm extract air is absorbed with the cold air from outside.
- Heat recovery technology minimises heat losses and heating expenses in the cold season.
- The supply and extract air streams do not get mixed, so transfer of humidity, contaminants, smells and microbes from one air stream to another is not possible.



## MODEL LINE



Name	A: width [mm]	B: depth [mm]	C: height [mm]
HC-EX4 300/95/C-1	300	95	100...500



## DESIGNATION KEY

### HC-EX4 A/B/C - 1

**HC-EX4:** commercial group.

**A:** width [mm]: 300

**B:** depth [mm]: 95

**C:** height [mm]: 100...500

**1:** casing modification: aluzinc

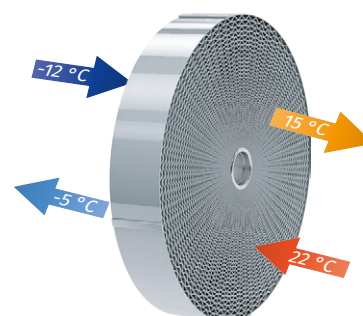
## GENERAL DESCRIPTION

The rotary heat exchangers have a rotating heat wheel. The accumulating mass rotates permanently between the warm extract and the cold intake air flows. During rotation of the heat exchanger the extract air heat is absorbed with the cold intake flow. Heat recovery efficiency reaches 85 %.



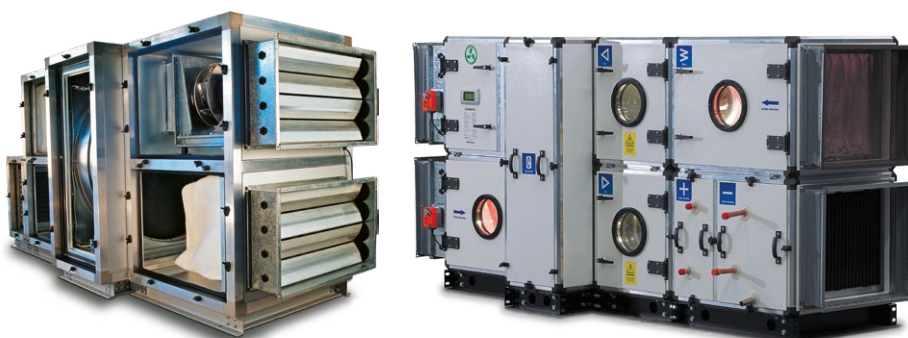
## DESIGN

The rotary heat exchanger has a cylindrical shape and cellular structure in the form of traverse through air channels used for movement of extract air flow from the room and supply air flow to the room. The reinforcing rods connected to the central hub and the aluminium shell provide rigid rotor design. The rotary heat exchanger is supplied enclosed in the galvanized steel casing with an electric motor as a standard.



## APPLICATIONS

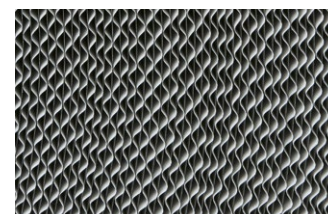
- Air conditioning and heating
- Industrial ventilation
- Swimming pools
- Paint booths
- Agricultural premises
- Marine environment
- Industrial premises



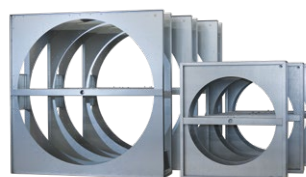
## APPLIED MATERIALS

- The rotary heat exchangers are made of high-quality aluminium foil with the width of 100 mm and 200 mm and thickness of 0.07 mm. Optionally the foil may have a special coating.

Foil width [mm]	100		200	
Foil wave height [mm]	1.6	2.1	1.6	2.1
Foil thickness [mm]	0.07		0.07	



- The casing has seamless design as a standard and is made of galvanized steel with variable thickness, depending on a size of the rotary heat exchanger.



## MODIFICATIONS

### ROTOR

- **Shallow rotors of 100 mm depth (RS)**

The basic rotor modification has the depth of 200 mm. However the rotary heat exchangers with the maximum depth of 100 mm are used for ventilation units, which have limited space for the heat exchangers, design limitations or high requirements to pressure losses.

- **Rotor without casing**

The rotor may be supplied without a casing. The rotor diameter is from 300 mm up to 1900 mm.



