

# ROTARY HEAT EXCHANGERS

OPERATIONAL AND INSTALLATION MANUAL

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This manual is intended to prevent undesirable problems and consequences that may occur if the product is installed and used incorrectly.

Please read this manual before installing the product into the unit.

This manual has been compiled with the utmost care and attention to all relevant standards.

No legal claims can be derived from the content of this manual.

We reserve the right to change the contents of the manual, in part or in full, at any time without prior notice.

## SCOPE OF THE MANUAL

- The purpose of this manual is to provide comprehensive guidelines for the installation, operation and maintenance of ZERN ENGINEERING rotary heat exchangers. It serves as a reference document for the personnel responsible for handling and maintaining the equipment to ensure proper functioning, safety and efficiency.
- The manual outlines essential procedures and recommendations, including:
  - Safe handling, unpacking and transport methods to prevent damage;
  - Step-by-step installation instructions to ensure optimum performance;
  - Technical specifications, including operating parameters and component details;
  - Routine maintenance and service requirements for extended equipment life;
  - Decommissioning and disposal guidelines in accordance with environmental regulations.
- This manual is an integral part of the rotary heat exchanger and should be read carefully before commencing any work. Adherence to the guidelines provided will contribute to safe and effective operation and minimize the risks associated with improper handling.

## SYMBOLS USED IN THE MANUAL

- For clarity and safety, the manual includes the following symbols to highlight key warnings and recommendations:



### WARNING

Indicates potential hazards that could result in personal injury or equipment damage.



### ELECTRICAL HAZARD

Denotes risks of electric shock due to live components.



### NOTICE

Provides additional technical notes or important operational details.



### CAUTION

Highlights scenarios where improper handling may lead to reduced performance or unit malfunction.

- Understanding and following these indicators is crucial to ensuring safe equipment operation.

## INTENDED AUDIENCE

- This manual is intended for:
  - **Installers and commissioning engineers:** responsible for setting up the unit according to specifications.
  - **Maintenance personnel:** authorized to perform routine inspections, servicing, and repairs.
  - **Operators:** tasked with monitoring daily operation and ensuring proper function of the equipment.
- All personnel must possess the necessary technical qualifications and experience to handle the heat exchanger safely and in compliance with local and international regulations.

## USER RESPONSIBILITIES

- Users of this equipment must adhere to the following responsibilities:
  - Ensure that all installation, operation, and maintenance procedures comply with the instructions in this manual.
  - Allow only trained and qualified personnel to install and service the unit.
  - Follow all applicable local and international safety regulations.
  - Maintain accurate records of inspections, maintenance, and repairs to guarantee long-term operational efficiency.
- Failure to comply with these responsibilities may result in equipment malfunction, reduced performance, or safety hazards.

## COMPLIANCE WITH STANDARDS AND REGULATIONS

- The rotary heat exchangers manufactured by ZERN ENGINEERING comply with the following directives and industry standards:
  - **Machinery Directive 2006/42/EC:** defines essential safety requirements for industrial equipment.
  - **Low Voltage Directive 2014/35/EU:** ensures electrical safety compliance.
  - **Electromagnetic Compatibility Directive 2014/30/EU:** regulates electromagnetic interference.
  - **EN 60204-1:** establishes safety requirements for electrical equipment of machines.
  - **EN ISO 13857:** defines minimum safety distances to prevent access to hazardous areas.
  - **EN 1005-3:** recommends force limits for safe manual handling.
- Compliance with these regulations guarantees the safety, reliability, and energy efficiency of the heat exchanger.

## TRANSPORT GUIDELINES

- The rotary heat exchanger must be transported in an upright position and securely fastened to prevent movement.
- Ensure that handling equipment, such as forklifts or cranes, is suitable for the unit's weight and dimensions.
- The heat exchanger should be protected against vibrations, shocks, and exposure to harsh weather conditions.
- If transporting on an open vehicle, use appropriate covering materials to protect the unit from dust, moisture, and potential contaminants.
- Inspect the unit upon arrival to identify any visible damage before unloading.

## HANDLING PRECAUTIONS

- Only qualified personnel should handle the unit to avoid improper lifting or dropping.
- It is recommended to lift the exchangers from underneath using a forklift.
- Use spreader bars and soft slings to distribute the load evenly and prevent damage to the casing or components.
- Avoid applying excessive force on the frame or heat transfer wheel, as it may lead to deformation or operational inefficiencies.
- Ensure that the lifting area is clear of obstructions and that personnel are positioned at a safe distance from suspended loads.

## UNPACKING AND INSPECTION

- Remove all packaging materials carefully without damaging the unit.
- Inspect the heat exchanger for any visible defects, such as dents, misalignment, or missing components.
- Verify that the nameplate information matches the specifications required for the intended installation.
- Report any signs of transport damage immediately to the supplier before proceeding with installation.

## STORAGE RECOMMENDATIONS

- If the unit is not installed immediately, store it in a clean, dry, and covered location.
- The storage environment should be free from excessive dust, moisture, and temperature fluctuations.
- Avoid placing heavy objects on the unit or stacking multiple heat exchangers to prevent structural deformation.
- Rotate the wheel manually during long-term storage to prevent static deformation of the matrix.

## OPERATION CONDITIONS

Parameters	
Storage temperature [°C]	0...+40
Storage relative humidity [%]	20...80
Operating temperature [°C]	-25...+50
Operating relative humidity [%]	10...95
Maximum airflow balance ratio [%]	±50
Maximum recommended airflow rate [m/s]	3
Maximum operating pressure drop [Pa]	300
Maximum operating pressure difference [Pa]	1000

## ROTORS

- The rotor matrix consists of alternating layers of smooth and corrugated foil, forming small, triangular airflow channels that optimize heat transfer efficiency.
- Rotors are available in one-piece wheel design for diameters between Ø 200–2500 mm and wave height of 1.4, 1.6, 1.8 and 2.1 mm.
- The rotors are designed for laminar airflow, ensuring efficient heat transfer and minimal pressure drop. They can be cleaned using compressed air, steam, or specialized cleaning agents. Standard operating temperature ranges from -20 °C to +70 °C.

