INSTALLATION, OPERATION

AND MAINTENANCE MANUAL

FOR

HRW SERIES

ENTHALPY WHEELS

INDOOR AND OUTDOOR MODELS

UNIT MODEL NO. _____
UNIT SERIAL NO. _____
SERVICED BY: _____
TEL. NO: _____

CANADIAN HEAD OFFICE AND FACTORY

1401 HASTINGS CRES SE
CALGARY, ALBERTA
T2G 4C8
Ph: (403) 287-2590
Fx: 888-364-2727

USA HEAD OFFICE AND FACTORY

32050 W. 83RD STREET
DESOTO, KANSAS
66018
Ph: (913) 583-3181
Fx: (913) 583-1406

CANADIAN EASTERN FACTORY

1175 TWINNEY DRIVE
NEWMARKET, ONTARIO
L3Y 5V7
Ph: (905) 898-1114
Fx: (905) 898-7244

SALES OFFICES ACROSS CANADA AND USA

Retain instructions with unit and maintain in a legible condition.
Please give model number and serial number when contacting factory for information and/or parts.

www.engineeredair.com

TABLE OF CONTENTS

YOU HAVE RESPONSIBILITIES TOO

This installation, operation and maintenance manual cannot cover every possibility, situation or eventuality. Regular service, cleaning and maintaining the equipment is necessary. If you are not capable of performing these tasks, hire a qualified service specialist. **Failure to perform these duties can cause property damage and/or harm to the building occupants and will void the manufacturers' warranty.**

Warning: 	**Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.**

INTRODUCTION

Engineered Air energy recovery wheels are high quality products designed and manufactured to provide many years of trouble-free operation. We recommend that this manual be read thoroughly to ensure proper installation, efficient operation and proper maintenance of this equipment. The submittal record is considered to be part of the Installation, Operation and Maintenance Manual. Please report any omissions to the national service manager.

SAFETY PRECAUTIONS

Warning:  	**This unit is connected to high voltages. Electrical shock or death could occur if instructions are not followed. This equipment contains moving parts that can start unexpectedly. Injury or death could occur if instructions are not followed. All work should be performed by a qualified technician. Always disconnect and lock out power before servicing. DO NOT bypass any interlock or safety switches under any circumstances.**

For the unit to operate properly a system air balance must be performed to ensure correct air flow. Failure to do so can damage the equipment and/or building and can be a cause of poor indoor air quality.

WARRANTY

ENGINEERED AIR will furnish without charge, F.O.B. factory, freight collect, replacement parts for, or repairs to parts covered herein which prove defective in material or workmanship under normal and proper use within one year from the date of delivery, provided the customer gives ENGINEERED AIR written notice of such defects and provided that inspection by ENGINEERED AIR establishes the validity of the claim and all pertinent invoices have been paid in full.

The correction of such defects or replacement will be made only when the complete product or part(s) claimed defective are returned to ENGINEERED AIR, transportation charges prepaid, if such return is requested by ENGINEERED AIR.

Repairs or replacements as provided by the foregoing paragraph shall constitute fulfillment of all ENGINEERED AIR's obligations with respect to this warranty. ENGINEERED AIR shall not be liable for any damage to person, property, loss of revenue, or expense incurred, irrespective of cause. This warranty does not apply to any products or parts thereof that have been subject to accident, misuse or unauthorized alterations, or where ENGINEERED AIR's installation and service requirements have not been met. The foregoing warranty is in lieu of all other warranties, expressed or implied.

ENGINEERED AIR Warranty is void if:

1. The wheel is not installed in accordance with this manual.
2. The start-up and operation of the wheel is not performed in accordance with this manual.
3. The wheel is operated in an atmosphere containing corrosive substances.
4. The wheel is allowed to operate during building construction.

PARTS

1. Motors:

Motor manufacturers have service centers that will repair or replace motors as required.

2. Parts Other Than Motors:

Contact the nearest Engineered Air factory or representative. Be sure to include Model No., Serial No., date of installation and nature of failure along with the description of the parts required. Some parts may not be stocked items that must be made or ordered.