### CASING

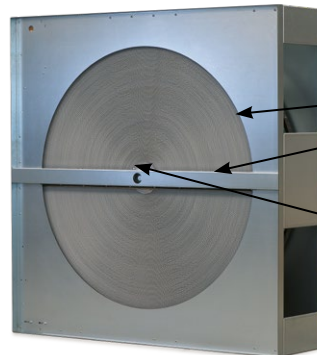
The standard rotary heat exchanger is made of galvanized steel. Other customized versions of the heat exchanger casing material are possible, such as aluminium, stainless steel, painted steel.



## COMPONENTS

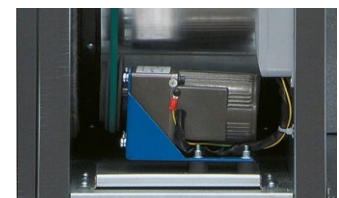
The smart air sealing technology minimises air leakages in the rotary heat exchanger. It also prevents air leakage from the heat exchanger or mixing of supply and extract air streams. All the gaps between the rotor and the casing are protected with special brush sealing. These sealings are reliable, durable and easy to replace.

The fasteners are made of zinc coated metal to prevent corrosion. The delivery set includes high-quality ball bearing of closed type.



## MOTOR AND ROTATION SPEED CONTROL COMPONENTS

The rotary heat exchanger drive consists of an electric motor with a worm reduction gearbox, a pulley and a belt. The rotation speed from 10 to 13 RPM ensures higher heat recovery efficiency. The three-phase electric motor is designed for connection to three-phase 400 V power supply and the single-phase electric motor is designed for connection to single-phase 230 V power supply. The motor power varies from 60 W up to 180 W depending on the rotor diameter. The rotor speed is controlled with a frequency controller (not included in the delivery set).



## TECHNICAL MAINTENANCE

During operation the air channels get gradually contaminated. This contamination not only decreases performance, but accelerates pressure losses. To attain the maximum performance regular maintenance of the rotary heat exchangers is required as follows:

- Cleaning of the rotor cells with compressed air to remove dust and other contaminants
- Regular control and check-up of the electric motor and controls
- Control of transmission belt tensioning

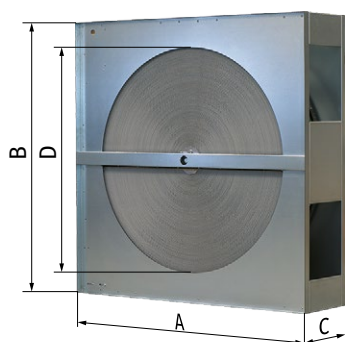
## TYPES. MODEL LINE

- Depending on environmental conditions and operation requirements the rotary heat exchangers are available in various sizes and with various coatings from aluminium foil.

### CONDENSING ROTARY HEAT EXCHANGERS. R-EX SERIES



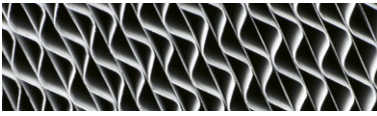
This rotary heat exchanger type is made of high-quality aluminium foil with no special coating. The rotor diameter is from 200 mm up to 2500 mm. This modification is used for non-aggressive environments with requirements to high heat recovery efficiency.



