Hoval

Hoval energy recovery

Rotary heat exchangers

Instructions for installation, commissioning and maintenance

ST1
ST3
SC1
SE3
SH1
HM1



Hoval | Responsibility for energy and environment

1 Use 3
1.1 Intended use. 3
1.2 User group 3

2 Safety 4
2.1 Symbols 4
2.2 Operational safety 4

3 Delivery 5
3.1 Scope of delivery 5
3.2 Identification and test 6
3.3 Storage. 6

4 Tools and aids 7

5 Lifting the exchanger 7
5.1 Lifting exchangers on pallets 7
5.2 Lifting exchangers with SM casing 8
5.3 Lifting exchangers with SP casing 10
5.4 Lifting exchangers with PR casing 11
5.5 Lifting wheels without casing 12

6 Assembly of segmented exchangers 13
6.1 Casing 13
6.2 Radial walls 16
6.3 Storage mass 18
6.4 Purge sector. 23
6.5 Seal 25
6.6 Drive system. 26

7 Assembly of half mounted exchangers 29
7.1 Casing 30
7.2 Radial walls 31
7.3 Storage mass 32
7.4 Purge sector, seal, drive system 33

8 Installation in the air handling unit 34
8.1 Requirements for the installation site 34
8.2 Vertical installation 34
8.3 Horizontal installation 35

9 Electrical connection 36

10 Commissioning 37
10.1 Checklist. 37

11 Maintenance and repair 39
11.1 Maintenance schedule 39
11.2 Cleaning the storage mass. 39
11.3 Spare parts. 40
11.4 Replacement of the brush seal 41
11.5 Replacement of the V-belt 41
11.6 Servicing. 41

1 Use

1.1 Intended use

Rotary heat exchangers
Hoval rotary heat exchangers are energy recovery units for installation in ventilation and air-conditioning units and for process engineering applications. They transfer energy through a rotating storage mass, which is alternately heated by one air stream and cooled by the other. The following application limits apply in operation:

Temperature				
without controller			−20 … 50	°C
with controller			−20 … 45	°C
Pressure drop				
1-piece wheels [1]	Ø 500 mm	max.	400	Pa
	Ø 2600 mm	max.	300	Pa
Segmented wheels		max.	400	Pa

[1] The maximum permissible pressure drop depends on the wheel diameter and changes linearly between the values given here (calculation with Hoval CASER).

Table 1: Application limits

Wheels without casing
Hoval wheels without casing are energy recovery components for installation in ventilation and air-conditioning units and for applications in process engineering. The following application limits apply in operation:

Temperature			−40 … 70	°C
Pressure drop				
1-piece wheels [1]	Ø 500 mm	max.	400	Pa
	Ø 2600 mm	max.	300	Pa
Segmented wheels		max.	400	Pa

[1] The maximum permissible pressure drop depends on the wheel diameter and changes linearly between the values given here (calculation with Hoval CASER).

Table 2: Application limits

Intended use also includes compliance with these instructions. Any usage over and above this use is considered to be not as intended. The manufacturer can accept no liability for damage resulting from improper use.

1.2 User group

Caution
Risk of injury from incorrect work. The rotary heat exchangers may only be installed and maintained by authorised and instructed personnel who are well acquainted with the units and are informed about possible dangers.

These instructions are for operating engineers as well as specialists in building, heating and ventilation technology.

2 Safety

2.1 Symbols



Caution
This symbol warns against risk of injury. Please heed all instructions designated by this symbol to prevent injuries and/or death.



Attention
This symbol warns against property damage. Please heed the respective instructions to prevent risk of damage to the unit and its functions.



Notice
This symbol denotes information about the economic use of the equipment or special tips.

2.2 Operational safety

The exchangers are constructed in accordance with the state of the art and are safe to operate. Despite every precaution being taken, potential and not immediately obvious risks always remain, for example:

- Danger from suspended load
- Danger from trapping of body parts
- Danger from tilting
- Danger from sharp edges
- Danger from falling objects
- Danger when working on the electrical system

Therefore:

- The exchanger may only be installed, operated and serviced by authorised, trained and instructed skilled personnel:
  - Specialists as defined by these operating instructions are those persons who, based on their training, knowledge and experience as well as their knowledge of the relevant regulations and guidelines, can carry out the work assigned to them and recognise potential hazards.
- Please read the instructions before unpacking, installing, commissioning and before maintaining the equipment.
- Store the operating instructions so that they are easily accessible.
- Observe any attached information and warning signs.
- Follow the local safety and accident prevention regulations at all times.
- Unauthorised reconfiguration or modification of the exchanger is not permitted.

3 Delivery

3.1 Scope of delivery

Rotary heat exchangers are delivered on pallets and packaged in film. Exchangers with stronger packaging are additionally protected with wood fibre boards and a wooden crate. The scope of delivery includes:

1-piece rotary heat exchangers with casing:
- Rotary heat exchangers, fully assembled
- Optional components, placed in the casing (in the drive corner):
  - Controller loose (CRLL)

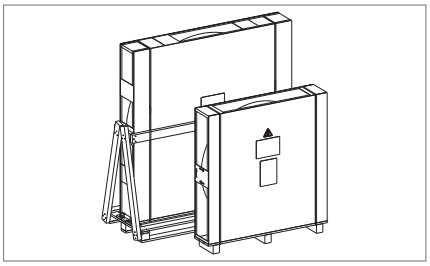


Fig. 1: Delivery of 1-piece exchangers

Segmented rotary heat exchangers with casing:
- Rotary heat exchanger in individual parts:
  - Casing with shaft, bearing and hub, in 2 parts
  - Radial walls
  - Periphery plates
  - Storage mass segments
  - Mounting kit for assembly
  - Drive system (if applicable)
- Optional components, placed in the casing (in the drive corner):
  - Purge sector (depending on the exchanger design)
  - Controller loose (CRLL)
  - Rotation guard (RG2 or RG3)

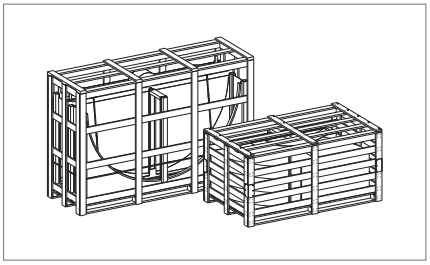
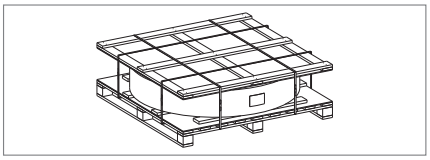


Fig. 2: Delivery of segmented exchangers

1-piece wheels without casing
- Wheel, fully assembled



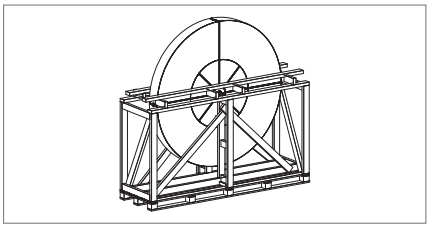


Fig. 3: Delivery of 1-piece wheels

Segmented wheels without casing
- Wheel in individual parts:
  - Shaft, bearing, hub (pre-assembled)
  - Radial walls
  - Periphery plates
  - Storage mass segments
  - Mounting kit for assembly

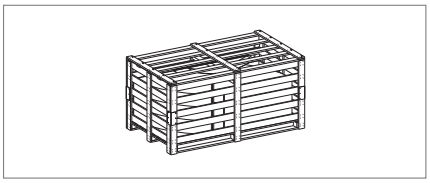
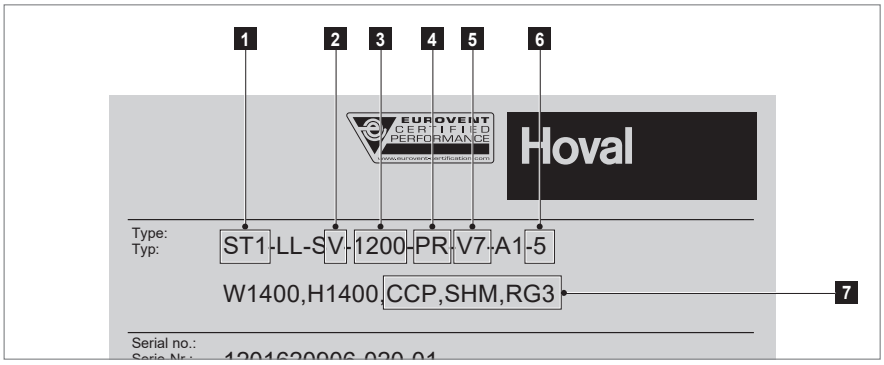


Fig. 4: Delivery of segmented wheels

3.2 Identification and test

The type label contains important information for identifying the rotary heat exchanger.



1	Design
2	Wheel orientation
3	Wheel diameter
4	Casing type
5	Drive system
6	Purge sector
7	Options

Fig. 5: Type label

- Check the consignment against the delivery documents and nameplate to ensure that it is correct.
- Check the delivery for visible transport damage.
- Report any wrong deliveries and possible transport damage immediately in writing.

3.3 Storage

If you do not install the exchanger immediately:

- Keep the exchanger in the original packaging.
- Place the exchanger on a level surface.
- Store the exchanger in a dry, dust-free room where it will not be subjected to vibrations.
- Storage temperature: −20 … 50 °C (or max. 45 °C for exchangers with controller)

4 Tools and aids

The following tools and aids are required for assembly:

- Electrical screwdriver
- Drill Ø 3.3 mm
- Pop rivet tool
- Set of Allen keys
- Scissors
- Spanner key set 10-19 mm
- Magnetic bit holder 8 mm
- Torque wrench 0-100 Nm
- Screw clamps
- Rubber mallet
- Personal protective equipment
- Lifting gear
- Measurement tape
- Spirit level
- Threaded rod M10

5 Lifting the exchanger

Caution
Risk of injury caused by falling load, tilting of the exchanger or improper handling. During all work:
– Wear personal protective equipment.
– Do not stand under suspended loads.
– Observe safety and accident prevention regulations.

5.1 Lifting exchangers on pallets

- Use a forklift with sufficient load-bearing capacity.
- Make sure that the exchanger is securely attached to the forklift truck with slings.

5.2 Lifting exchangers with SM casing

- Use lifting gear with sufficient load-bearing capacity.
- Hook the snap hooks of the lifting gear into the lifting eyes on both sides of the casing.
- Protect the exchanger casing with approx. 30 cm long square timbers.

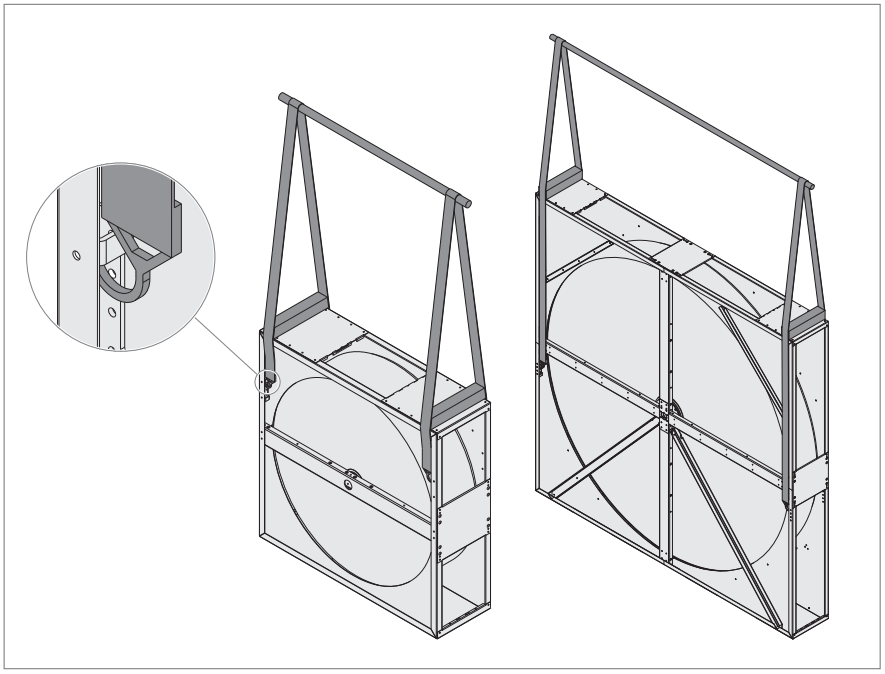


Fig. 6: Exchangers with SM casing

Turning exchangers

To save transport costs, exchangers with a height > 2700 mm and a width < 2700 mm are delivered in a turned position. Turn these exchangers into the upright position before lifting:

- Hook the snap hooks of the lifting gear into the upper corner sections on both sides.