RECEIVING

Refer to the back of the packing slip for receiving unit instructions.

On receipt of the unit, check for damage. Inspect protective covers for punctures or other signs that there may be internal damage. Remove protective covers and check for internal damage. Replace covers if the unit is not being assembled or installed at this time. Open access doors and check for internal damage. Close access doors when the inspection is complete.

Engineered Air enthalpy wheels are pre-tested at the factory immediately prior to shipping and are ensured to be in good operating condition at that time. If damage is found follow the instructions on the packing slip.

On receipt of the wheel, check electrical characteristics (see rating plate) to make sure the unit voltage is compatible with that available for the unit. All parts for field installation are listed on the shipping order form.

TEMPORARY STORAGE

If a wheel is to be stored prior to installation the following precautions are required:

- Store in a well drained area that will not accumulate surface water.
- Store in an area where the unit will not get damaged.
- The entire perimeter and any full height cross members of the unit must be supported by a level surface and the supporting surface must be adequate for supporting the entire weight of the unit.
- All protective coverings that were provided for shipping must be in place.
- Protect indoor units from rain and snow.

INSTALLATION

Warning:

This unit is not rated for hazardous locations and cannot be installed in areas requiring any hazardous location rating.

Caution:

All wiring installation must be completed by qualified persons in accordance with all federal, state, provincial and/or local codes.

Note: Installation shall be in accordance with this manual and all other associated component and control Installation, Operation and Maintenance Manuals.

CODES

In Canada:

1. The installation of this unit shall be in accordance with the latest edition of the Canadian Electrical Code, Part 1 – C.S.A. Standard C22.1, Provincial and Local Codes, and in accordance with the local authorities having jurisdiction.
2. This unit shall be electrically grounded in accordance with the latest edition of the Canadian Electrical Code, Part 1 – C.S.A. Standard C22.1, Provincial and Local Codes, and in accordance with the local authorities having jurisdiction.

3. The installation of this unit shall be in accordance with the latest edition of the National Plumbing Code of Canada, Provincial and Local Codes, and in accordance with the local authorities having jurisdiction.
4. The installation of this unit shall be in accordance with all other National, Provincial and Local Codes, and in accordance with the local authorities having jurisdiction.

In USA:

1. The installation of this unit shall be in accordance with the latest edition of the National Electrical Code (ANSI/NFPA 70), State and Local Codes and in accordance with the local authorities having jurisdiction.
2. This unit shall be electrically grounded in accordance with the latest edition of the National Electrical Code (ANSI/NFPA 70), State and Local Codes and in accordance with the local authorities having jurisdiction.
3. If the unit has not been provided with an electric disconnect switch, one of adequate ampacity shall be installed in accordance with Article 430 of the National Electrical Code (ANSI/NFPA 70).
4. The installation of this unit shall be in accordance with the latest edition of the National Standard Plumbing Code (NSPC), State and Local Codes and in accordance with the local authorities having jurisdiction.
5. The installation of this unit shall be in accordance with all other National, State and Local Codes, and in accordance with the local authorities having jurisdiction.

Engineered Air wheels are constructed for base mounting. The base of the wheel cassette must be supported continuously by a mounting support system that is directly below the wheel structural base frame and runs the entire length and width of the wheel.

MINIMUM CLEARANCE FOR SERVICE

Provide one wheel width + 9” (230mm) for service clearance and cassette removal.

LIFTING

Engineered Air recovery wheels are constructed on a structural steel or heavy gauge steel base frame. The wheel base frame is equipped with lifting lugs specifically located to facilitate proper lifting of the wheel cassette. Spreader bars must be used to keep rigging away from the cabinetry. All lifting lugs must be used. If using a lift truck, ONLY lift using the perimeter structural frame.

ASSEMBLING

Warning: ⚠	**Assembly of split units requires bolting together the base frame of adjacent sections. This may require personnel to work under the unit during assembly. Injury or death can result from improper support or improper loading of the curb. Additional temporary support shall be provided by the installer for the safety of personnel.**

If the wheel is split and shipped in sections, the sections must be field assembled. All sections are pre-drilled for assembly. All sections are predrilled for assembly. The hardware and gaskets are packed in one of the sections. Apply the gasket, align the sections. The base frame must be bolted together first. Access below the unit for bolting of the base frame and then tighten. Caulk all split lines. Install split joint caps. Connect all wiring on units that have been split for shipment.