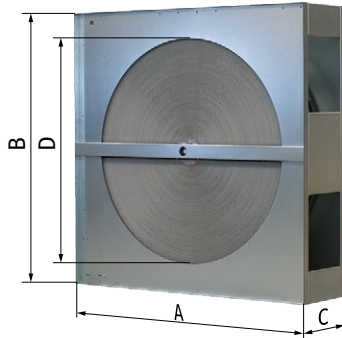
Name	D: rotor diameter [mm]	A: casing width [mm]	B: casing height [mm]	C: casing depth [mm]	h: wave height [mm]	Foil thickness [mm]
R-EX D400	400	600	600	295	1.6;2.1	100;200
R-EX D500	500	600	600	295	1.6;2.1	100;200
R-EX D600	600	700	700	295	1.6;2.1	100;200
R-EX D700	700	800	895	295	1.6;2.1	100;200
R-EX D800	800	900	900	290	1.6;2.1	100;200
R-EX D900	900	1100	1100	290	1.6;2.1	100;200
R-EX D1000	1000	1100	1100	290	1.6;2.1	100;200
R-EX D1100	1100	1250	1250	290	1.6;2.1	200
R-EX D1150	1150	1250	1250	290	1.6;2.1	200
R-EX D1300	1300	1400	1400	310	1.6;2.1	200
R-EX D1400	1400	1500	1500	310	1.6;2.1	200
R-EX D1510	1510	1630	1630	330	1.6;2.1	200
R-EX D1600	1600	1700	1700	310	1.6;2.1	200
R-EX D1700	1700	2010	2010	330	1.6;2.1	200
R-EX D1900	1900	2210	2210	330	1.6;2.1	200
R-EX D2000	2000	2210	2210	330	1.6;2.1	200
R-EX D2100	2100	2210	2210	330	1.6;2.1	200
R-EX D2200	2200	2300	2300	330	1.6;2.1	200
R-EX D2300	2300	2400	2400	330	1.6;2.1	200
R-EX D2400	2400	2500	2500	330	1.6;2.1	200
R-EX D2500	2500	2600	2600	330	1.6;2.1	200



### ENTHALPY ROTARY HEAT EXCHANGERS. R-E-EX SERIES (SILICA GEL COATING)



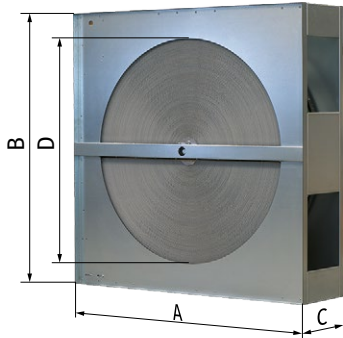
This rotary heat exchanger type is made of aluminium foil with water-absorbing coating. These heat exchangers enable sensible and latent heat recovery and are used for operation in premises requiring air humidifying with no air cooling.



Name	D: rotor diameter [mm]	A: casing width [mm]	B: casing height [mm]	C: casing depth [mm]	h: wave height [mm]	Foil thickness [mm]
R-E-EX D400	400	600	600	295	1,6;2,1	100;200
R-E-EX D500	500	600	600	295	1,6;2,1	100;200
R-E-EX D600	600	700	700	295	1,6;2,1	100;200
R-E-EX D700	700	800	895	295	1,6;2,1	100;200
R-E-EX D800	800	900	900	290	1,6;2,1	100;200
R-E-EX D900	900	1100	1100	290	1,6;2,1	100;200
R-E-EX D1000	1000	1100	1100	290	1,6;2,1	100;200
R-E-EX D1100	1100	1250	1250	290	1,6;2,1	200
R-E-EX D1150	1150	1250	1250	290	1,6;2,1	200
R-E-EX D1300	1300	1400	1400	310	1,6;2,1	200
R-E-EX D1400	1400	1500	1500	310	1,6;2,1	200
R-E-EX D1510	1510	1630	1630	330	1,6;2,1	200
R-E-EX D1600	1600	1700	1700	310	1,6;2,1	200
R-E-EX D1700	1700	2010	2010	330	1,6;2,1	200
R-E-EX D1900	1900	2210	2210	330	1,6;2,1	200
R-E-EX D2000	2000	2210	2210	330	1,6;2,1	200
R-E-EX D2100	2100	2210	2210	330	1,6;2,1	200
R-E-EX D2200	2200	2300	2300	330	1,6;2,1	200
R-E-EX D2300	2300	2400	2400	330	1,6;2,1	200
R-E-EX D2400	2400	2500	2500	330	1,6;2,1	200
R-E-EX D2500	2500	2600	2600	330	1,6;2,1	200

**SORPTION ROTARY HEAT EXCHANGERS. R-N-EX SERIES (MOLECULAR SIEVE COATING)**


This rotary heat exchanger type is made of foil with high extremely hygroscopic coating. These heat exchangers are designed for permanent air dehumidification in premises with total heat recovery.