## FOIL TYPES

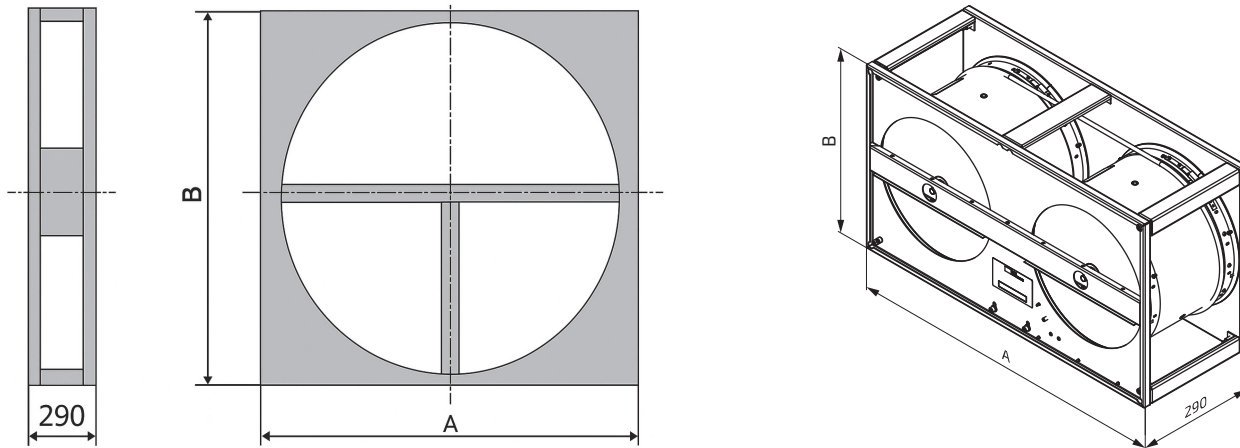
- The rotary heat exchangers are available with different foil types, depending on the required performance and environmental conditions:
  - **Condensation (R-EX Series):** suitable for basic heat recovery applications, with moisture transfer occurring only when condensation is present.
  - **Enthalpy (R-E-EX Series):** coated with silica gel to enhance humidity transfer, ideal for comfort ventilation.
  - **Sorption (R-N-EX Series):** equipped with a molecular sieve coating (3Å sorption layer) for maximum humidity transfer, especially in hot and humid climates.

## CASING

- All ZERN ENGINEERING rotary heat exchangers are supplied in a non-demountable casing to ensure robust construction and reliable performance. The casing is designed to maintain structural integrity and minimize air leakage.
- Each casing is fitted with adjustable brush seals around the rotor perimeter and centre beam to minimize air leakage and ensure high efficiency. The casing is designed for vertical installation with all necessary mounting points integrated for easy system integration.

## DIMENSIONS

- ZERN ENGINEERING rotary heat exchangers are available in a wide range of standardized sizes to meet diverse air handling requirements. All models feature compact and rigid casings designed for seamless integration into ventilation units.
- The table below summarizes the standard dimensional characteristics of the rotary heat exchanger:



	Slide-in type
Diameter Ø [mm]	100–2500
Wheel depth [mm]	100; 150; 200
Dimensions A×B [mm]	min Ø+50
Casing depth [mm]	min 290
One piece casing	+
One piece rotor	+

	Combi type
Diameter Ø [mm]	100–2500
Wheel depth [mm]	100; 150; 200
Dimensions A×B [mm]	min Ø+50
Casing depth [mm]	min 290
Wheels [pcs. / rotor]	up to 3

## DRIVE EQUIPMENT

- All ZERN ENGINEERING rotary heat exchangers are equipped with durable and efficient drive systems designed to ensure consistent rotor operation under varying system loads. The drive system is a critical component that directly influences heat and humidity transfer rates, energy consumption, and operational reliability.

### Motor Configurations

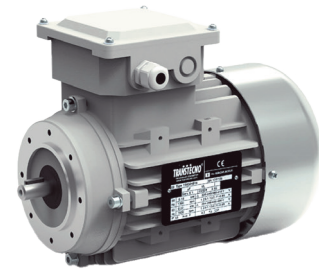
- The rotor is actuated by an external electric motor mounted on a steel support bracket. Power is transmitted via a belt drive to the rotor's circumference. This indirect drive system ensures torque is distributed evenly, minimizing wear and promoting smooth rotation.
- Depending on the rotor size and torque requirement:
  - round belts are used for small-sized rotors (typically  $\text{Ø} \leq 800$  mm)
  - V-belts are used for larger rotors ( $\text{Ø} > 800$  mm), offering higher frictional contact and torque transfer

### Constant drive

- In a constant drive configuration, the rotor operates at a fixed rotational speed or remains stationary when disabled — commonly referred to as an on/off drive mode.
- Compact induction motors with integrated reduction gearboxes are offered in both single-phase and three-phase versions, making them suitable for small and medium-sized rotary heat exchangers. These motors are available in 25 W, and 40 W power levels. They feature Class B insulation, IP54 enclosure protection, and a maintenance-free gearbox with lifetime lubrication.



- For larger systems, asynchronous motors with worm gear transmission are available. These are offered in single-phase or three-phase configurations, with power ratings ranging from 90 W to 750 W. They provide higher torque capacity, come with Class F insulation, and are protected to IP55, making them well-suited for continuous-duty operation in more demanding environments.




Drive motor	Voltage	Frequency [Hz]	Engine power [kW]	Current [A]	Weight [kg]	For Ø of rotary wheel [mm]
4IK25GN-C	1×220	50	0.025	0.25	1.60	200–400
4IK25GN-S	3×220	50	0.025	0.17	1.60	
5IK40GN-C	1×220	50	0.040	0.35	3.40	400–800
5IK40GN-S	3×220	50	0.040	0.30	3.40	
SMM6324	1×230	50	0.180	1.5	6.20	800–2500
TS6324	3×400	50	0.180	0.70	6.20	