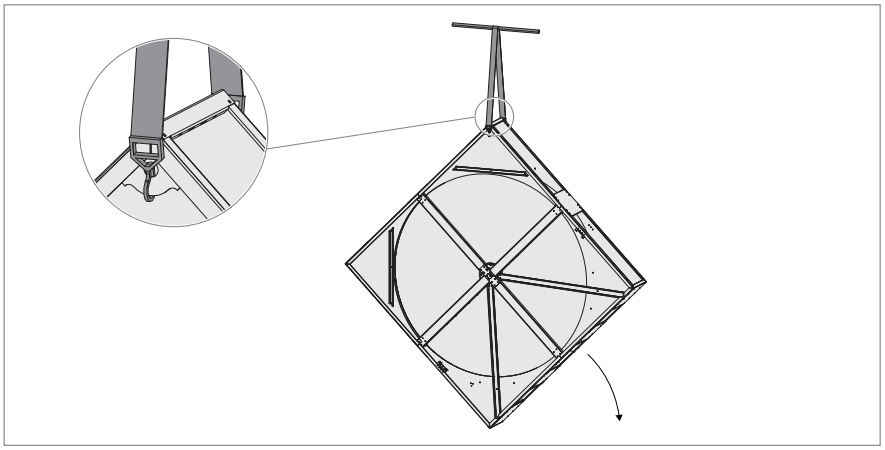


Fig. 7: Turning exchangers

Lifting exchangers packed together

Several exchangers with stronger packaging are delivered side by side on a pallet.

- On the freely accessible side, hook the snap hooks of the lifting gear into the lifting eyes of the casing.
- On the opposite side, hook the snap hooks of the lifting gear into the upper corner sections.
- Protect the exchanger casing with approx. 30 cm long square timbers.

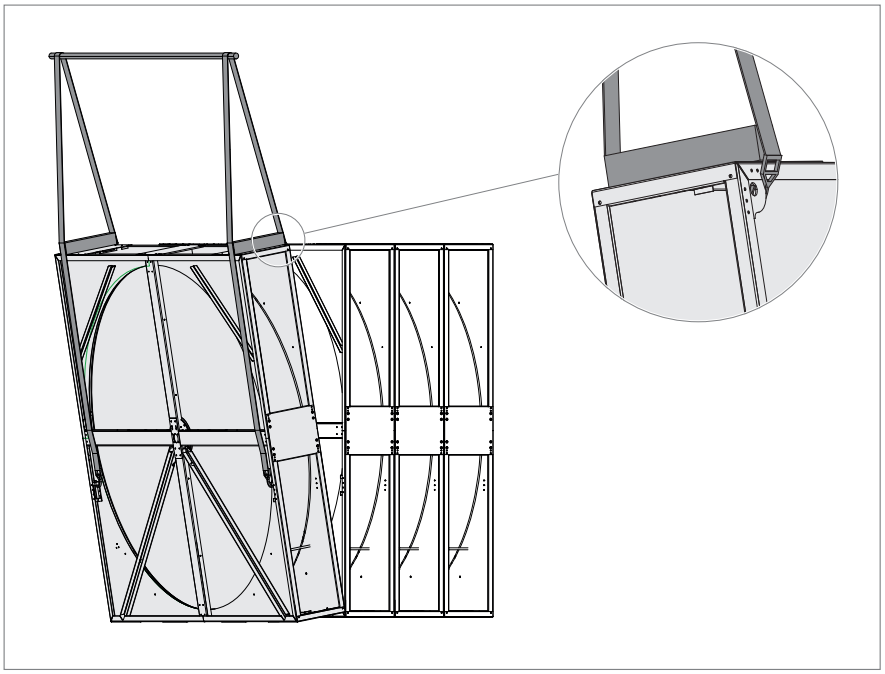


Fig. 8: Lifting exchangers packed together

5.3 Lifting exchangers with SP casing

- Use lifting gear with sufficient load-bearing capacity.
- Hook the snap hooks of the lifting gear into the lifting eyes on both sides of the casing.
- Protect the exchanger casing with approx. 30 cm long square timbers.

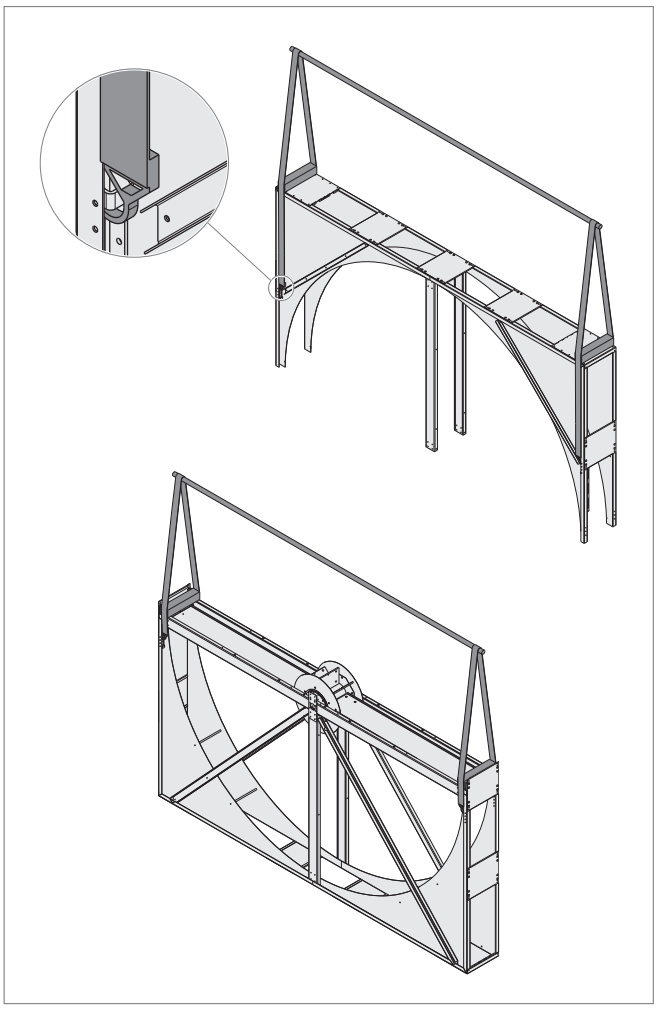


Fig. 9: Exchangers with SP casing

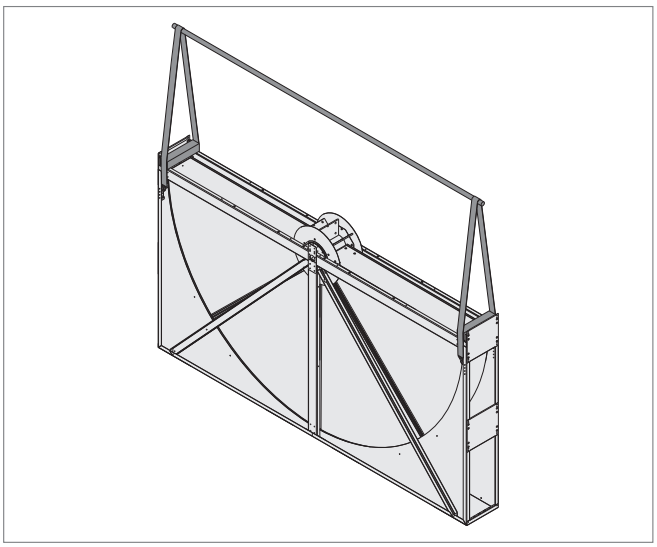


Fig. 10: Exchangers with SP casing and option “Half mounted” (SHM)

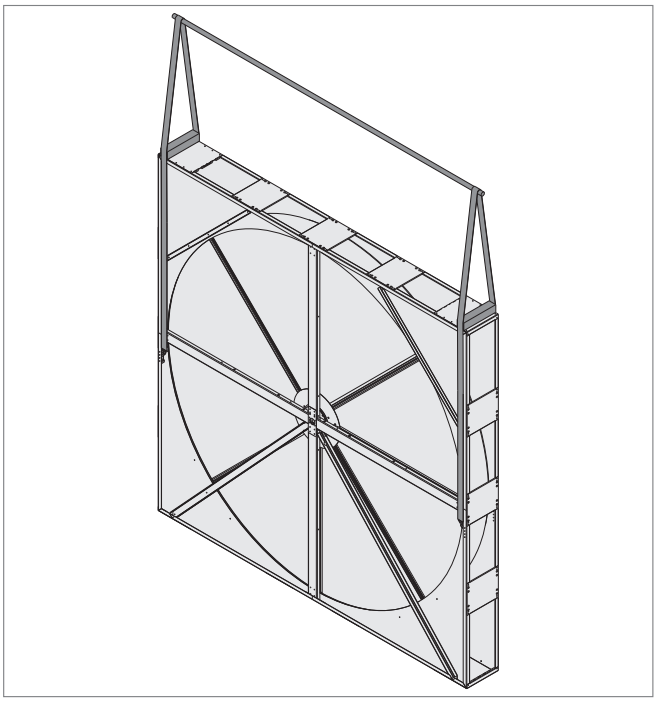


Fig. 11: Exchangers with SP casing and option “Fully mounted” (SFM)

5.4 Lifting exchangers with PR casing

- Use lifting gear with sufficient load-bearing capacity.
- Screw the supplied lifting kits into the profile casing as shown below.
- Hook the snap hooks of the lifting gear into the lifting kits on both sides.
- Protect the exchanger casing with approx. 45 cm long square timbers.

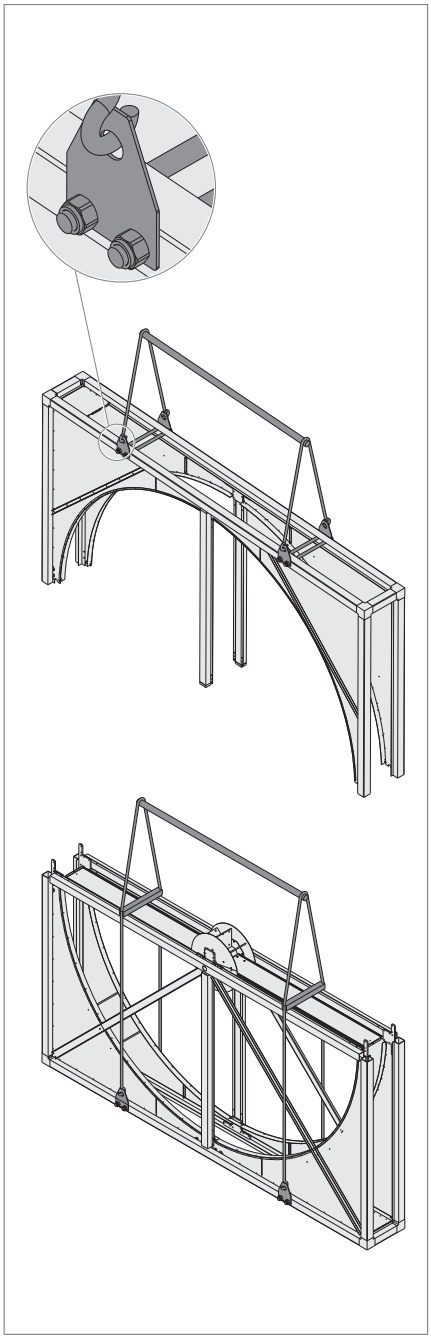


Fig. 12: Exchangers with PR casing

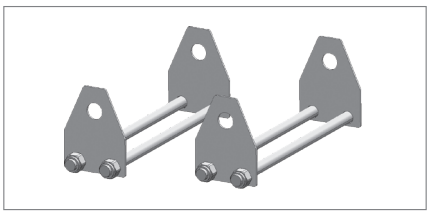


Fig. 13: Lifting kit

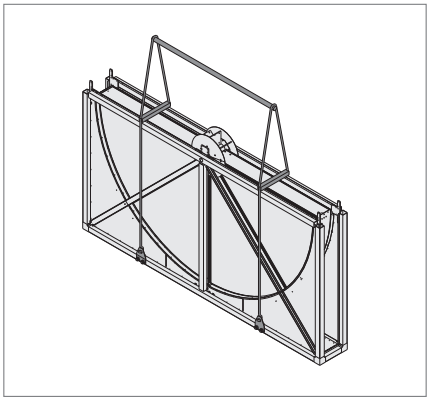


Fig. 14: Exchangers with PR casing and option “Half mounted” (SHM)

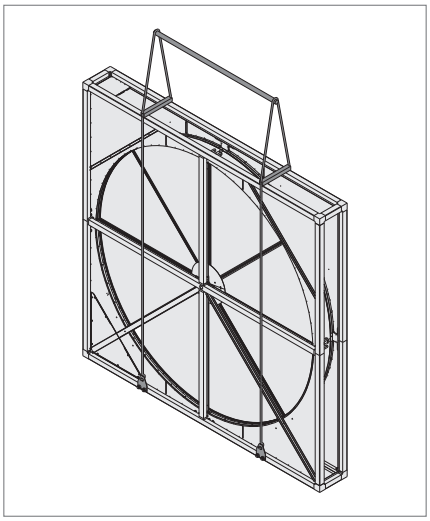


Fig. 15: Exchangers with PR casing and option “Fully mounted” (SFM)

5.5 Lifting wheels without casing

Attention
Danger of damaging the units.
Do not transport the wheels by rolling them.



- Use lifting gear with sufficient load-bearing capacity.
- The storage mass has 2 opposite drilled holes on the outside for lifting the wheel.
  - Use metal rods (preferably smooth shafts) with 10-12 mm diameter and approx. 200 mm length to lift the wheel.
  - Insert the rods into the drilled holes and attach the lifting gear to them.