PIPING, ELECTRICAL OR CONTROL SERVICE CONNECTIONS

DO NOT install anything that will interfere with equipment access or the rating plate.

All penetrations through the unit walls must be caulked and sealed to prevent air and/or water from entering the unit.

ELECTRICAL INSTALLATION

DO NOT install anything that will interfere with equipment access or the rating plate.

The unit must be electrically grounded and all wiring must be installed in accordance with the National Electrical Code, ANSI/NFPA 70, and/or the Canadian Electric Code CSA 22-1 and to the approval of the authorities having jurisdiction. **THE FLOOR OF THE UNIT HAS BEEN MADE WATER-RESISTANT. DO NOT CUT OR DRILL HOLES IN THE FLOOR OR USE PENETRATING FASTENERS.** Field wiring diagrams, internal wiring diagrams and operating functions are included in the control cabinet. The power requirements are indicated on the rating plate. Where field wiring of control circuits is required, take care to size the field wiring for a maximum 10% voltage drop. The control circuit ampacity is noted on the field wiring diagram. See the field wiring diagram for requirements for shielded or twisted pair wire for solid state devices.

Caution: 	**Temporary Power Generation** **Do not use temporary power to operate the heat wheel control and motor.**

Warning: 	**No unspecified external load shall be added to the control transformer circuit(s) or to the main power circuit(s).**

DRAIN TRAPS

Each drain connection requires a separate drain trap supplied and installed by the contractor. For a trap to work properly, it must be primed. During freezing periods, primed traps may need to be heat traced or drain and plug the trap when not in use. If a drain connection has a smaller pipe inside, connect to the outer pipe only. Ensure that the trap is of adequate depth to operate against a static that includes the extra pressure drop for dirty filters.

Warning:

Failure to properly trap each connection can result in drain pan flooding, standing water in unit, building damage, injury or death, cause poor air quality or other problems.

Drains may be connected to a common drain providing that each drain is individually trapped and vented to avoid problems from drains in different pressure zones. The drain must be properly sized and sloped.

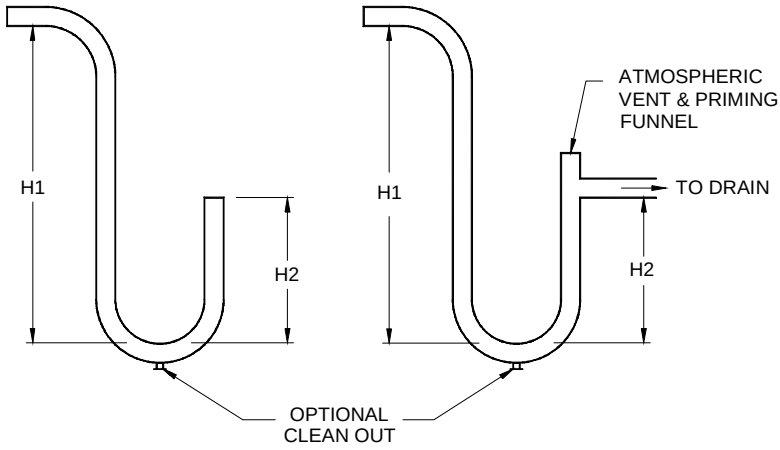
Size drain trap with the following minimum requirements:

a) Units With Draw Through Drain Pans:

H1 = Negative Static† x 1.5 + 3.5” (89mm)
H2 = Negative Static† x 0.75 + 2.5” (64mm)

b) Units With Blow Through Drain Pans:

H2 = Maximum Positive Static† x 1.5
H1 = H2 + 0.5” (13mm)



† Static Water Column (WC) in inches or mm including fully loaded filters.

Ensure adequate clearance for properly sized drain traps.