**Variable drive**

- Variable drive systems enable precise and efficient control of rotor speed, allowing dynamic adaptation to seasonal conditions, ventilation loads, and indoor climate requirements. By adjusting the rotor’s revolutions per minute (RPM), the system maximizes heat and humidity transfer when needed and reduces energy consumption during part-load operation.
- A variable drive configuration includes a stepper motor paired with an integrated or external control unit. This controller adjusts motor speed proportionally to an input signal (commonly 0–10 V or 4–20 mA), enabling real-time modulation based on building automation commands, sensor feedback, or programmed control logic.
- ZERN ENGINEERING rotary heat exchangers are compatible with OJ Electronics DRHX-series controllers, purpose-built for rotary heat recovery applications. These controllers provide precise motor speed regulation based on analog signals (0–10 V) and are designed for seamless integration into modern HVAC systems.
- Both the DRHX-1055 and DRHX-1220 offer:
  - continuous (stepless) speed control of three-phase motors
  - input for magnetic rotation sensors
  - defrost logic to prevent rotor icing
  - alarm output for system fault signaling
  - compatibility with building automation systems
  - DIN-rail mounting and IP20-rated housings
  - reliable operation in ambient temperatures from -40 °C to +40 °C

Stepper motor	Units	MRHX-3P02N-03Cx	MRHX-3P04N-03Cx	MRHX-3P08N-03Cx
				
Torque	Nm	2	4	8
Power (250 rpm)	W	55	110	260
Weight	Kg	≈ 2.4	≈ 3.5	≈ 5
Compatible with rotary wheel	Ø [mm]	500 - 600	601 - 1800	1801 - 2500
Stepper motor voltage	V	3 x 0-200~	3 x 0-200~	3 x 0-200~
Revolutions	rpm	1 - 400	1 - 400	1 - 400
Operating temperature	°C, °F	-40°C/+40°C -40°F/+104°F	-40°C/+40°C -40°F/+104°F	-40°C/+40°C -40°F/+104°F
Storage temperature	°C, °F	-40°C/+70°C -40°F/+158°F	-40°C/+70°C -40°F/+158°F	-40°C/+70°C -40°F/+158°F
Dimensions	mm	85 x 85 x 67 *1	85 x 85 x 97 *1	85 x 85 x 156 *1
Shaft diameter	mm	12	12	12
Cable length (with connector)	mm	300	300	300
Electrical connection	-	4-pole Tyco MATE-N-LOK	4-pole Tyco MATE-N-LOK	4-pole Tyco MATE-N-LOK
Max. radial force (20 mm from the flange)	N	250	250	250
Max. axial force	N	60	60	60
Ingress protection	IP	54	54	54

x=5: CE approval, \*1: +3 mm in length (only for variants with x=7)

Control Unit	DRHX-1055-MAD5	DRHX-1220-MAD5
		
Modbus	Yes	Yes
0-10V	Yes	Yes
Display	Yes	Yes
Intelligent rotor	Standard	Standard
External rotor	Accessories	Accessories
Aut. purge function	Yes	Yes
Deformation assurance	Yes	Yes
Max power	55W	110/220W
Supply power	1x230VAC	1x230VAC
Nominal torque	2Nm	4/8Nm
Max rpm	400rpm	400rpm *
Motor power	3x0-200VAC	3x0-200VAC
Dimensions (b×h×d) [mm]	183.0×142.7×55.0	183.0×142.7×55.0
Ingress protection (IP)	IP54	IP54

\*: Only for 4Nm motor

## DRIVE BELT

- In ZERN ENGINEERING rotary heat exchangers, rotor rotation is achieved by means of a belt drive system that connects the motor pulley to the rotor's outer perimeter, ensuring consistent and reliable movement.
- Depending on the rotor diameter and customer requirements, the following types of belts are used:

### Round Belts

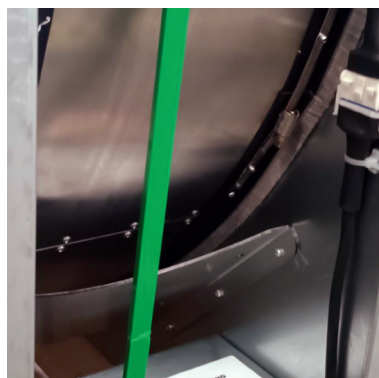
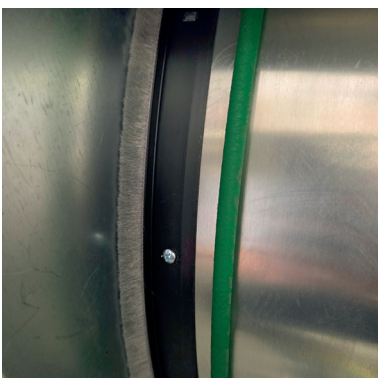
- Primarily selected for small and medium rotors.
- Easy to install, providing sufficient torque transmission for standard applications.

### V-Belts

- Utilized for larger diameter rotors where increased torque transfer is needed.
- Ensure reliable power delivery and stability under higher mechanical loads.

### POWERTWIST V-Belts:

- Constructed with a 13×4 mm V-profile and made from a durable polyester and polyurethane composite.
- Highly resistant to oils, greases, water, and many industrial chemicals and solvents.
- Modular design with interlocking links enables custom belt lengths to be assembled manually, without tools.
- Suitable for a broad temperature range, operating from -40°C to +116°C, making it ideal for demanding environments.



## SEALS

- Effective sealing around the rotor is essential to minimize air leakage and maintain high thermal and humidity recovery efficiency. ZERN ENGINEERING rotary heat exchangers are equipped with a robust sealing system strategically installed at critical points of the exchange.
- The sealing system includes:
  - **Peripheral seals:** positioned around the outer circumference of the rotor to minimize leakage between the supply and exhaust air streams.
  - **Central beam seals:** installed along the rotor's center support structure to prevent internal bypass and maintain efficient air separation.
- Depending on project requirements, two types of sealing materials are utilized:
  - **Brush Seals:**
    - Composed of durable synthetic fibers.
    - Provide flexible, continuous contact with the rotor surface even under varying pressure conditions.
    - Suitable for standard applications with a focus on longevity and minimal maintenance.
  - **Polyurethane Seals:**
    - Made from highly resilient polyurethane material, offering superior air tightness and resistance to deformation.
    - Recommended for high-performance systems requiring minimal cross-contamination and optimized sealing efficiency.
- Regular inspection of the seals is important to detect signs of wear, misalignment, or material degradation. Proper maintenance of the sealing system helps preserve the exchanger's overall energy efficiency and extends the service life of the unit.