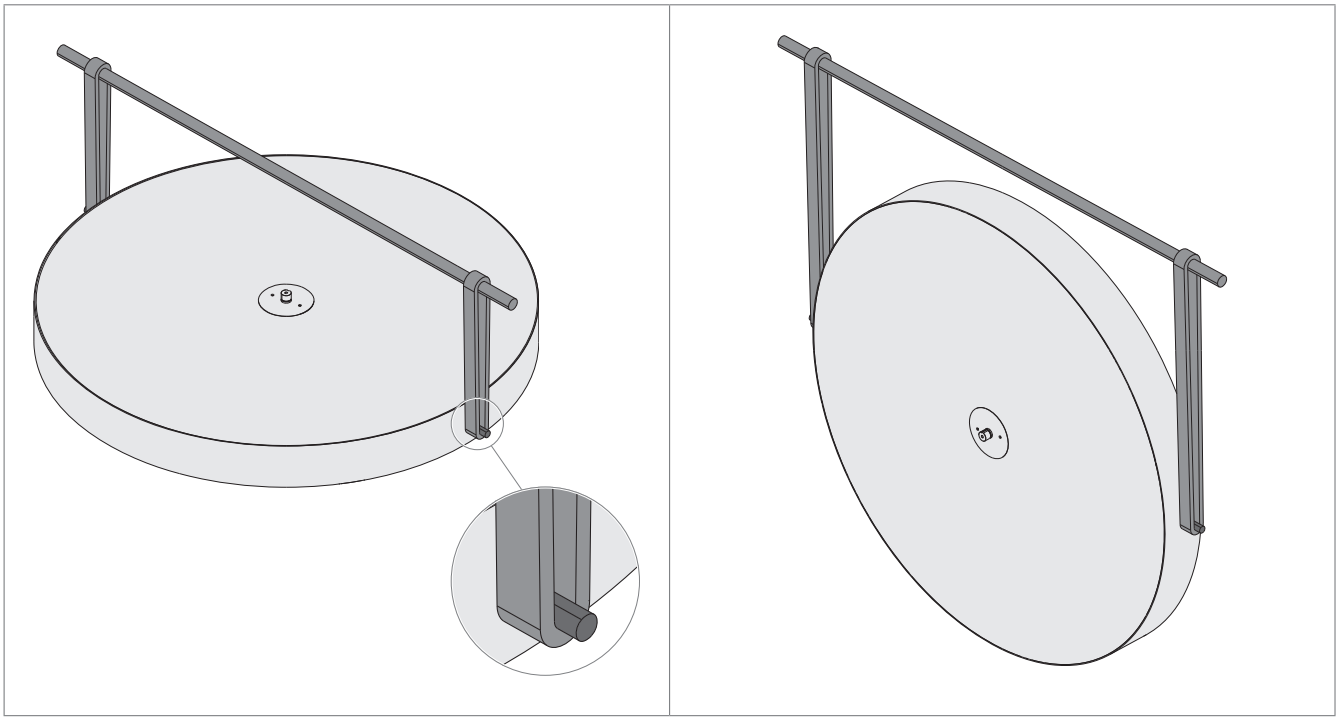


Fig. 16: Wheels without casing

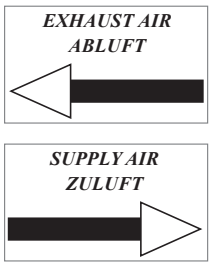
6 Assembly of segmented exchangers

Caution
Risk of injury caused by falling load, tilting of the exchanger or improper handling. During all work:
– Wear personal protective equipment.
– Do not stand under suspended loads.
– Observe safety and accident prevention regulations.

Notice
This section describes the assembly of segmented exchangers delivered in individual parts; for exchangers with the option “Half mounted” (SHM) see section 7.

6.1 Casing

- Place the bottom half of the casing on a level surface.
- Bring the casing halves into the correct position in relation to each other.
  – The air flow arrows must be on the same side of the casing and point in opposite directions:



- Put on the top half of the casing.
- Screw the two parts together.
  – Align the two casing halves using a spirit level.

SP casing

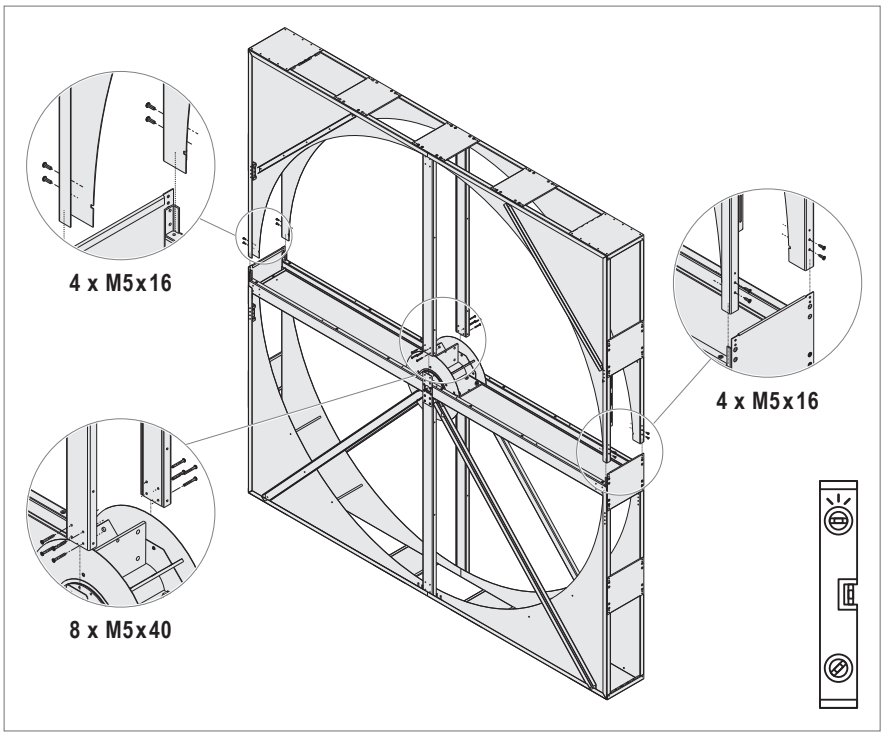


Fig. 17: Assembly of SP casings

PR casing

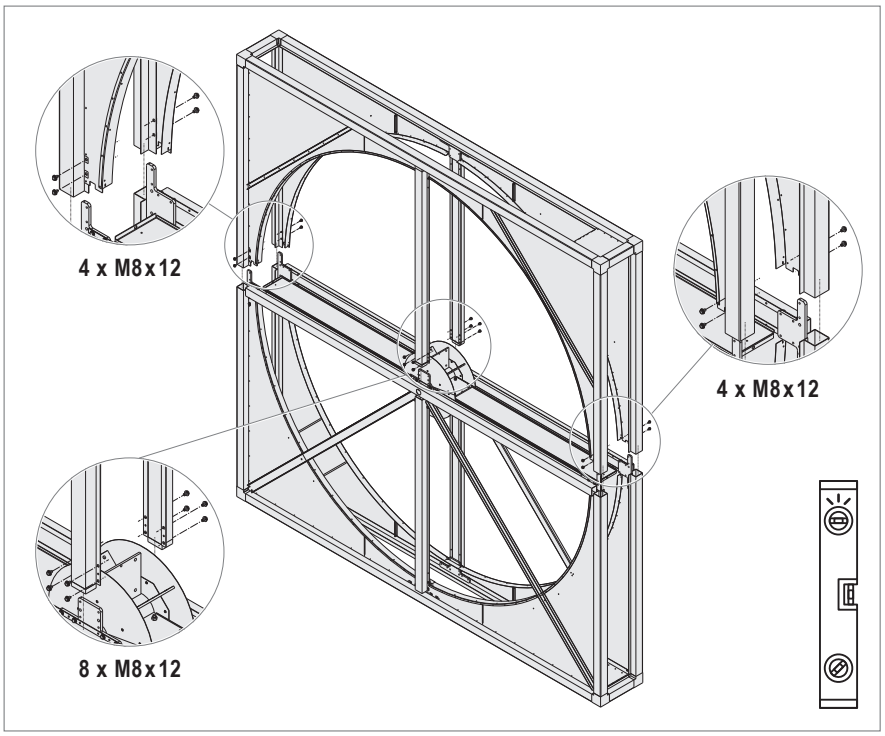


Fig. 18: Assembly of PR casings

Radial seal in PR casings

The radial seal is pre-mounted in PR casings in both halves of the casing.
Proceed as follows to connect the two parts:

- Shorten the brush seals to the correct length.
  – Let the two ends overlap by about 5 cm.
- Place the two ends on top of one another and clamp them under the retaining plate.
  – The retaining plate should rest against the clamp, not against the brush.

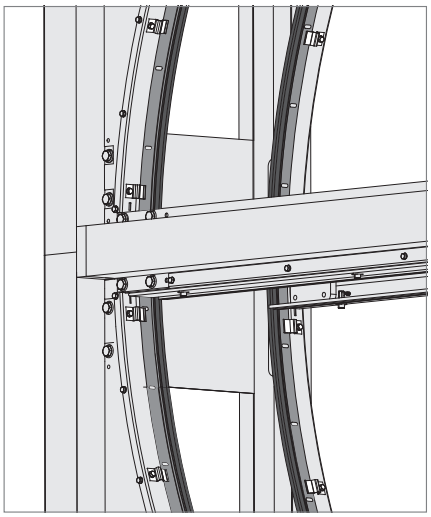


Fig. 19: Radial seal in PR casings

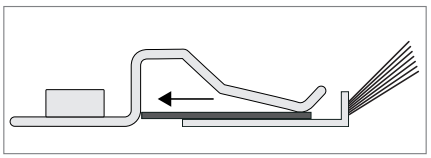


Fig. 20: Retaining plate resting against the clamp

6.2 Radial walls

Caution
Risk of injury due to uncontrolled movements of radial walls. Secure the wheel position during all work (e.g. with boards).

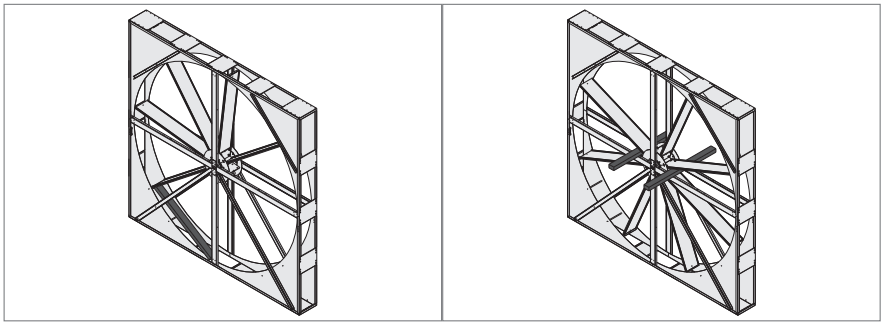


Fig. 21: Securing the wheel position

Mounting the radial walls 3 + 4

- Turn the hub with the 2 pre-assembled radial walls until one hub plate is pointing vertically downwards.
- Screw one radial wall each aligned vertically downwards and upwards onto the hub plates:
  - Mount the radial walls on the side marked with “Λ”.
  - Ensure that they are aligned in the same way as the pre-mounted radial walls: the edge at the outer end must not be bent towards the hub plate, but must point in the opposite direction.

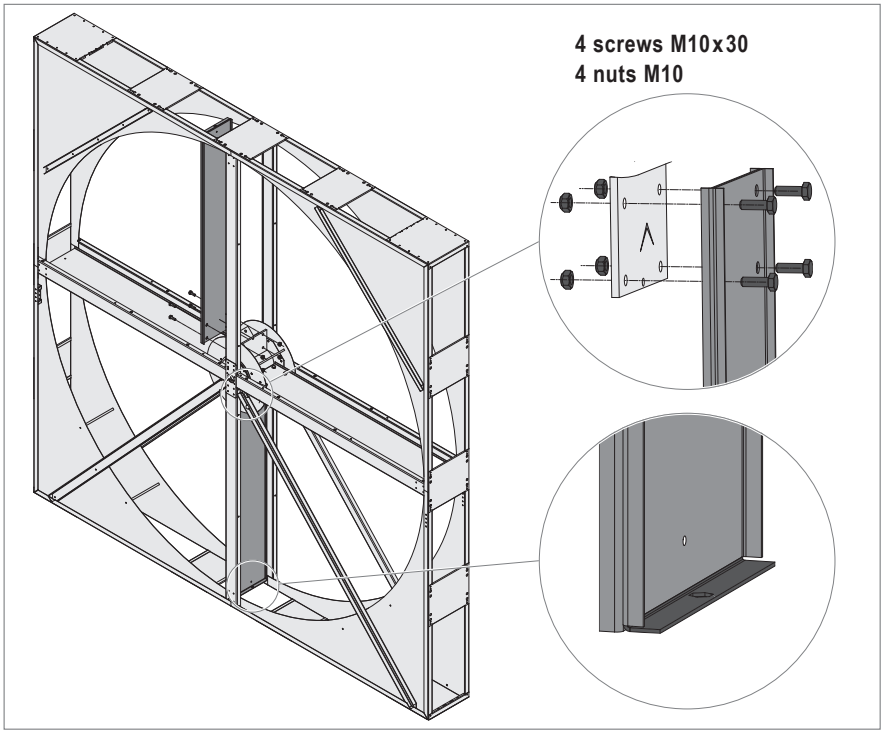


Fig. 22: Mounting of radial walls

Checking the radial walls 3 + 4

- Check the axial run-out of hub and radial walls:
  - Measure the distance A and B at the positions 1 and 3.
  - Turn the hub with the radial walls by 90°.
  - Measure the distance A and B at the positions 2 and 4.
  - Repeat the hub rotation and the measuring process until the two newly mounted radial walls have been measured in positions 1 to 4.
  - Check that the tolerance values are observed:
    A1 = A2 = A3 = A4 (± 1 mm)
    B1 = B2 = B3 = B4 (± 1 mm)
  - The distance to the frame can be different on side A and B.
- If the tolerance values are not observed:
  - If necessary, adjust the inclination of the wheel in the casing (for details see section “«Adjustment» on page 22).
  - If necessary, remove the relevant radial wall from the hub again.
  - Align the radial wall straight and screw it tight again.
  - Repeat the measurement.