START UP CHECKLIST

1. Set all associated electrical switches, controls, thermostats and main disconnect switch to “OFF” position.

2. Confirm that all shipping materials have been removed. See any supplemental instructions shipped with the wheel to help identify possible locations. Shipping restraints are provided on the motor drive assembly and on the heat wheel rotor to stop it from spinning. The wheel drive motor should be free to float on its isolation springs.

3. The wheel labyrinth seal should be checked before start-up. The normal clearance is approximately 1/32” (0.8 mm) at the closest spot. First, take a close look at the partition seals on both entering and leaving sides without spinning the wheel. Then, do the same by hand spinning the wheel for a full revolution or more. The seal is a non-contact type and must not touch the media face for correct operation. CONTACT WILL CAUSE WHEEL DAMAGE.

4. The purge angle comes factory preset, but is field adjustable if required. For procedure of adjustment see page 14.

5. Check the set screws of all bearings on the heat wheel shaft and motor jackshaft assembly (if supplied), drive and wheel hub for tightness. See page 12 for recommended torque.
CAUTION: Over tightening may cause the race to crack.

   IT IS IMPORTANT TO PERFORM THIS CHECK BEFORE INITIAL START-UP, AFTER A RUN-IN PERIOD OF 2 TO 4 WEEKS AND THEN ON A REGULAR BASIS OF 4 TO 6 MONTHS. See maintenance section, page 10 for further instruction.

6. Check drive pulley and belt alignment and belt tension of the heat wheel and jackshaft (if provided).

7. Inspect all electrical wiring, both field and factory installed, for loose connections.

8. Ensure all filters are installed, in both air tunnels.

9. Turn unit disconnect switch "ON" (control switch is still off) and check the supply voltage. Voltage must be within 10% of name plate rating. If not, consult the power company and have the voltage condition corrected before continuing unit start-up.

10. Enable the heat wheel, and check for correct rotation according to rotation arrow signs. For three phase AC motor, first check other components for correct rotation (i.e. Supply air fan). If all other rotations are incorrect, reverse main feeder connections. If all other component rotations are correct, then reverse heat wheel motor connections.

11. Check the amperage draw and voltage of the heat wheel motor at full operating speed. Refer to unit or motor rating plate for full load amps. At the unit, check and record the voltage while it is running. For 3 phase power the phase to phase voltage imbalance should be less than 2%. A 2%

voltage imbalance can cause up to a 10% current imbalance that will overheat motor windings.

To calculate voltage imbalance (NEMA method) refer to the following example:

Phase to phase voltage readings: 235V 236V 230V
The average Voltage between legs is 233.7V (235+236+230)/3
Highest voltage deviation from average is: 233.7V – 230V = 3.7V
Voltage imbalance percentage = Highest deviation divided by average X 100

3.7 / 233.7 x 100 = 1.6% This imbalance is less than 2% and therefore is OK

If voltage imbalance is greater than two percent (2%), turn off main disconnect and contact the installing electrical contractor to have the voltage condition corrected.

12. For the wheel to operate properly a system air balance must be performed to ensure correct air flow. Failure to do so can damage the equipment and/or building and can be a cause of poor indoor air quality.

13. Some wheels are equipped with an adjustable air bypass. This must be field adjusted during the system air balance to ensure proper air flow across the wheel. Adjust the bypass to achieve wheel pressure drop as stated on the submittal and/or the unit function sheet.

14. Set all controls to the settings indicated on the wiring diagram.

15. Replace all access panels.

16. Remove any packing material or debris.

OPERATION

Warning:  	**This unit is connected to high voltages. Electrical shock or death could occur if instructions are not followed. This equipment contains moving parts that can start unexpectedly. Injury or death could occur if instructions are not followed. All work should be performed by a qualified technician. Always disconnect and lock out power before servicing. DO NOT bypass any interlock or safety switches under any circumstances.**

Warning: 	**Proper commissioning and start-up of the air handling system is the responsibility of the installing contractor. It is recommended that an air balance be completed by a certified air balancing contractor to insure the air volume being delivered matches the unit rating plate. Failure to perform a proper air balance can cause injury or death, damage to the equipment, property damage, system operational problems, or be a cause of poor air quality. Moisture carry over can result from improper air flow.**

All filters must be in place before enabling air flow and operation.