## PURGE SECTOR

- The purge sector is an important feature designed to reduce cross-contamination between the exhaust and supply air streams in rotary heat exchangers.
- It works by using a controlled portion of the supply air to purge residual exhaust air from the rotor surface before it enters the supply side.
- Operation principle.
- During rotation, some exhaust air becomes trapped in the rotor matrix and can be carried over to the supply air stream. The purge sector directs clean supply air through a dedicated sector of the rotor to displace and remove this trapped exhaust air.
- This minimizes the Exhaust Air Transfer Ratio (EATR) and improves indoor air quality.
- Key design features.
  - The purge sector is factory-installed and positioned at the transition zone between the exhaust and supply sides.
  - Available sector angles are typically 5° or 10°, depending on rotor diameter and application requirements.
  - The purge airflow is dependent on a pressure differential of approximately 50–100 Pa between the supply and exhaust sides.
- Important considerations.
  - Correct adjustment of the purge sector angle may be required during system balancing.
  - A pressure differential that is too low may lead to ineffective purging and higher EATR values.
  - Excessive pressure differential (>1500 Pa) should be avoided to prevent mechanical strain on the casing and seals.



### NOTE

To maintain hygienic standards and low cross-contamination levels, a properly functioning purge sector is critical.



**WARNING**

Incorrect installation or adjustment of the purge sector can compromise the performance and hygiene of the ventilation system.

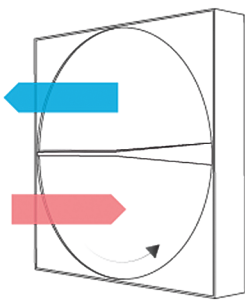
- Purge sector location.
- The correct placement of the purge sector is essential to ensure effective removal of residual exhaust air from the rotor:
  - The purge sector is typically positioned at the point where the rotor transitions from the exhaust side to the supply side.
  - In units with horizontal airflow configurations, the purge sector is usually installed at the bottom of the rotor to take advantage of natural gravitational airflow patterns.
  - In vertical airflow configurations, the purge sector positioning must be carefully aligned with the airflow direction to maintain proper purge efficiency.
- For optimal performance:
  - The supply air must enter the purge sector before the rotor reaches the supply air stream.
  - The purge sector must cover the appropriate angular section (5° or 10°) depending on unit size and project requirements.



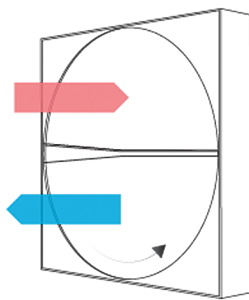
**NOTE**

Incorrect location or orientation of the purge sector can result in increased air transfer between exhaust and supply sides, reducing overall system hygiene.

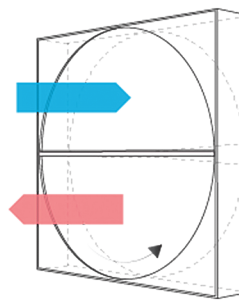
**Horizontal plane of intersection**



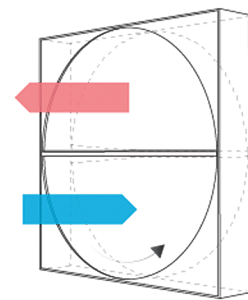
Front side right (A)



Front side left (B)

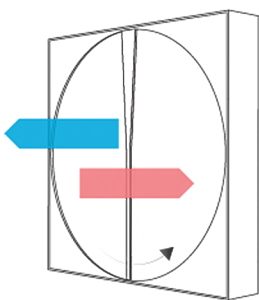


Back side right (C)

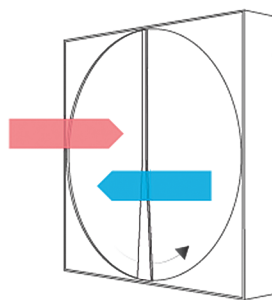


Back side left (D)

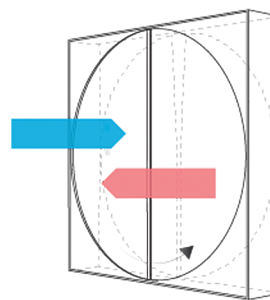
**Vertical plane of intersection**



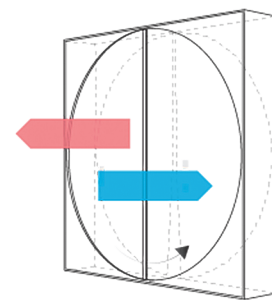
Front side top (A)



Front side bottom (B)



Back side top (C)



Back side bottom (D)



Exhaust air



Supply air

**Rx-x-EXDx-x/7-0-1-H-V AxBxC-x**

**Wheel width [mm]**

**R:** 200  
**RS:** 100

**Rotor type**

**\_:** condensing  
**E:** enthalpy  
**N:** sorption  
**K:** epoxy

**EX:** standard commercial group

**Rotor diameter [mm]**

**Dx:** 200-2500

**Wave height [mm]**

**x:** 1.4/1.6/1.8/2.1

**Foil thickness [mm]**

**7:** 0.07  
**5.5:** 0.055

**Purge section**

**0:** without  
**1:** with

**Number of wheel sections**

**1**

**Installation orientation**

**\_:** vertical  
**H:** horizontal

**Plane of intersection**

**\_:** horizontal  
**V:** vertical

**Casing [mm]**

**A:** width (min Ø+50)  
**B:** height (min Ø+50)  
**C:** depth (min 290)

**Drive**

**1:** single-phase 230 V  
**3:** three-phase 400 V  
**4:** OJ DRHX rotary step drive

Proper mechanical installation is critical to ensure reliable operation, long service life, and optimal performance of the rotary heat exchanger. All installation work must be carried out by qualified personnel following applicable regulations and site-specific requirements.

## PREPARATION BEFORE INSTALLATION

- **Inspection:** before installing, visually inspect the heat exchanger for any damage that may have occurred during transport or storage. Pay special attention to casing integrity, rotor surface, seals, and drive system components.
- **Handling:** always handle the exchanger carefully. Use appropriate lifting equipment (e.g., forklift) to avoid damage. Units must be secured properly during lifting to prevent tipping or falling.
- **Mounting Surface:** ensure the installation surface or frame is flat, level, and capable of supporting the full weight of the exchanger without deformation.