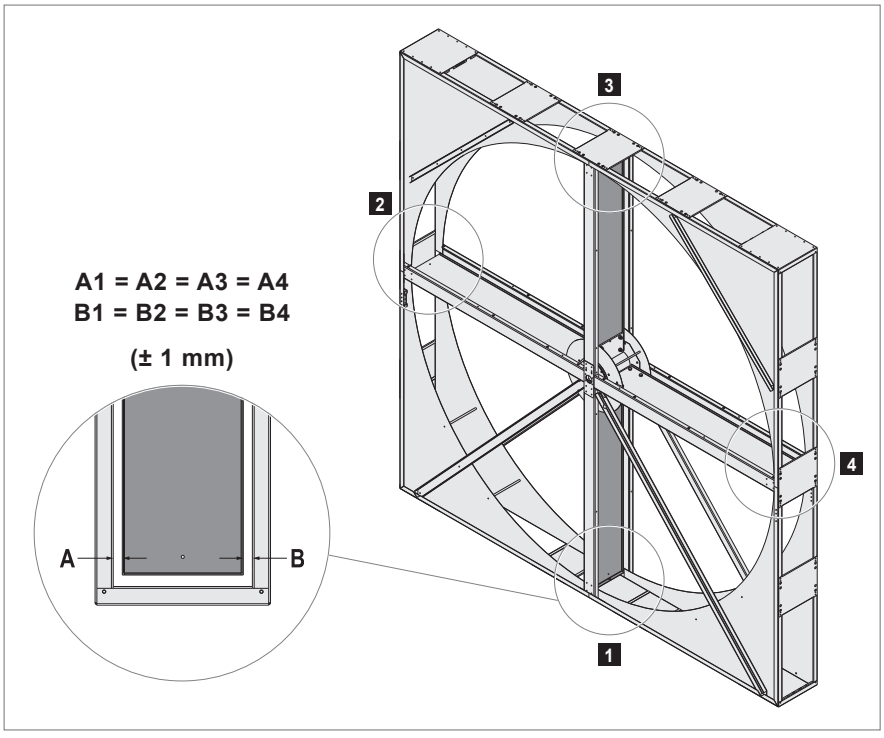


Fig. 23: Checking the radial walls

Mounting of additional radial walls

- Mount and check the remaining radial walls in the same way.

6.3 Storage mass

Caution
Risk of injury due to uncontrolled movements of radial walls and segments. Secure the wheel position during all work. Use ropes or tension bands with pulley block, for example, for controlled rotation.

Labelling of segments
The segments of the storage mass are numbered on the outside. The number of the segment is in the middle. The number of each of the neighbouring segments is written on the edges.

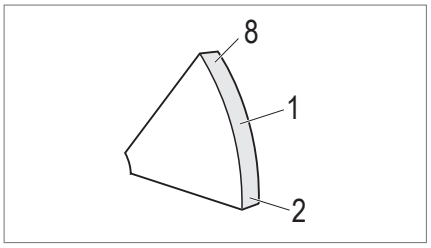


Fig. 24: Labelling of segments

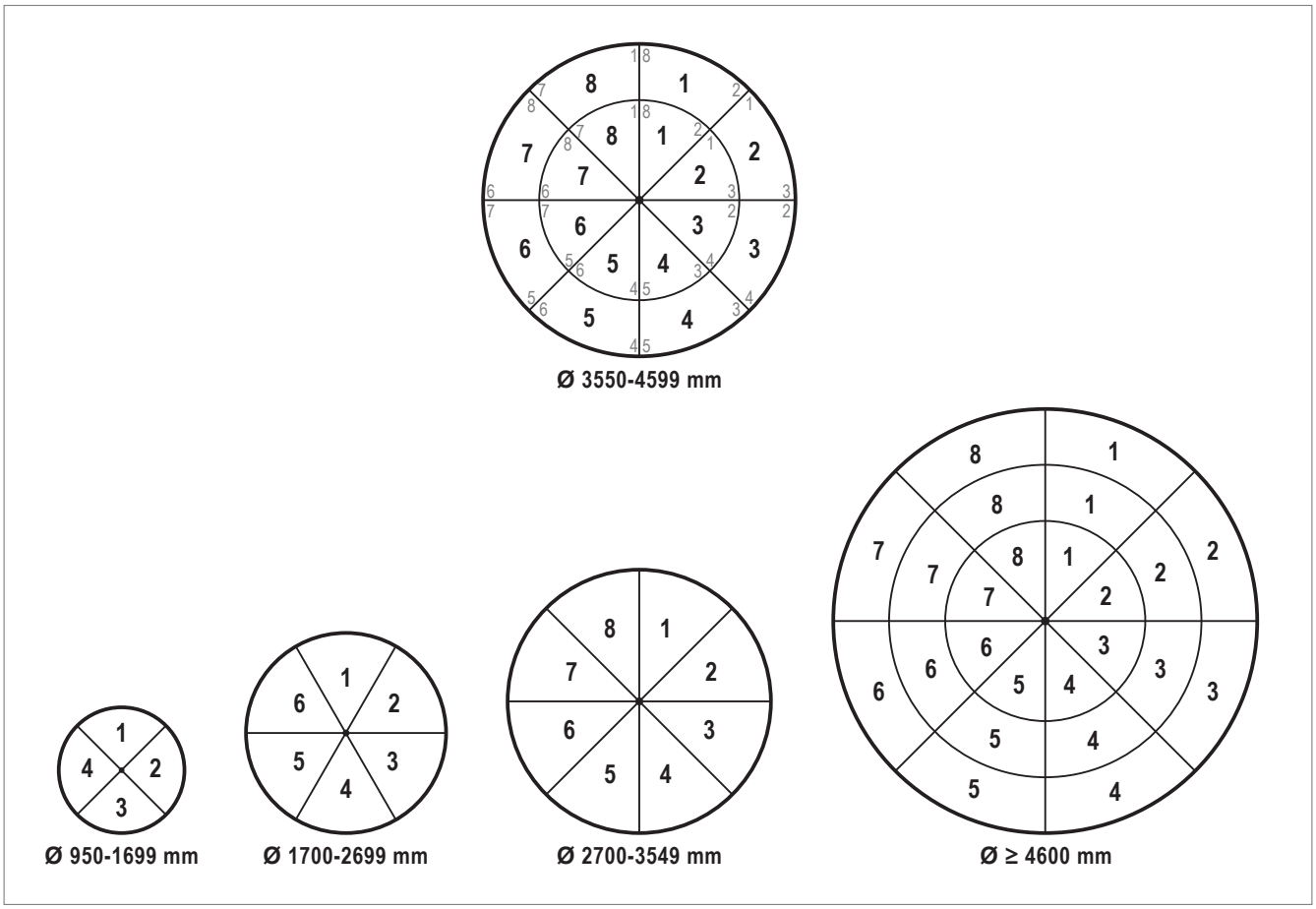


Fig. 25: Different segmentations depending on wheel size

Mounting of segment 1

- Secure the wheel position.
- Push segment 1 between the radial walls up to the hub.
  - Make sure that the milled outer edges of the segment at the top and bottom are within the curved edges of the radial walls.
  - Gently tap the segment into the correct position with a rubber mallet.
- For exchangers with multi-layer segmentations:
  - Mount the outer segments of the storage mass in the same step.
  - Make sure that the identification of the segments matches.

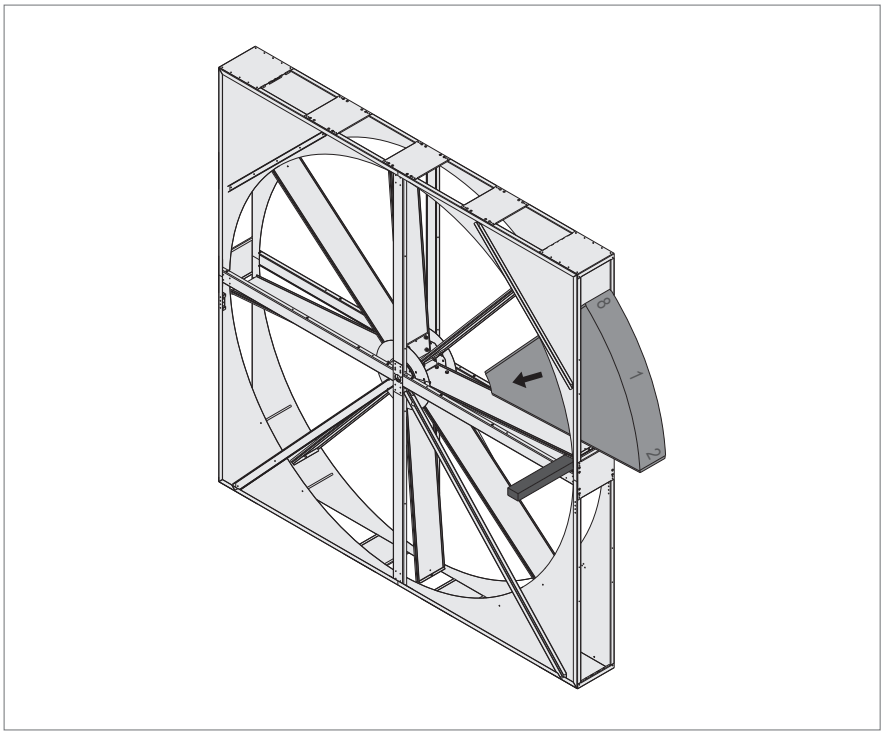


Fig. 26: Insertion of the segment

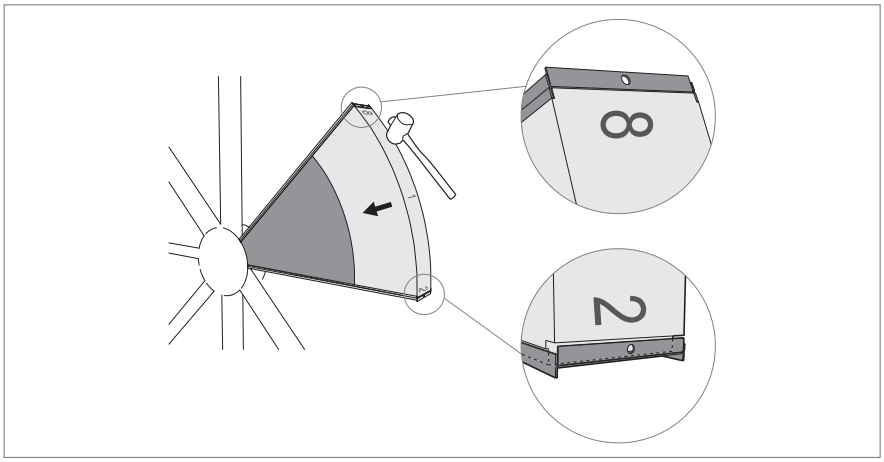


Fig. 27: External edges within the bent edges of the radial walls

Mounting of peripheral plate 1

- Move the peripheral plate 1 into position:
  – Align the edge with the slot facing up and the edge with the hole facing downward.
- Loosely insert one screw and washer each into the slot at the top and into the hole at the bottom.
  – Final tightening of the screws is only carried out after the adjacent peripheral plates have been mounted.