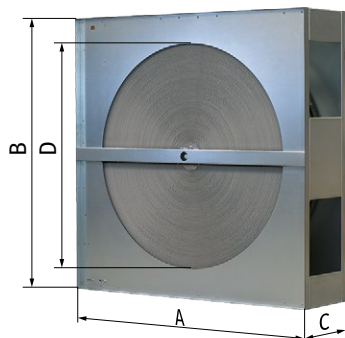


Name	D: rotor diameter [mm]	A: casing width [mm]	B: casing height [mm]	C: casing depth [mm]	h: wave height [mm]	Foil thickness [mm]
R-N-EX D400	400	600	600	295	1.6;2.1	100;200
R-N-EX D500	500	600	600	295	1.6;2.1	100;200
R-N-EX D600	600	700	700	295	1.6;2.1	100;200
R-N-EX D700	700	800	895	295	1.6;2.1	100;200
R-N-EX D800	800	900	900	290	1.6;2.1	100;200
R-N-EX D900	900	1100	1100	290	1.6;2.1	100;200
R-N-EX D1000	1000	1100	1100	290	1.6;2.1	100;200
R-N-EX D1100	1100	1250	1250	290	1.6;2.1	200
R-N-EX D1150	1150	1250	1250	290	1.6;2.1	200
R-N-EX D1300	1300	1400	1400	310	1.6;2.1	200
R-N-EX D1400	1400	1500	1500	310	1.6;2.1	200
R-N-EX D1510	1510	1630	1630	330	1.6;2.1	200
R-N-EX D1600	1600	1700	1700	310	1.6;2.1	200
R-N-EX D1700	1700	2010	2010	330	1.6;2.1	200
R-N-EX D1900	1900	2210	2210	330	1.6;2.1	200
R-N-EX D2000	2000	2210	2210	330	1.6;2.1	200
R-N-EX D2100	2100	2210	2210	330	1.6;2.1	200
R-N-EX D2200	2200	2300	2300	330	1.6;2.1	200
R-N-EX D2300	2300	2400	2400	330	1.6;2.1	200
R-N-EX D2400	2400	2500	2500	330	1.6;2.1	200
R-N-EX D2500	2500	2600	2600	330	1.6;2.1	200

## EPOXY ROTARY HEAT EXCHANGERS. R-K-EX SERIES (EPOXY COATING)



This rotary heat exchanger type is made of foil with a special coating with high corrosion-, salt- and chemical-resistant properties. Used in swimming pools, paint booths, agricultural premises, etc.



Name	D: rotor diameter [mm]	A: casing width [mm]	B: casing height [mm]	C: casing depth [mm]	h: wave height [mm]	Foil thickness [mm]
R-K-EX D400	400	600	600	295	1,6;2,1	100;200
R-K-EX D500	500	600	600	295	1,6;2,1	100;200
R-K-EX D600	600	700	700	295	1,6;2,1	100;200
R-K-EX D700	700	800	895	295	1,6;2,1	100;200
R-K-EX D800	800	900	900	290	1,6;2,1	100;200
R-K-EX D900	900	1100	1100	290	1,6;2,1	100;200
R-K-EX D1000	1000	1100	1100	290	1,6;2,1	100;200
R-K-EX D1100	1100	1250	1250	290	1,6;2,1	200
R-K-EX D1150	1150	1250	1250	290	1,6;2,1	200
R-K-EX D1300	1300	1400	1400	310	1,6;2,1	200
R-K-EX D1400	1400	1500	1500	310	1,6;2,1	200
R-K-EX D1510	1510	1630	1630	330	1,6;2,1	200
R-K-EX D1600	1600	1700	1700	310	1,6;2,1	200
R-K-EX D1700	1700	2010	2010	330	1,6;2,1	200
R-K-EX D1900	1900	2210	2210	330	1,6;2,1	200
R-K-EX D2000	2000	2210	2210	330	1,6;2,1	200
R-K-EX D2100	2100	2210	2210	330	1,6;2,1	200
R-K-EX D2200	2200	2300	2300	330	1,6;2,1	200
R-K-EX D2300	2300	2400	2400	330	1,6;2,1	200
R-K-EX D2400	2400	2500	2500	330	1,6;2,1	200
R-K-EX D2500	2500	2600	2600	330	1,6;2,1	200