### WARNING

Do not attempt to lift the heat exchanger by the rotor, drive components, or seals. Always lift by the casing or designated lifting points.

## POSITIONING

- Install the rotary heat exchanger in the specified orientation (vertical or horizontal) according to the project design.
- Maintain the correct airflow.
- Ensure sufficient clearance around the unit for future maintenance access, particularly near the motor, belt tensioner, and inspection hatches.

## SERVICE ACCESS

- To ensure safe and efficient maintenance of the rotary heat exchanger, adequate service access must be planned during installation.
- Sufficient clearance should be provided around the unit to allow for:
  - Inspection and replacement of the drive belt.
  - Access to the motor and drive system.
  - Cleaning of the rotor surface and purge section.
  - Checking and adjustment of sealing components.
- The minimum recommended service clearance is 400 mm on the drive side and 300 mm on the opposite side. Additional space may be required depending on the unit size and configuration.
- For units equipped with a purge sector or motor guards, ensure that the inspection area allows full visual and manual access to these components.



### NOTE

Failure to provide adequate service space may complicate maintenance operations and increase the risk of damage during routine servicing.

- All service work must be performed with the system powered down and secured against accidental restart.

## CONNECTIONS TO DUCTWORK

- Duct connections must be airtight and aligned with the exchanger flanges.
- Support ducts independently to avoid transferring loads onto the heat exchanger casing.
- Ensure that airflows correspond correctly to the supply and exhaust sides, based on the labeling and project drawings.



### NOTE

Misaligned duct connections can cause air leakage, increased pressure drop, and mechanical stress on the casing.

## INITIAL ROTOR CHECK

- After the mechanical installation is complete and before connecting the drive motor electrically, manually rotate the rotor by hand.
- Ensure the rotor turns freely without excessive resistance, noise, or contact with the casing or seals.
- Check that the rotor remains centered within the casing and does not show signs of misalignment or rubbing.
- If resistance or interference is detected, inspect the drive belt tension, seal positioning, and casing fixation, and adjust as necessary.



### NOTE

Manual rotation should be smooth and continuous. Resistance or abnormal noise may indicate improper installation or mechanical deformation.

## GENERAL REQUIREMENTS

- Before performing any electrical connection or inspection, the following conditions must be observed:
  - All electrical work must be performed by trained and authorized specialists in accordance with national and local regulations.
  - The unit must be completely disconnected from the power supply before installation, servicing, or inspection.
  - Ensure that the motor's voltage, frequency, and rated power correspond to the local power supply. Refer to the motor nameplate for details.
  - Use only the wiring diagrams and technical documentation provided for the specific motor and control equipment.
  - Install suitable circuit breakers or fuses upstream of the motor to ensure protection against overloads and short circuits.
  - Motors must be protected from overheating using built-in thermal contacts or external protection devices where applicable.
  - After connection, verify the correct direction of rotor rotation. For three-phase motors, rotation can be reversed by swapping any two phases.
  - Electrical components must be housed in enclosures rated at least IP54 to protect against dust and moisture.
  - All electrical wiring must be strain-relieved and mechanically secured to prevent damage or loosening during operation.

## MOTOR CONNECTION

- Depending on the model and application, ZERN ENGINEERING rotary heat exchangers are equipped with either asynchronous geared motors (single-phase or three-phase) or stepper motors with integrated controllers. All motor connections must follow the wiring diagrams provided with each unit and comply with local electrical codes.

## AC GEARED INDUCTION MOTORS (1-PHASE / 3-PHASE)

### Constant speed motor – 4IK25GN-C (1 $\phi$ 220V 50Hz)

- Wiring for this constant-speed motor must follow the diagram shown below.
- The motor is single-phase, rated for 220V / 50Hz operation.
- A run capacitor is required for proper operation (typically installed near the motor terminal).
- The direction of rotation (CW or CCW) can be selected using a switch between terminals.
- Electrical connections must be completed by qualified personnel as per national safety regulations.

### Electrical wiring instructions

#### CW Rotation (Clockwise):

- **L (Live):** Blue
- **N (Neutral):** White
- Capacitor between White and Red

#### CCW Rotation (Counterclockwise):

- **L (Live):** Red
- **N (Neutral):** White
- Capacitor between White and Blue
- PE (Protective Earth) must be connected to the motor housing.



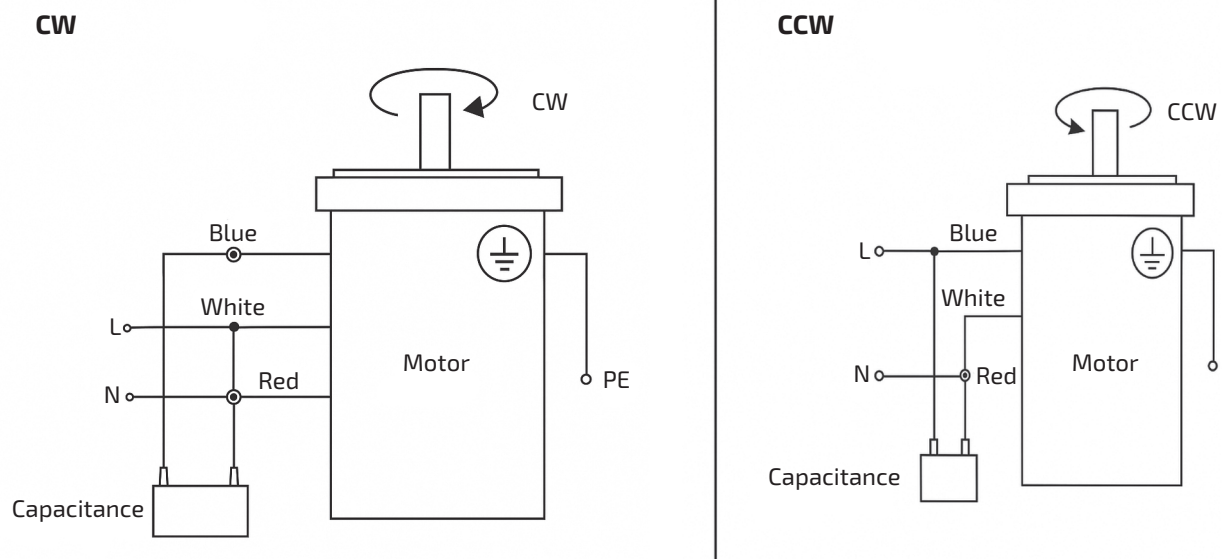
#### NOTE

The cable colours shown in example illustrations may differ from those required by local electrical standards for live, neutral, and protective earth conductors. Always refer to the corresponding wiring diagram and installation instructions to ensure correct connections.