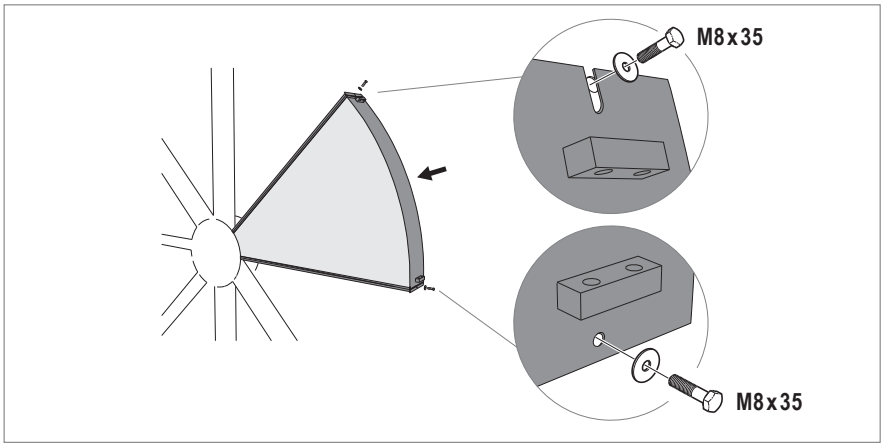


Fig. 28: Mounting of the peripheral plate 1

Mounting of segment 2

- Turn the wheel to the correct position for mounting of the next segment.
- Secure the wheel position.
- Mount segment 2 in the same way as segment 1.

Peripheral plate 2

- Move the peripheral plate 2 into position:
  – The bottom edge with the hole overlaps the first plate. Remove the screw already fitted, put on the peripheral plate 2 and refit the screw.
- Loosely insert one screw and washer into the slot at the top.
- Tighten the screw in the hole at the bottom: torque 20 Nm.
- Connect the two peripheral plates loosely with clamping screws.
  – Final tightening of the clamping screws is only carried out after all segments have been mounted.

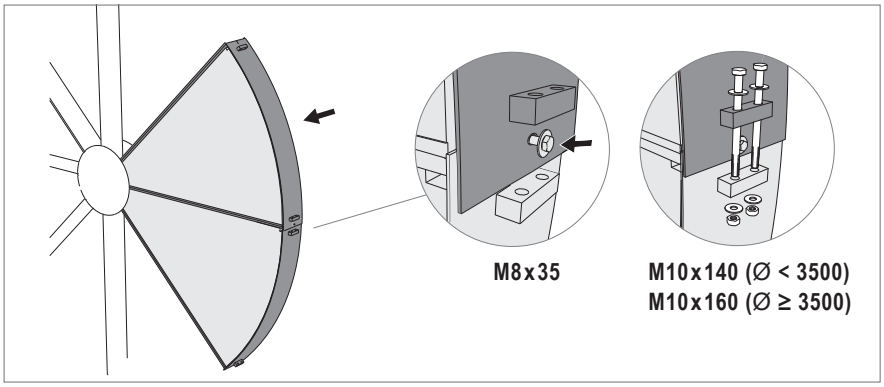


Fig. 29: Mounting of the peripheral plate 2

Mounting of additional segments

- Mount and secure the remaining segments and peripheral plates in the same way.

Completion of the periphery

- Connect the last peripheral plate with the first one.
  - Insert a threaded rod into the connecting eyes.
  - Tighten until the two peripheral plates overlap.
- Next to it, move a clamping screw into position and tighten it.
- Replace the threaded rod with a clamping screw.
- Tighten all clamping screws with a torque wrench:
  - Torque 35 Nm

> **Notice**
> Pay attention to the correct working order: Always tighten 2 diagonally opposite screws one after the other.

- Seal all gaps between the inner and outer segments with sealing compound.

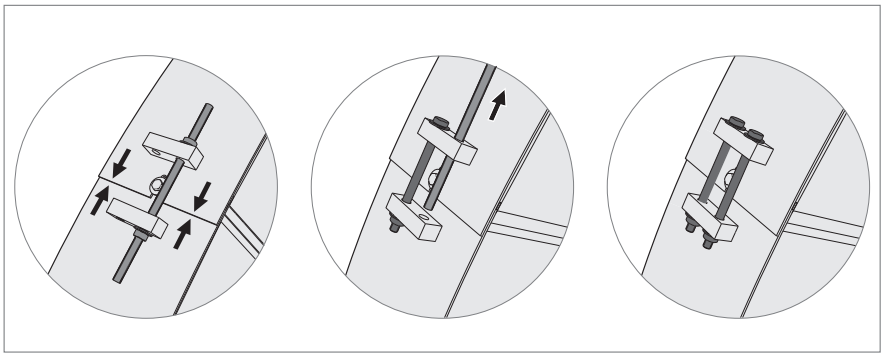


Fig. 30: Completion of the periphery

After 4 hours of operation

- Retighten the clamping screws of the peripheral plates:
  - Torque 40 Nm
  - Always tighten 2 diagonally opposite screws one after the other.

Adjustment

If necessary, adjust the inclination of the wheel in the casing.

SM casing from wheel Ø 1800 mm, SP casing

- Unscrew the cover plates 1 of the middle beam on the left and right of the hub to gain access to the adjusting screws.
- Loosen the fixing screws 2.
- Adjust the wheel with the adjusting screws 3.
- Retighten the fixing screws.
- Remount the cover plates.

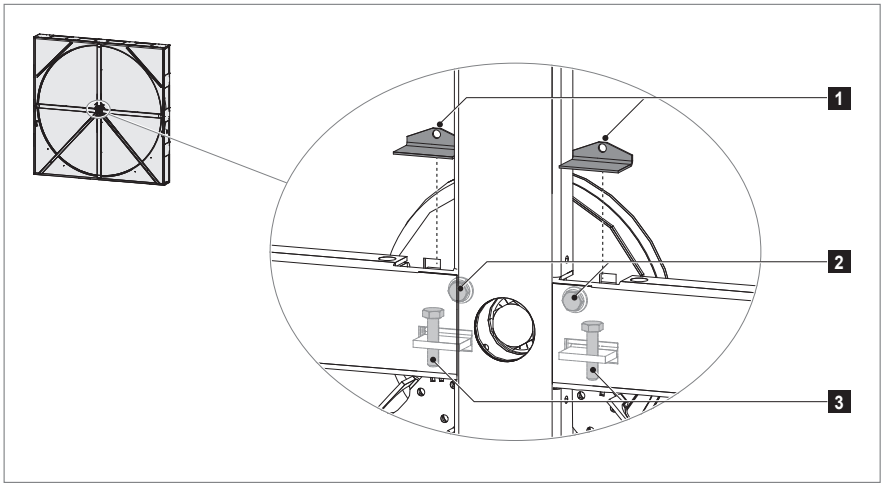


Fig. 31: Adjusting screws in SM casing and SP casing

PR casing

- Loosen the fixing screws 1 (accessible from the rear of the middle beam).
- Adjust the wheel with the adjusting screws 2.
- Retighten the fixing screws.

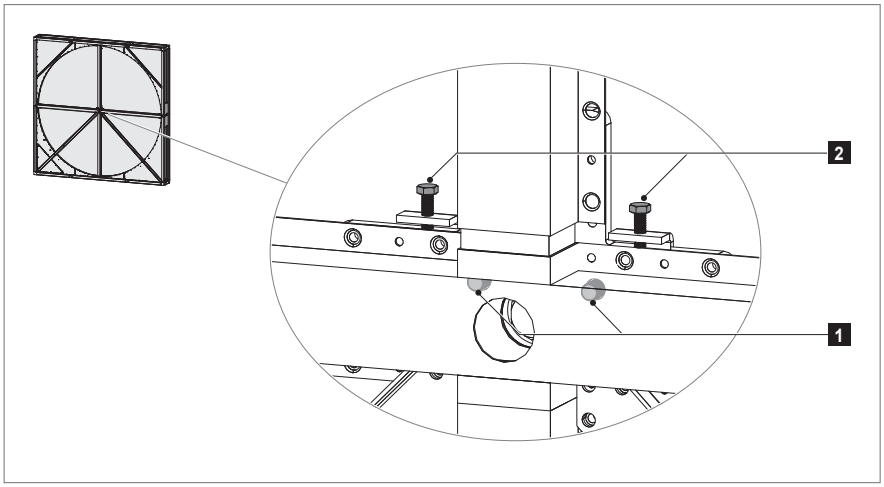


Fig. 32: Adjusting screws in PR casing

6.4 Purge sector

General notices

- Depending on the exchanger design, the purge sector is supplied loose or pre-assembled at the factory.
  - Supplied loose: Mount the purge sector as shown below.
  - Pre-assembled: Check that the purge sector is correctly positioned for the actual installation position of the exchanger. If necessary, it can be disassembled and reassembled in the correct position.

> **Notice**
> The same rules apply to the conversion of the purge sector for an SM casing as for an SP casing.

SP casing

- The purge sector for SP casings consists of 2 mirror-inverted parts (part A and B). Always mount the two mirror-inverted parts on top of each other so that the shorter sides are on top of each other. Depending on the position of the purge sector, the longer side of part A or B rests on the middle beam.

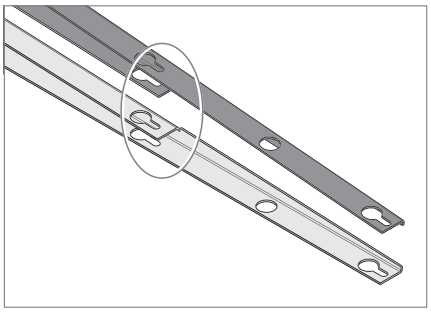
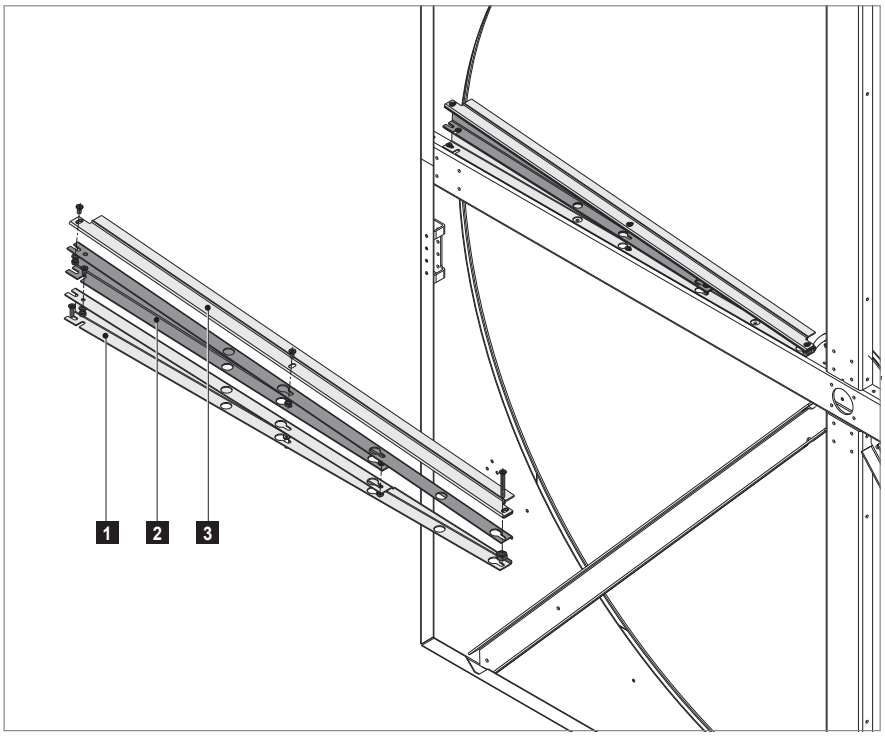


Fig. 33: 2-piece purge sector



1 Purge sector part A
2 Purge sector part B
3 Seal

Fig. 34: SM casing and SP casing with 2-piece purge sector

PR casing

- The purge sector for PR casings is always 1-part.

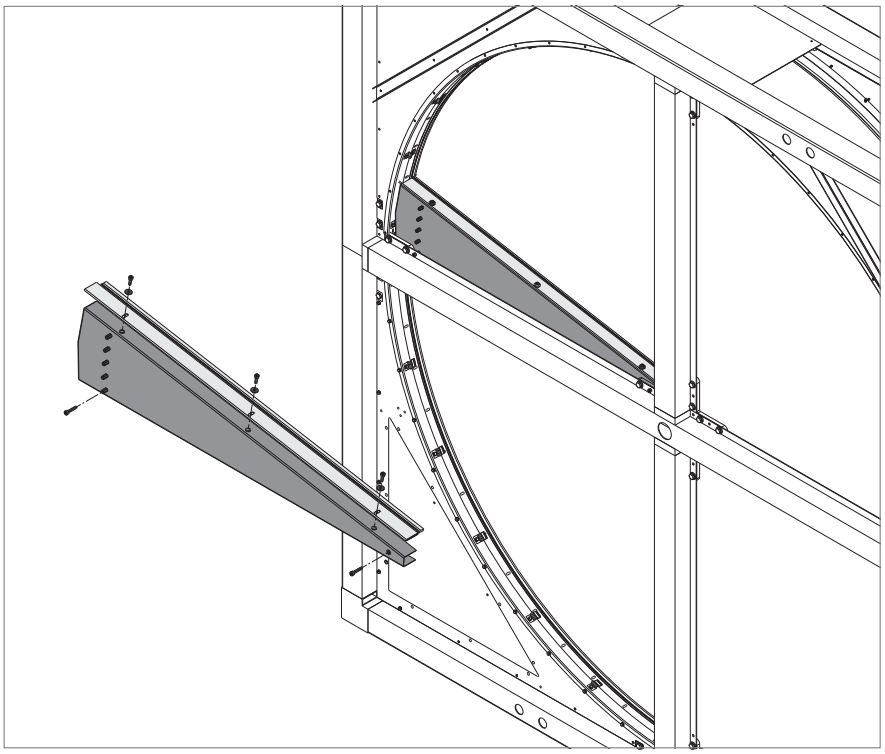
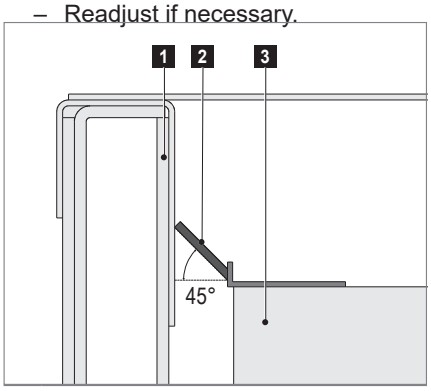


Fig. 35: PR casing with purge sector

6.5 Seal

Middle beam seal
The middle beam seal is pre-assembled in all casings. Proceed as follows for correct adjustment:
- Loosen the screws securing the brush seal to the middle beam or purge sector.
- Push the brush seal towards the wheel until the brush is fully seated but the wheel can still be turned easily by hand.
- Retighten the brush seal.