## DESIGNATION KEY

**Rx-x-EX Dx-x/7-0-1 AxBxC-x**

**R**: standard heat exchanger type

**x**: foil width: «-»: 200 mm; «S»: 100 mm

**x**: rotor type: «-»: condensing type; «E»: enthalpy type; «N»: sorption type; «K»: epoxy type

**EX**: standard commercial group

**Dx**: rotor diameter [mm]: 350-2400

**x**: wave height [mm]: 1.6 / 2.1

**A**: casing width [mm]: 500-2600

**B**: casing height [mm]: 500-2600

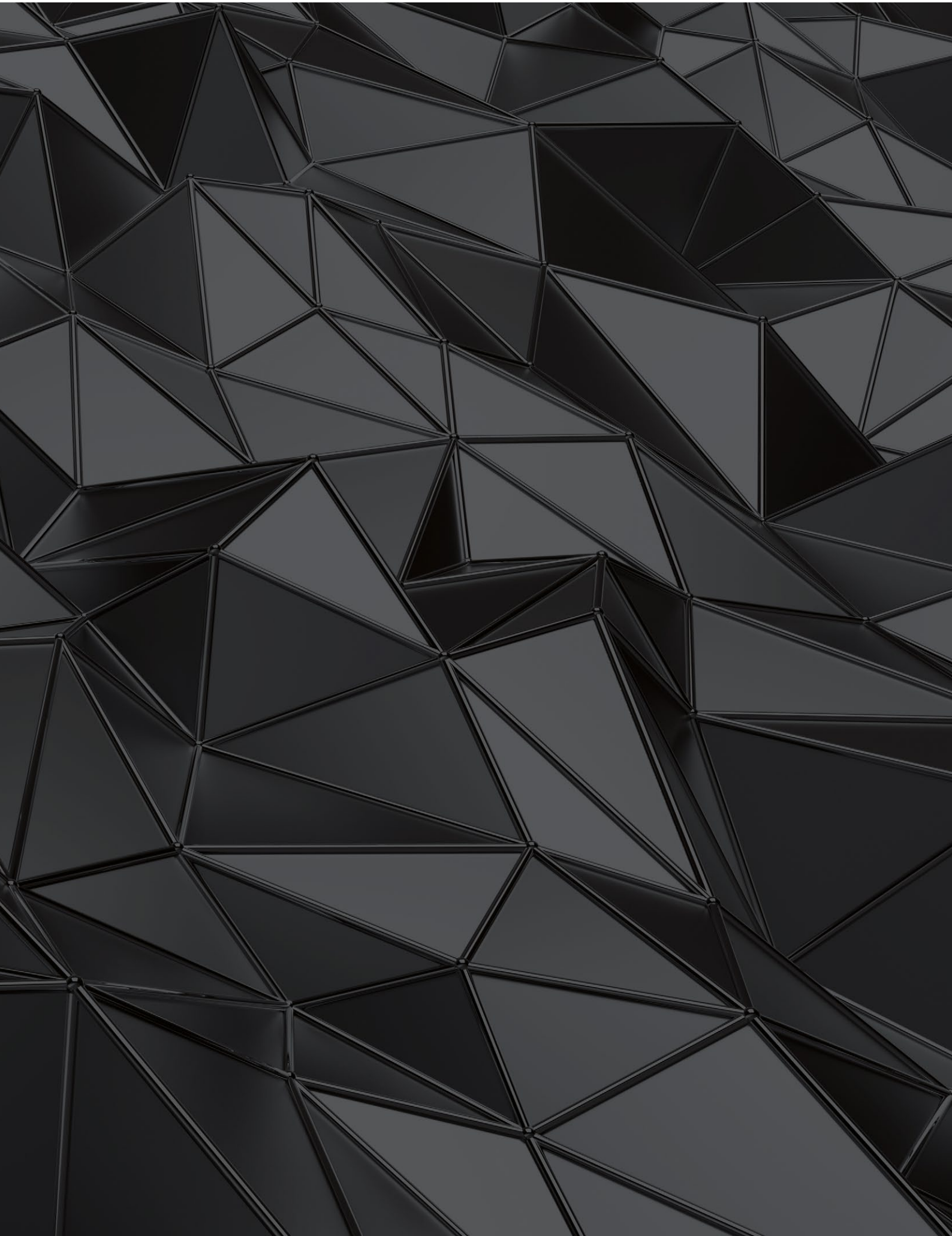
**C**: casing depth [mm]: 250-500

**7**: standard foil thickness [mm]: 0.07

**0**: standard available cleaning section: 0: not available; 1: available

**1**: standard number of sections

**x**: number of phases of electric motor: 1: single-phase 230 V; 3: three-phase 400 V







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