#### WARNING

Ensure correct wiring to avoid reverse rotation or capacitor damage. Disconnect power supply before servicing.



Constant speed motor – 4IK25GN-C (1φ 220V 50Hz) wiring diagram

**Constant speed motor – 4IK25GN-S (3φ 220V 50Hz)**

- This motor is a three-phase asynchronous geared motor, suitable for fixed-speed operation.
- The standard supply voltage is 3×220V, 50 Hz.
- The motor is connected in direct line (no star/delta configuration) due to its low power (25 W).
- The rotor operates at its rated speed once connected to the power supply.
- Direction of rotation can be changed by reversing any two of the supply phases.

**Electrical wiring instructions**

- **L1 (R):** Black wire
- **L2 (S):** Blue (or Red)
- **L3 (T):** White
- Ground (PE) must be securely connected to the motor casing.



**NOTE**

The cable colours shown in example illustrations may differ from those required by local electrical standards for live, neutral, and protective earth conductors. Always refer to the corresponding wiring diagram and installation instructions to ensure correct connections

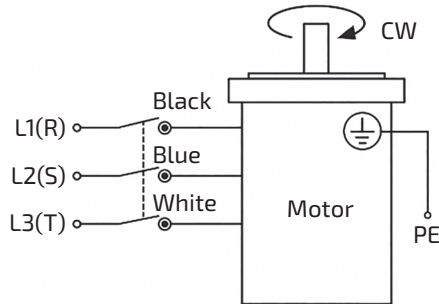


**WARNING**

Incorrect phase connection may cause reverse rotation or improper torque delivery.

### Changing rotation direction

- To reverse the rotor direction (e.g., from CW to CCW), swap any two of the three phases (L1, L2, L3).



To change the rotation direction change any two connections among R, S and T

#### Constant speed motor – 4IK25GN-S (3φ 220V 50Hz) wiring diagram

### Constant speed motor – SMM6324 (1φ 230V 50Hz)

- This motor is a single-phase asynchronous capacitor-run motor, designed for fixed-speed operation.
- The standard supply voltage is 230 V, 50 Hz.
- The motor is directly connected to the supply (no star/delta configuration).
- The rotor operates at its rated speed once connected to the power supply.
- Direction of rotation can be changed by rewiring the capacitor lead to the opposite coil terminal as per manufacturer's instruction.

### Electrical wiring instructions

- L (Live):** Blue wire
- N (Neutral):** Black wire
- Ground (PE) must be securely connected to the motor casing.



#### NOTE

The cable colours shown in example illustrations may differ from those required by local electrical standards for live, neutral, and protective earth conductors. Always refer to the corresponding wiring diagram and installation instructions to ensure correct connections.



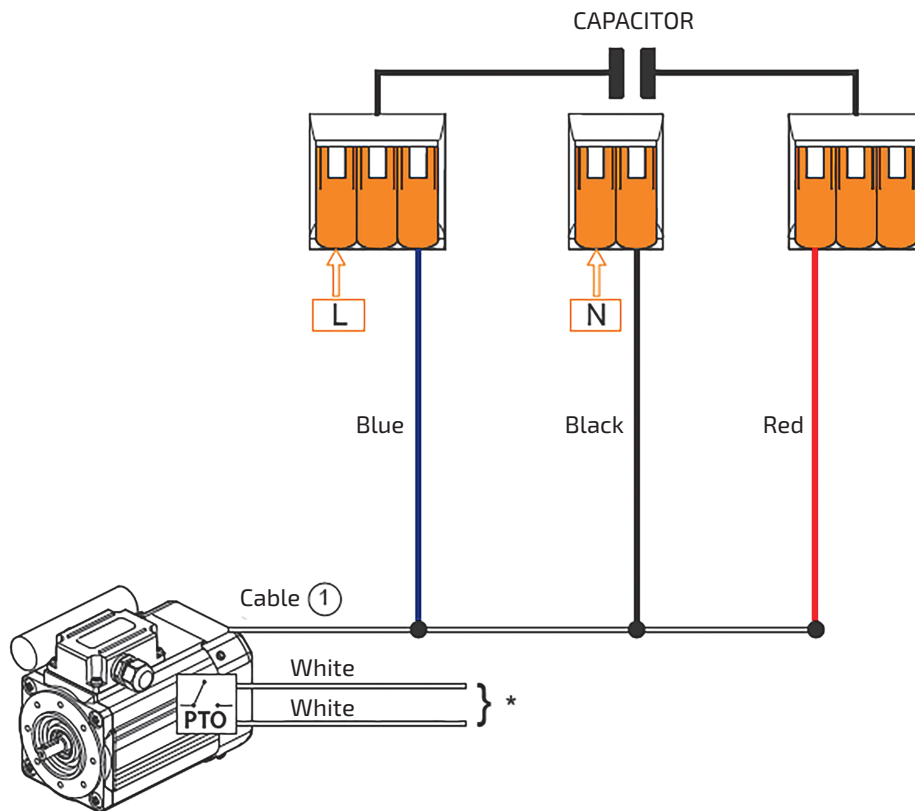
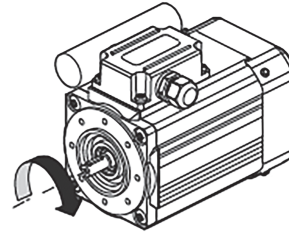
#### WARNING

Incorrect wiring may cause failure to start, reversed direction, or damage to the motor. Disconnect power supply before servicing.

**Changing rotation direction**

- To reverse the motor rotation direction (e.g., CW to CCW), swap the capacitor connection between the auxiliary winding terminals, following the wiring diagram provided with the motor.