Radial seal in SP casings
Mount the radial seal as follows:
- The outer seam in the brush seal serves as transport protection.
  – Remove this seam.
- Pilot drill every 5th hole in the brush seal with a 3.3 mm drill bit.
- Mount the brush seal on the jacket plate of the wheel using self-tapping screws.
  – The edge of the brush seal must face outwards.
  – The brush must contact the end wall of the casing at a 45° angle.
  – Let the two ends overlap and use an existing hole to screw the overlap onto the jacket plate.
- Check that the brush seal is in continuous contact and that the wheel can be easily turned by hand.
  – Readjust if necessary.



1 End wall of the casing
2 Brush
3 Wheel

Fig. 36: Radial seal in the SP casing

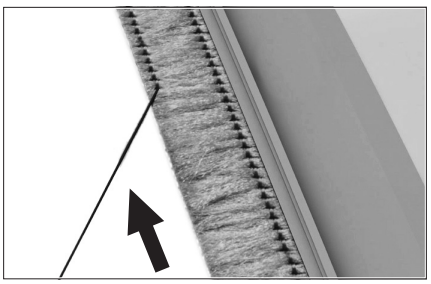


Fig. 37: Removing the outer seam

Radial seal in PR casings
The radial seal is pre-mounted in PR casings in both halves of the casing. The two parts are connected during assembly of the casing (see section “«Radial seal in PR casings» on page 15).

- Check that the brush seal is in continuous contact and that the wheel can be easily turned by hand.
  – Readjust if necessary.

6.6 Drive system

Belt

Mount the belt as follows:

- If the drive motor is installed on a bracket:
  - Insert a screwdriver into one of the eyelets on the motor bracket and lift the motor bracket.
  - Move the spacer up and screw it tight (1 or 2 pieces).
- Move the belt into position.
  - It must run around the wheel and the pulley.
- Determine the correct belt length:
  - Ensure that the motor bracket is suspended at the right angle:

Drive system	K1, K3, K5, V0, V1	V6	V7
Ø ≤ 1000 mm	α = 10°-15°	α = 10°-15°	firmly installed
Ø 1001-1479 mm	firmly installed		
Ø ≥ 1480 mm	α = 30°-35°		



Table 3: Angle of the motor bracket

- Shorten the belt to the correct length:
  - Cut the belt straight.
  - Connect the two ends with the belt fastener. Use the existing holes for this.
  - File off the screw tips on the belt fastener.
- If the motor bracket is equipped with only 1 spacer:
  - Loosen the spacer.
  - Insert a screwdriver into one of the eyelets on the motor bracket.
  - Push the motor bracket upwards and unhook the belt.
  - Guide the motor bracket downwards and hook the spring into the front or rear notch, depending on the required angle.
  - Push the motor bracket back upwards and hook the belt in again.
- If the motor bracket is equipped with 2 spacers:
  - Leave the two spacers screwed tight.
- Check the belt:
  - If the tension is correct, the belt can only be pressed in with the thumb by about 1-2 cm.
  - Ensure that the belt does not rub at any point.
  - The belt must not be twisted in the pulley.

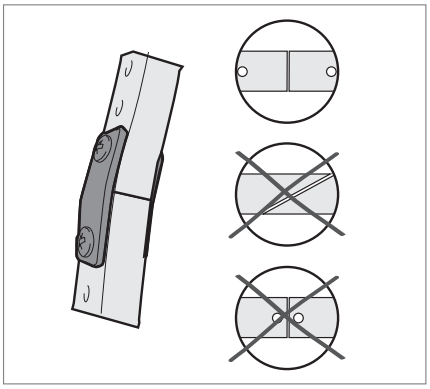


Fig. 38: Belt fastener

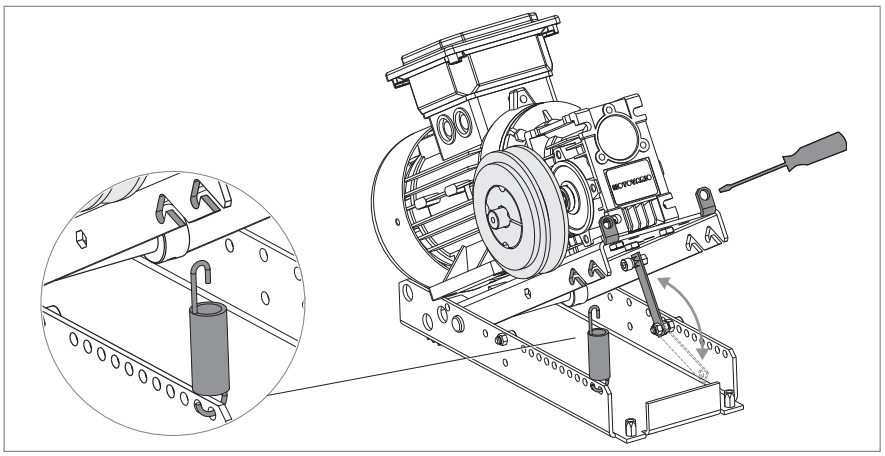


Fig. 39: Motor bracket with 1 spacer

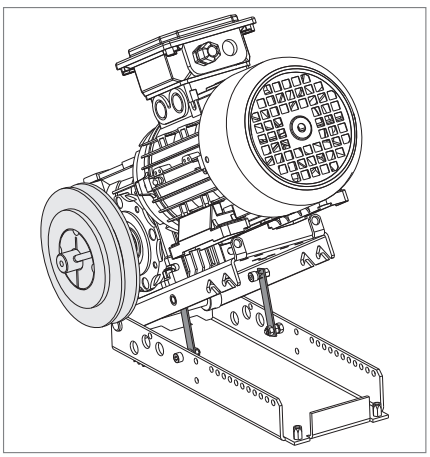


Fig. 40: Motor bracket with 2 spacers

Controller

- Install the controller in a suitable position.
- SP casing:
  - Screw the controller onto the retaining plate.
  - The position can be adjusted in height using the rail.
- PR casing:
  - Install the controller on the casing profiles with the clamping screws.
  - The position can be adjusted in height using the clamping screws.
- Ensure that the wheel can be turned without obstruction.

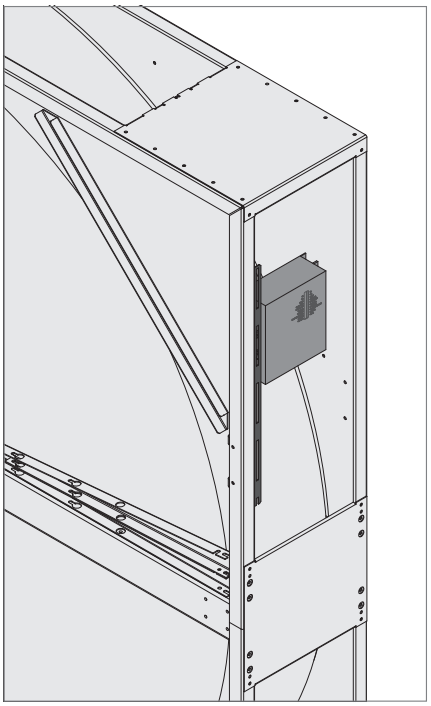


Fig. 41: Controller in SP casing

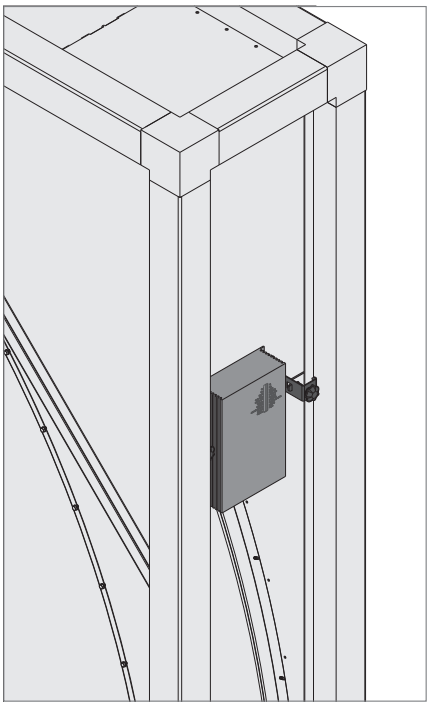


Fig. 42: Controller in PR casing

Rotation guard

Mount the rotation guard in the drive corner as follows:

- Rivet the holder to the end wall of the exchanger (3 pop rivets 4.8 x 9.5).
  - The holes are pre-punched.
- Screw the rotation sensor into the holder:
  - Select the position in the slot so that the wheel can turn without obstruction and does not rub at any point.
- Screw the magnet into the jacket plate of the wheel with a self-tapping screw.
  - Make sure that the position is correct in relation to the rotation sensor.

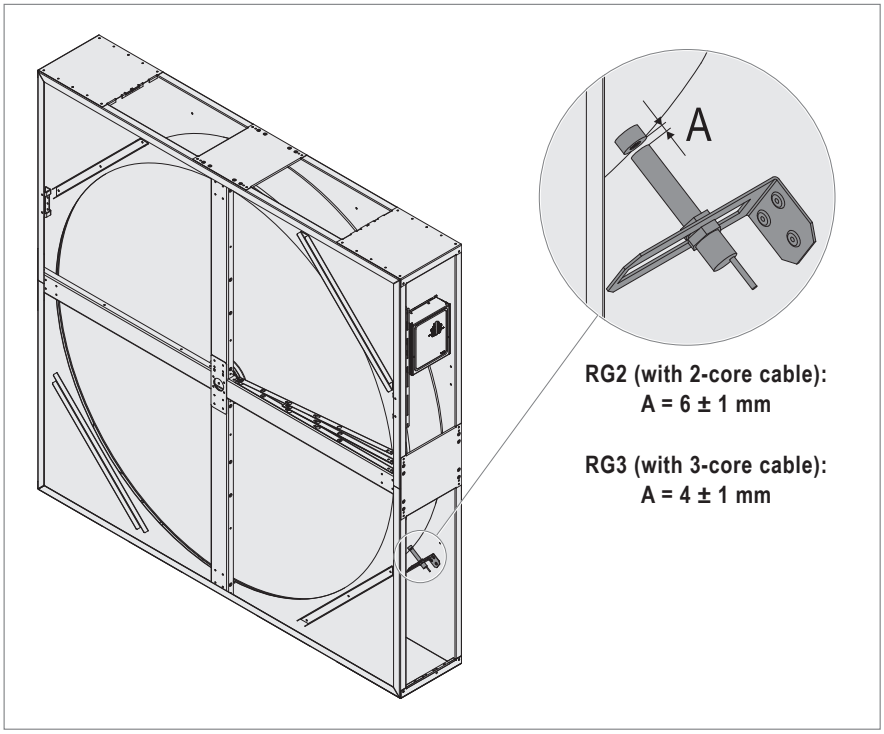


Fig. 43: Rotation guard

7 Assembly of half mounted exchangers

Caution
Risk of injury caused by falling load, tilting of the exchanger or improper handling. During all work:
– Wear personal protective equipment.
– Do not stand under suspended loads.
– Observe safety and accident prevention regulations.

Notice
This section describes the assembly of segmented exchangers ordered with the option “Half mounted” (SHM). Half of the storage mass and, if necessary, the drive motor are pre-assembled in the lower half of the casing.