This unit may incorporate one or more functions and a variety of controls and options to suit individual requirements. A description of the unit functions and options is shown on the Electrical Data Sheet and unit wiring diagram. Carefully check your wiring diagram to verify that all remote controls are properly located and correctly field wired.

Some equipment may contain programmable unitary controllers or programmable logic controllers (PLC). Additional information can be obtained from the specific programmable control manufacturer. Often this information is available from the control manufacturer's website.

MAINTENANCE

Warning:  	**This unit is connected to high voltages. Electrical shock or death could occur if instructions are not followed. This equipment contains moving parts that can start unexpectedly. Injury or death could occur if instructions are not followed. All work should be performed by a qualified technician. Always disconnect and lock out power before servicing. DO NOT bypass any interlock or safety switches under any circumstances.**

Warning: 	**Follow the cleaning instructions and recommended inspection schedule to reduce the risk of mold or other bacterial growth. Property damage or personal injury claims may result from mold or biological growth arising from improper installation, inadequate maintenance, or failure to inspect. Engineered Air has no responsibility for and makes no express or implied warranties regarding mold or bacterial growth or any other indoor air quality issues. If mold or biological growth is present, determine and fix the cause. Properly remove and dispose of the contamination. Properly clean and sanitize the affected area using only approved sanitizers suitable for HVAC equipment.**

To provide a maintenance history, It is recommended that the owner have a maintenance file for each unit. **The following maintenance instructions are to be carried out each spring and fall or as otherwise indicated by qualified service personnel.**

ELECTRICAL

Caution: 	**Label all wires prior to removal when servicing controls or critical components. Wiring errors can cause improper and dangerous operation.**
	**Verify proper operation after servicing.**

1. Check all wiring for loose connections.
2. Check voltage at unit (while in operation).
3. Check amperage draw against unit rating plate.

4. Where possible, all contactors should be inspected to ensure that contacts are clean and are making good contact. If contacts are abnormally pitted or burned badly, replace contactor. Single phasing and motor burnouts can result from bad contacts.

BELT ADJUSTMENT

The perforated V-belt provided with the heat wheel is easily cut to length and assembled to the correct belt tension. The belt should be tight enough to allow the spring tensioned motor base to operate correctly (i.e. springs should be compressed approximately one half the length of a non-tensioned spring).

Some wheels are equipped with a jackshaft and speed reduction pulley assembly. For maximum belt and bearing life, pulley alignment and belt tension must be properly maintained. Only replace with belts of proper size and type. Allow 1/64" (0.4mm) of deflection for each 1" (25mm) of span length.

BEARING SET SCREW TORQUES

Shaft diameter	**NTN**	**KOYO**	**DODGE**
Type	**UC SERIES (set screw)**		**SC 203-215 SERIES**
3/4" (19mm)	35 in-lb (3.9 Nm)	35 in-lb (4.0 Nm)	66 – 80 in-lb (7.5 – 9 Nm)
1" (25mm)	35 in-lb (3.9 Nm)	35 in-lb (4.0 Nm)	126 - 156 in-lb (14 - 18 Nm)
1 15/16" (49mm)	69 in-lb (7.8 Nm)	155 in-lb (17.5 Nm)	228 - 272 in-lb (26 - 31 Nm)

Refer to bearing manufacturers' literature for all other types of bearings.

LUBRICATION OF BEARINGS

Most bearings have permanently lubricated sealed ball bearings which should not require lubrication. These bearings are factory packed 30-50% full. Bearings that require lubrication should be greased while the bearing is rotating slowly, with the following quantities of a lithium base lubricant. DO NOT OVERGREASE. DO NOT USE NON-LITHIUM BASED GREASE.

	Re-Greasing Interval		
Bearing Temperature	Clean	Dusty	Dusty and Wet
Under 120°F (50°C)	2 ½ Years	Yearly	4 Months
Under 158°F (70°C)	Yearly	4 Months	1 Month

Shaft Diameter	¾" (19mm)	1" (25mm)	1 15/16" (49mm)
Grease	0.06 oz. (1.8g)	0.12 oz. (3.3g)	0.36 oz. (10.3g)

Gear Motors are factory sealed and do not require additional greasing.