Clockwise direction of rotation



Constant speed motor – SMM6324 (1φ 230V 50Hz) wiring diagram

**Constant speed motor – TS6324 (3φ 400V 50Hz)**

- This motor is a three-phase asynchronous geared motor, suitable for fixed-speed operation.
- The standard supply voltage is 3×400V, 50 Hz.
- The motor is connected in star (Y) configuration.
- The rotor operates at its rated speed once connected to the power supply.
- Direction of rotation can be changed by reversing any two of the supply phases.

**Electrical wiring instructions**

**For 400V (Y):**

- **L1 (R):** Brown wire
- **L2 (S):** Black wire
- **L3 (T):** Grey wire

**For 230V (Δ):**

- **L1 (R), L2 (S), L3 (T):** connected to terminals in delta pattern (refer to terminal diagram)
- Ground (PE) must be securely connected to the motor casing.



**NOTE**

The cable colours shown in example illustrations may differ from those required by local electrical standards for live, neutral, and protective earth conductors. Always refer to the corresponding wiring diagram and installation instructions to ensure correct connections.



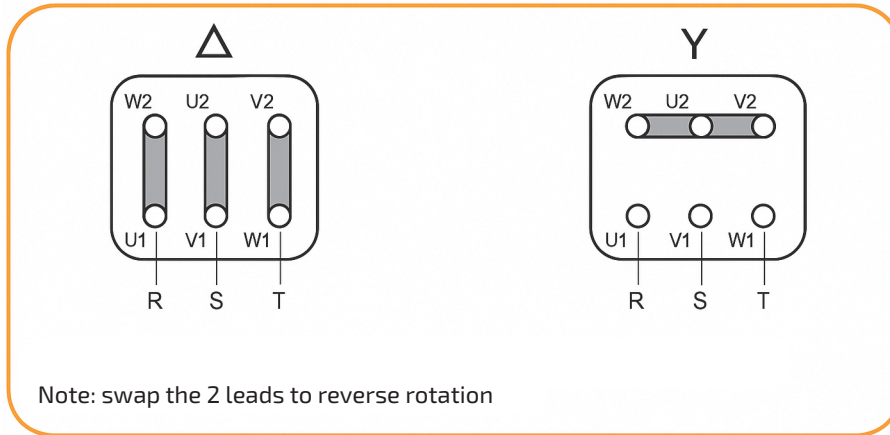
**WARNING**

Incorrect phase connection or configuration (Y/Δ) may cause motor damage or poor performance. Disconnect power supply before servicing.

**Changing rotation direction**

- To reverse the rotor direction (e.g., from CW to CCW), swap any two of the three phases (L1, L2, L3).

**TS - 230 V - 50 Hz (275 V 60Hz) / 400 V - 50 Hz (480 V 60Hz)**



**Constant speed motor – TS6324 (3φ 400V 50Hz) wiring diagram**

**Stepper motor drive – OJ DRHX with MRHX-3P02N / MRHX-3P04N**

- The DRHX system consists of a DRHX controller and an MRHX stepper motor, designed for driving rotary heat exchangers with high precision and reliability.
- DRHX is preconfigured for 0–10 V analogue control, with optional RS-485 Modbus interface for integration into building management systems.
- MRHX-3P02N provides max. torque of 2 Nm; MRHX-3P04N provides 4 Nm.
- Nominal power supply for DRHX: 1×230 V AC, 50/60 Hz
- Motor output: 3×0–200 V AC at up to 400 rpm (limited depending on motor type)
- Internal rotor guard monitors rotor movement and provides fault protection (e.g. belt slip, E01).
- Direction of rotation can be reversed by swapping wires V (black) and W (blue) at the controller terminal.

**Electrical wiring instructions**

**Power Supply:**

- L:** Line (Brown)
- N:** Neutral (Blue)
- PE:** Ground (Yellow/Green)

**Motor Connection:**

- U:** Brown
- V:** Black
- W:** Blue
- PE:** Yellow/Green

**Control signal (0–10V):**

- Terminal 1:** 0–10 V IN (+)
- Terminal 2:** 0–10 V GND (–)

**Optional digital inputs:**

- DI1:** Start/Stop
- DI2:** External rotor guard enable
- DI3:** Signal from external rotor guard (if used)



**NOTE**

Motor and controller are factory matched — use only the specific DRHX/MRHX pair.  
Do not shorten or modify motor cables. Use supplied connectors only.  
Ensure proper mechanical fixation and potential equalization to avoid electrical noise.