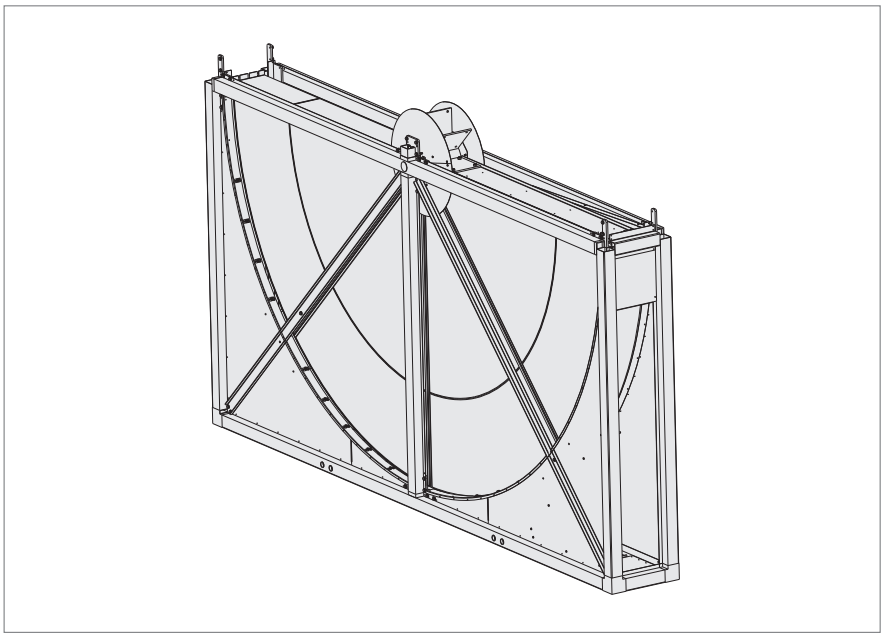


Fig. 44: Casing half with pre-assembled storage mass

7.1 Casing

- Place the bottom half of the casing on a level surface.
- Unscrew the hub cover plates on both sides.

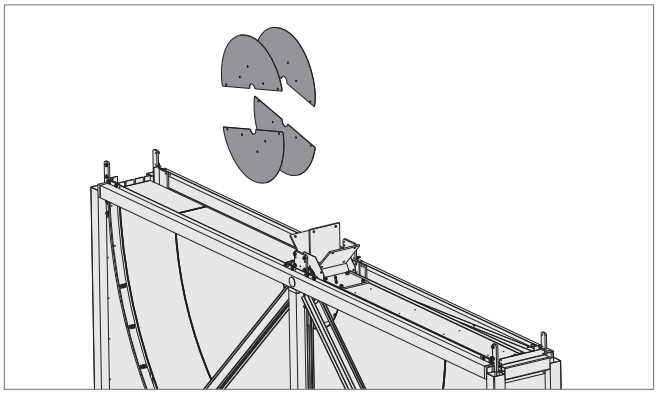
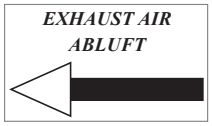
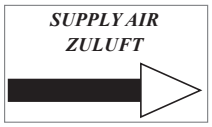


Fig. 45: Dismantling the hub cover plates

- Bring the casing halves into the correct position in relation to each other.
  – The air flow arrows must be on the same side of the casing and point in opposite directions:





- Put on the top half of the casing.
- Screw the two parts together.
  – Align the two casing halves using a spirit level.
  – For details on the screw connection, see section 6.1.

Radial seal in PR casings

The radial seal is pre-mounted in PR casings in both halves of the casing.

- To connect the two parts, follow the instructions in the section “«Radial seal in PR casings» on page 15.

7.2 Radial walls

Caution
Risk of injury due to uncontrolled movements of radial walls. Secure the wheel position during all work (e.g. with boards).

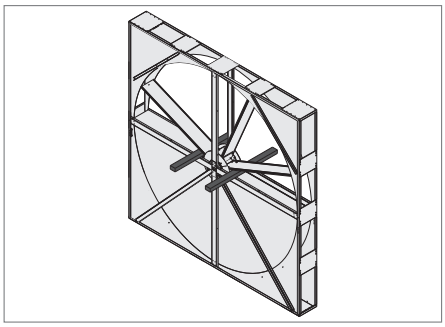


Fig. 46: Securing the wheel position

Mounting the radial walls

- Screw the loosely supplied radial walls aligned upwards onto the hub plates:
  - Mount the radial walls on the side marked with "Λ".
  - Ensure that they are aligned in the same way as the pre-mounted radial walls: the edge at the outer end must not be bent towards the hub plate, but must point in the opposite direction.
  - Tighten the screws only hand-tight.
  - For details see Fig. 22 on page 16.

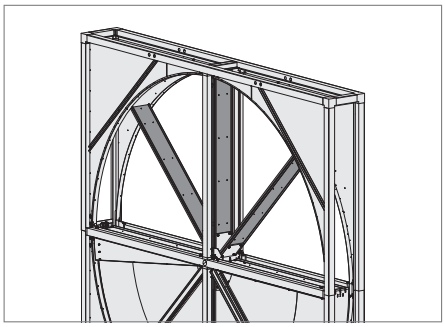


Fig. 47: Mounting the radial walls

7.3 Storage mass

Caution
Risk of injury due to uncontrolled movements of radial walls and segments. Secure the wheel position during all work. Use ropes or tension bands with pulley block, for example, for controlled rotation.

Mounting the segments and peripheral plates

- Mount the loosely supplied segments and peripheral plates.
  – For details see section “«6.3 Storage mass»”.

Completion of the periphery

- Connect the last peripheral plate with the first one.
  – Insert a threaded rod into the connecting eyes.
  – Tighten until the two peripheral plates overlap.
  – For details see Fig. 30 on page 21.
- Next to it, move a clamping screw into position and tighten it.
- Replace the threaded rod with a clamping screw.
- Loosen the screws of the peripheral plates pre-mounted at the factory (all 3 screws in each case).

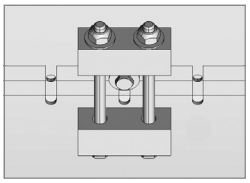


Fig. 48: Loosen screws

- Tighten all clamping screws with a torque wrench:
  – Torque 35 Nm

Notice
Pay attention to the correct working order: Always tighten 2 diagonally opposite screws one after the other.

- Seal all gaps between the inner and outer segments with sealing compound.

After 4 hours of operation

- Retighten the clamping screws of the peripheral plates:
  – Torque 40 Nm
  – Always tighten 2 diagonally opposite screws one after the other.

Aligning the wheel

- Loosen the screws of the radial walls pre-mounted at the factory (4 screws in each case).

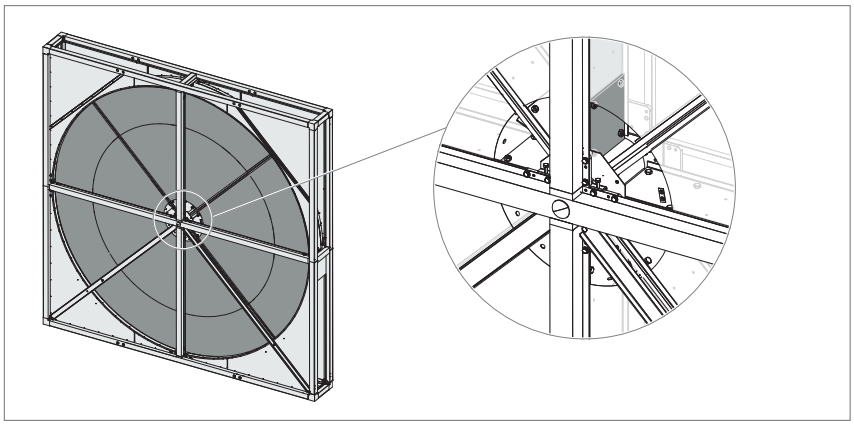


Fig. 49: Loosen screws

- Turn the wheel and align the radial walls and segments so that there is a flat surface on the left and right.

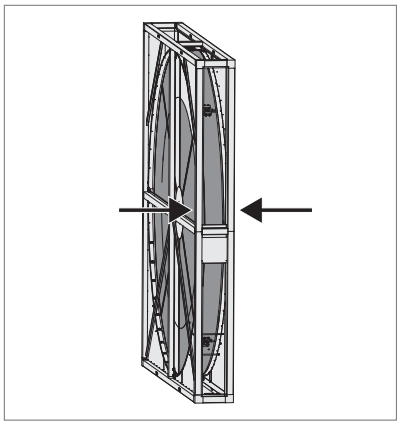


Fig. 50: Aligning the wheel

- Screw the radial walls to the hub plates.
- Check the axial run-out of the wheel for compliance with the tolerance values.
  – For details see section “«Checking the radial walls 3 + 4» on page 17.
- Remount the hub cover plates on both sides.

Adjustment

- If necessary, adjust the inclination of the wheel in the casing.
  – For details see section “«Adjustment» on page 22.

7.4 Purge sector, seal, drive system

For mounting the purge sector, seals and drive system, follow the instructions in sectors 6.4, 6.5 and 6.6.

8 Installation in the air handling unit

Caution
Risk of injury caused by falling load, tilting of the exchanger or improper handling. During all work:
– Wear personal protective equipment.
– Do not stand under suspended loads.
– Observe safety and accident prevention regulations.

8.1 Requirements for the installation site

- Make sure that the flow to the exchanger is uniform.
- Make sure that the airflow through the exchanger is in accordance with the directional arrows on the casing.
- Make sure that the application limits are observed.
- Make sure to avoid transmission of vibration to the wheel:
  – Ensure a good isolation efficiency for all vibration-producing components such as fans, pumps, frequency converters, etc. (isolation efficiency > 90 %).
  – Use anti-vibration mounts for installing the wheel casing.
- The exchanger in the ventilation unit must be accessible from all sides for maintenance work.
- The minimum space required for cleaning is at least 500 mm in front of and behind the exchanger.
- The mechanical strength of the ventilation unit must at least correspond to casing class D2 according to EN 1886.

8.2 Vertical installation

Important for the vertical installation position
– Ensure that the sides of the exchanger fit tightly against the casing of the ventilation unit.
– Make sure that the installation area is level so that the exchanger stands up without tension.
– For casings with vertical middle beam or support foot: provide additional support in the middle.

Installation
- Lift the exchanger only by the lifting eyes.
- Place it in the ventilation unit.
- Secure its position in the ventilation unit.
- Remove the transport protections.



Fig. 51: Removing transport protections

8.3 Horizontal installation

Important for the horizontal installation position
– Support the casing over a wide area.
– Provide additional support for the shaft with sufficient strength. The maximum permissible deflection of the support is 2 mm.
– Make sure that the contact surface is level so that the exchanger makes contact without tension.

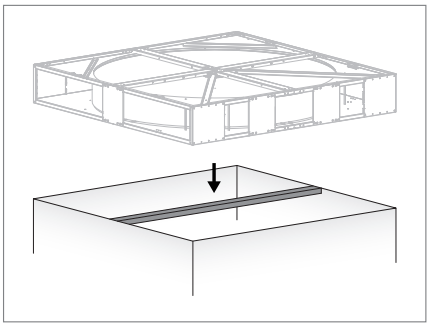


Fig. 52: Support for the shaft

Installation
- Hook the snap hooks of the lifting gear into the upper corner sections.
- Tilt the exchanger into the horizontal position.
- Hook the snap hooks of the lifting gear into the lifting eyes of the casing and lift the exchanger onto the support surface.
- Secure its position in the ventilation unit.
- Remove the transport protections.

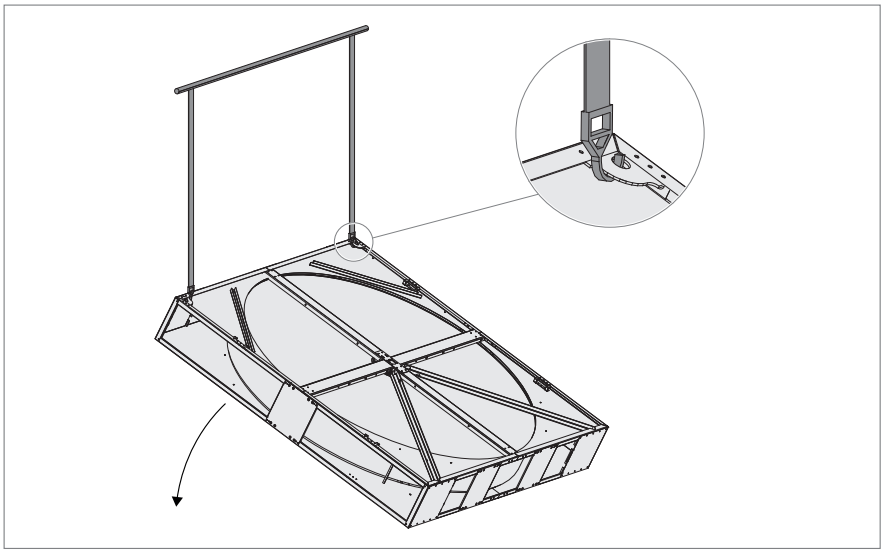


Fig. 53: Tilting the exchanger into the horizontal position

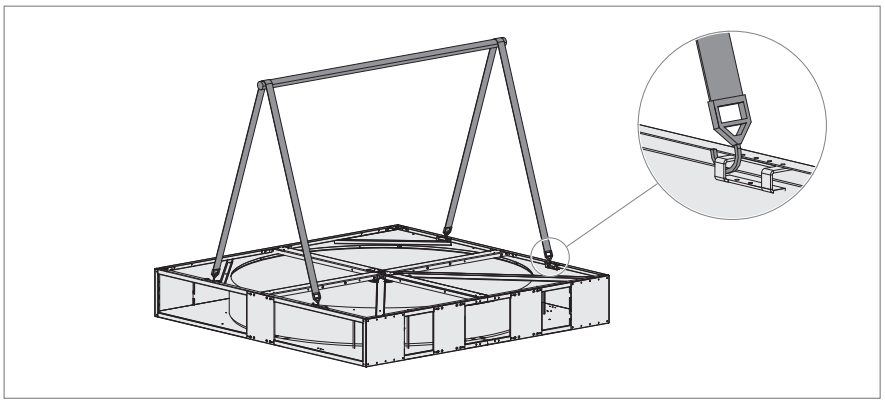


Fig. 54: Lifting horizontal exchangers

9 Electrical connection

Caution
Danger of electric shocks. The electrical installation is only allowed to be carried out by a qualified electrician.