FILTERS

Caution:

Heat wheels are sensitive to dirt accumulation and must be kept clean. Filter maintenance is crucial for the extended operational life of the wheel.

During filter maintenance checks and at least once every six months, the heat wheel media surface should be inspected for dirt build-up. If required, clean lightly with a dry cloth taking care not to damage the wheel media's aluminum structure. Vacuuming can also be effective.

DO NOT CLEAN WITH WATER OR OTHER LIQUIDS. Cleaning with water will damage the wheel.

Filter-changing intervals can be based on the pressure drop across the filter or by calendar scheduling or visual inspection. Scheduled intervals should be between one and six months, depending on the pollutant loading from indoor and outdoor air. More-frequent changes may be required during the economizer season.

Units that operate with high levels of outside air MAY require the outside air filters to be removed during the winter months in areas that have heavy frost or snow.

Plugged or excessively dirty filters can cause damage to the equipment. See submittal record for filter quantities, sizes and types. Use same size and type for replacement.

A. High Velocity Permanent:

It is important that the filters be checked and cleaned regularly during the period immediately following installation, in order to determine the best service interval. To clean, rinse with water. Shake off excess water and re-install. These filters do not require an oil adhesive.

B. Pleated Throwaway and/or Replaceable Media (Cartridge, Bag):

Replacement filters can be obtained from any Engineered Air representative.

In some applications the used filters/media may contain chemical or biological hazards. All local, regional and national regulations for safety and disposal should always be followed.

CONTROLS

Annually clean and recalibrate all controls, check for proper operation, and repair or replace any faulty controls. Check all damper hardware settings every three months. Replace blown fuses with equivalent size and type fuse. Failure to do so can result in damage to the unit.

OUTDOOR AIR INTAKES, MIXING SECTIONS AND DAMPERS

Outdoor air intakes, screens, and adjacent areas shall be checked semi-annually for cleanliness, integrity and proper operation. Adjust dampers where required.

SEAL ADJUSTMENT

The seals should be checked for correct clearance at least once every six months. The non-contact seal should be set to allow a clearance of approximately 1/32" (0.8 mm) to the media face at the closest spot. To adjust the seal, turn off the unit and loosen the seal clamp. Rotate the heat wheel by hand to determine the closest point, set seal to 1/32” (0.8 mm) gap and tighten clamp. Rotate the wheel to the next section of seal and adjust as above. When completed, rotate the heat wheel by hand and ensure that the seal does not come in contact with the media at any point.

PURGE ANGLE ADJUSTMENT

The purge sector allows the outside air to flush out any return / exhaust air that trapped in the wheel flutes, which would otherwise cross into the supply air stream as the wheel rotates. This will reduce the amount of cross contamination in the system. To adjust the purge angle correctly, the amount of pressure differential across the heat wheel between the two air steams must be determined.

Pressure Differential (in. w.c.)	Pressure Differential (Pa)	Purge Angle (in degrees)
0 - 0.8	0 - 200	0
0.8 - 0.9	200 - 225	10
0.9 - 1.0	225 - 250	9
1.0 - 1.2	250 - 300	8
1.2 - 1.5	300 - 375	7
1.5 - 1.9	375 - 475	6
1.9 - 2.5	475 - 625	5
2.5 - 3.5	625 - 875	4
3.5 - 4.5	875 - 1120	3
4.5 - 5.5	1120 - 1370	2
5.5 - 6.0	1370 - 1500	1
> 6.0	> 1500	Consult factory

The purge angle is determined by the number of holes (degrees) on the purge plate from the heat wheel partition. The plate will have a total of eleven holes ranging from zero degrees (closest to the partition) to ten degrees (furthest from the partition). To adjust the purge angle, simply loosen the purge shelf fastening bolt near the outer edge of the wheel and move the purge shelf to the correct angle, align the holes in the shelf and plate and reattach the fastener. Recheck the seal for correct adjustment.