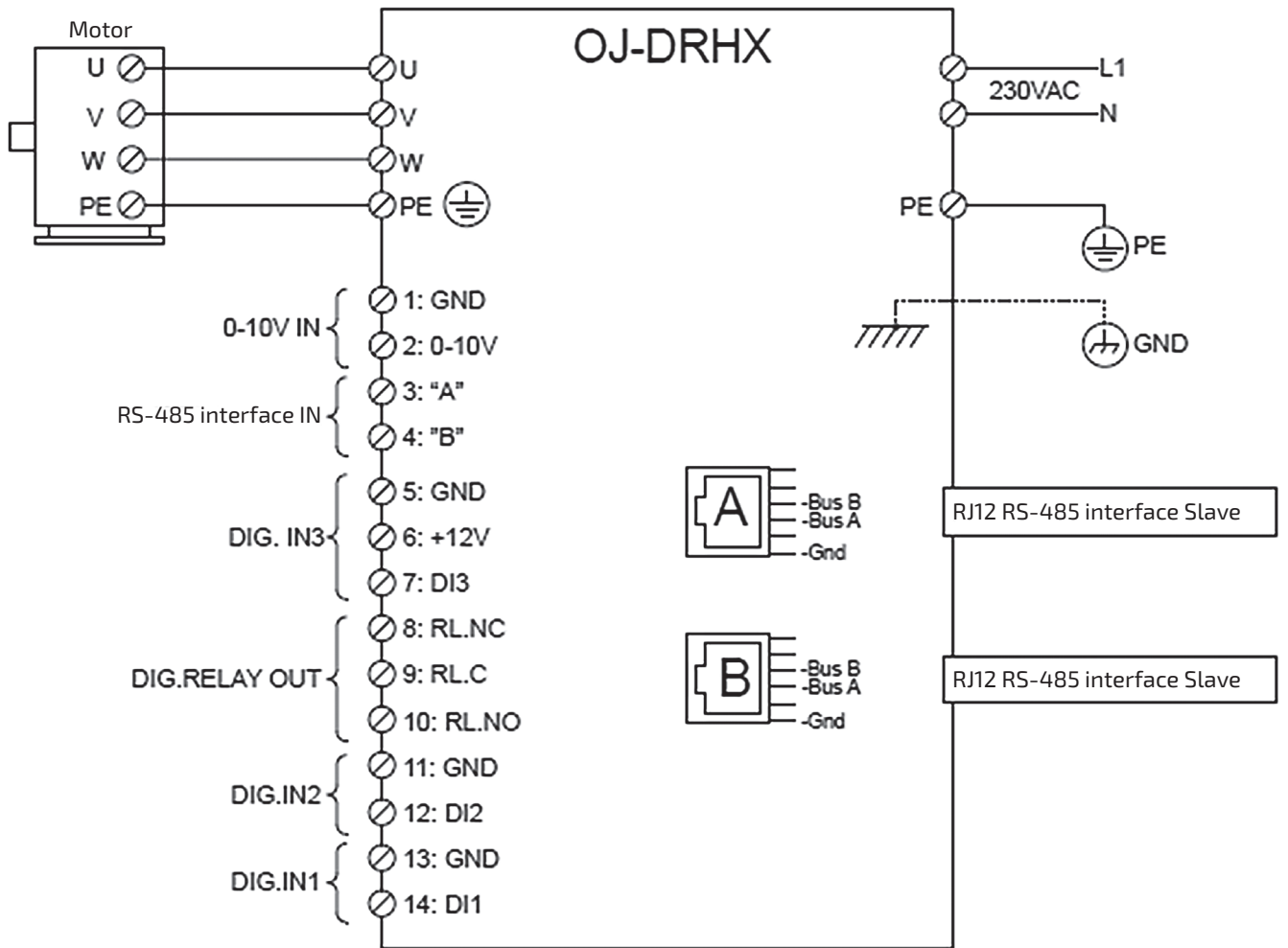


**WARNING**

DRHX contains capacitors that remain charged for up to 3 minutes after disconnecting power. Wait before servicing.  
Incorrect wiring, DIP settings, or missing grounding may result in malfunction or safety hazard.  
Never operate the stepper motor without the belt and rotor correctly installed.

**Changing rotation direction**

- To reverse motor direction, swap wires V and W (black and blue) on the DRHX motor terminals.



Stepper motor drive – OJ DRHX with MRHX-3P02N / MRHX-3P04N wiring diagram

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Terminal	Description	Function	Wiring
L1	Mains L1 Phase	-	Customer
N	Mains Neutral	-	Customer
PE	Mains Earth	-	Customer
1 (GND)	Ground	Ground	Factory*
2 (0-10V)	0-10 V	0-10 V speed control	Factory*
3 (A)	RS-485 A	Modbus connection	-
4 (B)	RS-485 B	Modbus connection	-
5 (GND)	Ground	Ground	-
6 (+12V)	12 V	Permanent 12 V supply	Factory*
7 (DI3)	Motion sensor	Option rotor guard motion sensor	Factory**
8 (RL.NC)	Alarm NC	Alarm output (NC)	
Max: 2A/30V DC, 24V AC	Customer		
9 (RL.C)	Alarm	Alarm input	
Max: 2A/230VAC	Customer		
10 (RL.NO)	Alarm NO	Alarm output (NO)	
Max: 2A/30V DC, 24V AC	Customer		
11 (GND)	Ground	Ground	-
12 (DI2)	Not used	-	-
13 (GND)	Ground	Ground	-
14 (DI1)	Not used	-	-

\* Linked to 12 V from factory, remove to provide separate speed control signal.

\*\* Optional only if ordered

Before commissioning the rotary heat exchanger, it is essential to verify the correct mechanical, electrical, and control system installation. Failure to perform these checks may result in equipment malfunction, reduced efficiency, or damage.

### The following steps must be carried out

#### Mechanical checks

- Ensure the rotor is securely installed and rotates freely without obstruction.
- Verify that the rotor is correctly centered within the casing, with no contact against seals or housing.
- Check that the drive belt is properly tensioned and aligned.
- Confirm that the purge sector (if installed) is adjusted according to design specifications.



#### NOTE

Ensure that the rotary heat exchanger is rigidly and securely installed within the air handling unit (AHU). Any possibility of movement in any direction must be eliminated. For proper structural support, the unit should be supported along the middle horizontal profile. The use of optional bottom locking rails is recommended. A correctly mounted unit will operate quietly, without excessive vibrations, and with optimal efficiency.

The manufacturer does not supply mounting brackets or fasteners. Proper structural integration must be ensured by the AHU design.

#### Electrical checks

- Confirm all electrical connections are completed according to the wiring diagram.
- Verify correct power supply voltage and phase sequence.
- Ensure the stepper or AC motor is securely connected and grounded.
- Inspect motor cable routing — avoid tension, sharp bends, or interference with moving parts.
- Check functionality of safety features such as thermal protection and rotor guard.



#### NOTE

Before connecting to power, ensure that the appropriate electrical installation is available on site. Each model requires a specific power supply voltage and configuration—refer to the motor documentation for exact requirements.

All electrical work must be performed by qualified personnel and in accordance with local electrical codes and regulations. Improper installation may result in electric shock or fatal injury.

#### Control system checks

- Ensure all control signals (analog 0–10V, digital inputs) are properly connected to the drive/controller.
- Verify DIP switch or parameter settings on DRHX or external controller match design values.
- Check availability and calibration of sensors used in regulation (temperature, airflow, etc.).
- For Modbus/RS-485 systems, confirm network addressing and communication parameters.

#### Cleanliness and visual inspection

- Remove any construction debris or transport protection from the unit.
- Check for any foreign objects inside the rotor housing.
- Clean surfaces if contaminated with dust, grease, or packaging residue.



#### NOTE

Start-up should only be performed by qualified personnel. A functional test and system balancing must follow initial activation.



#### WARNING

Do not operate the unit with protective covers removed or safety devices disabled



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