- Observe all relevant regulations (e.g. EN 60204-1).
- Carry out the electrical installation according to the enclosed wiring diagram.

Drive systems V1, V6, V7
- The parameters of the controllers are set ex-works for the optimum speed.
- The supply voltage of the controllers is 1 × 230 V.
- Detailed instructions for the various controllers can be downloaded from the website (www.hoval-energyrecovery.com).

Drive system V0
- Connect the drive motor to a customer-side controller with an output voltage of 3 × 220 V.
- The transmission ratio of the drive is designed for 50 Hz.
- The circuitry provided by the customer for the thermal contact must ensure that no automatic restart takes place after cooling down.

Drive system K1
- The supply voltage of the motor is 1~ 230 V.
- The circuitry provided by the customer for the thermal contact must ensure that no automatic restart takes place after cooling down.

Drive systems K3, K5 – Motor type SPG40-3K
- The supply voltage of the motor is 3~ 400 V.

Drive systems K3, K5 – Motor types N56-3, N63-3, N71-3, N80-3
- The motors can be connected to Δ/Y 230/400 V.
- On delivery they are prepared for connection to Y 400 V.
- For connection to Δ 230 V:
  – Reconnect the jumpers on the motor terminal board accordingly.
- The circuitry provided by the customer for the thermal contact must ensure that no automatic restart takes place after cooling down.

Rotation guards RG2, RG3
- If the controller is mounted outside the exchanger:
  – Extend the signal cable of the rotation guard as required.

Access for cable connection
If there is not enough space for connecting the cable, you can detach the drive unit from the casing:
- Loosen the two screws in the corner of the casing that fix the drive unit to the casing.
- Push the drive unit forward so that the plug-in tabs of the base plate slide further into the eyelets.
- Lift the drive unit at the rear and pull it out of the casing.

For reassembly after cable connection:
- Hold the drive unit at an angle and insert the plug-in tabs into the eyelets.
- Put the drive unit down, pull it back into the corner and screw it on again.

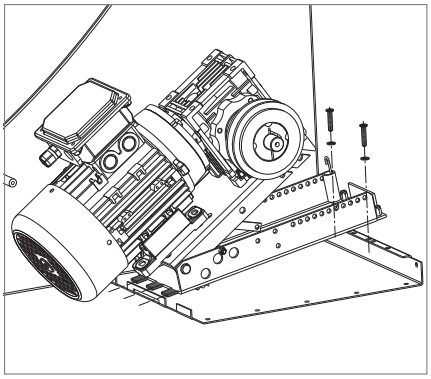


Fig. 55: Releasing from the motor plate

10 Commissioning

10.1 Checklist

Perform the following checks before initial start-up to ensure efficient and trouble-free operation:

<table>
<tr><td>Visual check</td><td>There is no visible damage due to transport or handling.</td></tr>
<tr><td rowspan="11">Assembly check</td><td>Airflow through the rotary exchanger corresponds to the arrows on the casing.</td></tr>
<tr><td>The wheel is aligned vertically and horizontally in the casing. (If necessary, readjust.)</td></tr>
<tr><td>The exchanger is properly secured in the ventilation unit and anti-vibration mounts are installed.</td></tr>
<tr><td>The cables are properly installed and do not rub against the wheel.</td></tr>
<tr><td>The casing stands on a horizontal, stable base (usually on the base of the AHU).</td></tr>
<tr><td>For horizontal installation:
■ The casing is supported over a wide area with additional support for the shaft.</td></tr>
<tr><td>For segmented wheel construction:
■ The wheel is mounted correctly according to the instructions.</td></tr>
<tr><td>The V-belt is properly tensioned and does not rub against the casing.
For motors installed on a bracket:
■ Check the angle of the bracket and, if necessary, shorten the belt.
<table>
<tr><th>Drive system</th><th>K1, K3, K5, V0, V1</th><th>V6</th><th>V7</th></tr>
<tr><td>Ø ≤ 1000 mm</td><td>α = 10°-15°</td><td rowspan="3">α = 10°-15°</td><td rowspan="3">firmly installed</td></tr>
<tr><td>Ø 1001-1479 mm</td><td>firmly installed</td></tr>
<tr><td>Ø ≥ 1480 mm</td><td>α = 30°-35°</td></tr>
</table>


</td></tr>
<tr><td>The wheel can be turned easily by hand.</td></tr>
<tr><td>The brush seals fit tightly on the wheel or the end wall of the casing over the entire length.
(If necessary, readjust the seals.)</td></tr>
<tr><td>The purge sector is installed in the correct position.</td></tr>
<tr><td rowspan="3">Function check</td><td>The wheel's direction of rotation corresponds to the direction indicated by the arrow.
(If necessary, correct the electrical connection.)</td></tr>
<tr><td>The wheel reaches the optimum speed:
■ max. 12 min^{-1} for design ST1 / ST3 / SC1 / SE3
■ max. 20 min^{-1} for design SH1 / HM1
(If necessary, correct the setting in the controller.)</td></tr>
<tr><td>The rotation guard is functioning properly.</td></tr>
</table>

Test run	Perform a test run with fans switched on. ■ The drive is functioning without problems. ■ The brush seals fit tightly over the entire length. (If necessary, adjust the inclination of the wheel in the casing.) Remove any production chips blown out during the test run.
	Check that the rotary heat exchanger is operating within the specified limits: ■ Is the volume flow rate within the specified range? ■ Is the pressure drop within the permissible range? Measure and record both values. Volume flow _____ m³/h Pressure drop _____ Pa
Monitoring work after 4 hours of operation	■ For segmented wheel construction: – Retighten the clamping screws of the peripheral plates (torque 40 Nm, always tighten 2 diagonally opposite screws one after the other) ■ Check and adjust the seals and drive belt if necessary. ■ Additional cleaning may be necessary. Remove production chips and abrasion.

Table 4: Checklist for commissioning

11 Maintenance and repair

Caution
Risk of injury from incorrect work. Maintenance and repair work is only allowed to be carried out by qualified personnel.

11.1 Maintenance schedule

Activity	Interval
■ Visual inspection of the exchanger for dirt build-up, damage, corrosion and leakage. – If necessary: adjust seals, clean, repair, remove production chips and abrasion. ■ Check the tension of the V-belt. – If necessary: Shorten the belt. ■ Check the clamping screws of the peripheral plates. – If necessary: Retighten (torque 40 Nm). ■ Check the position of the wheel in the casing. – If necessary: Adjust the inclination. ■ Check that the rotary heat exchanger is operating within the specified limits: – Is the volume flow rate within the specified range? – Is the pressure drop within the permissible range? Measure and record both values.	For the fist time after 4 hours of operation Following that, every 6 months

Notice
Improper commissioning as well as maintenance work that is not carried out properly may result in the loss of warranty claims.

11.2 Cleaning the storage mass

- Choose a suitable cleaning method depending on the contamination level and the type of deposits.
- Observe all relevant regulations (e.g. VDI 6022-1).

Before cleaning
- Switch off the fans of the ventilation unit and secure them against being switched back on.
- Make sure that the water used for cleaning can be properly drained off.

After cleaning
- Allow the exchanger to dry.
- Put the fans back into operation.

Cleaning methods

Method	Remarks
Dry cleaning (for slight contamination)	■ Remove dust and fibres with a soft brush, a vacuum cleaner and/or compressed air. ■ Use caution when cleaning with compressed air: – Min. 20 cm distance between nozzle and exchanger – Max. air pressure 8 bar – Direct the air jet at a right angle to the inflow surface.
Wet cleaning (for heavier contamination)	■ Remove oils, solvents and similar with hot water and grease solvents. – Spray on grease solvents with a spray bottle. – Recommended cleaning agents are, for example: Frosch, Fairy, Largo ■ Remove cleaning agents with a high-pressure cleaner. – Use a 40° flat nozzle. – Min. 20 cm distance between nozzle and exchanger – Max. water pressure is 100 bar – Direct the water jet at a right angle to the inflow surface.
Disinfection (after wet cleaning)	■ Spray on disinfectants with a spray bottle. – Recommended disinfectants are, for example: Bacillol® 30 Foam, Dr. Becher Schnelldesinfektion ■ Allow disinfectants to act for approx. 30 minutes. ■ Remove disinfectants with a high-pressure cleaner. – Use a 40° flat nozzle. – Min. 20 cm distance between nozzle and exchanger – Max. water pressure is 100 bar – Direct the water jet at a right angle to the inflow surface.
Descaling	■ Decalcifier: – NALCO ACITOL CL-931 as 10% solution ■ On-site circulation equipment with pH control is necessary ■ Maintain the pH value below 2.5 during descaling: – Add new ACITOL CL-931 as a 10% solution as required. ■ Repeat descaling until no more limescale residues are visually visible. ■ Remove decalcifier with a high-pressure cleaner. – Use a 40° flat nozzle – Min. 20 cm distance between nozzle and exchanger – Max. water pressure is 100 bar – Direct the water jet at a right angle to the inflow surface.

Table 5: Cleaning methods for rotary heat exchangers

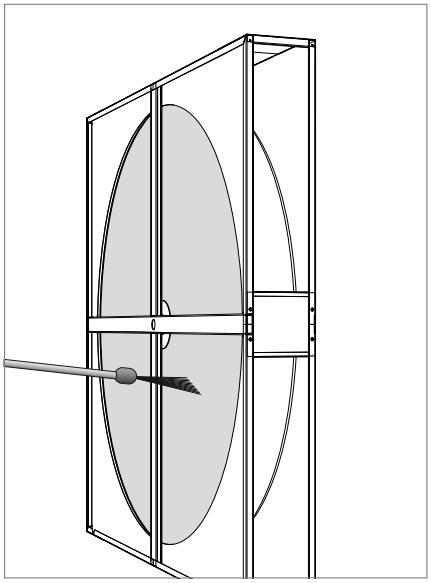


Fig. 56: Cleaning the storage mass

11.3 Spare parts

Hoval recommends the use of original spare parts. You can download the spare parts list from the website (www.hoval-energyrecovery.com).

11.4 Replacement of the brush seal

Middle beam seal

Proceed as follows to replace the middle beam seal:

- Loosen the screws securing the brush seal to the middle beam or purge sector.
- Replace the old seal in the retaining plate with the new one.
- The outer seam in the brush seal serves as transport protection.
  - Remove this seam.
- Screw the new brush seal on tightly.
  - Make sure that the brush seal is in continuous contact and that the wheel can be easily turned by hand.

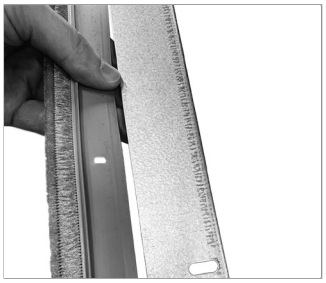


Fig. 57: Pushing into the retaining plate

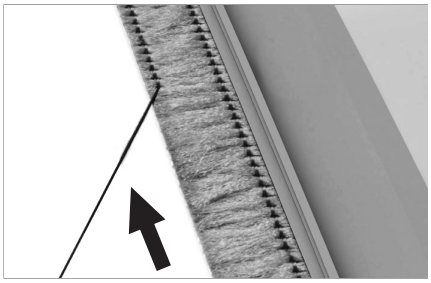


Fig. 58: Removing the outer seam

Radial seal in SP casings

Proceed as follows to replace the radial seal:

- The outer seam in the brush seal serves as transport protection.
  - Remove this seam.
- Loosen the screws securing the brush seal to the jacket plate of the wheel.
- Screw the new brush seal on tightly (for details, see section “«Radial seal in SP casings» on page 25).
  - Make sure that the brush seal is in continuous contact and that the wheel can be easily turned by hand.

Radial seal in PR casings

Proceed as follows to replace the radial seal:

- The outer seam in the brush seal serves as transport protection.
  - Remove this seam.
- Pull out the old seal with the retaining plate under the spring clips.
- Clamp the new seal with the retaining plate under the spring clips (for details see section “«Radial seal in PR casings» on page 15).
  - Make sure that the brush seal is in continuous contact and that the wheel can be easily turned by hand.

11.5 Replacement of the V-belt

- To replace the V-belt, proceed as described in section “«Belt» on page 26.

11.6 Servicing

Please contact the manufacturer's customer service if needed.

Hoval Aktiengesellschaft
Austrasse 70
9490 Vaduz
Liechtenstein
Tel. +423 399 24 00
info.er@hoval.com
www.hoval-energyrecovery.com