



Seibu Giken America, Inc.

Air-to-Air Heat Recovery Cassettes

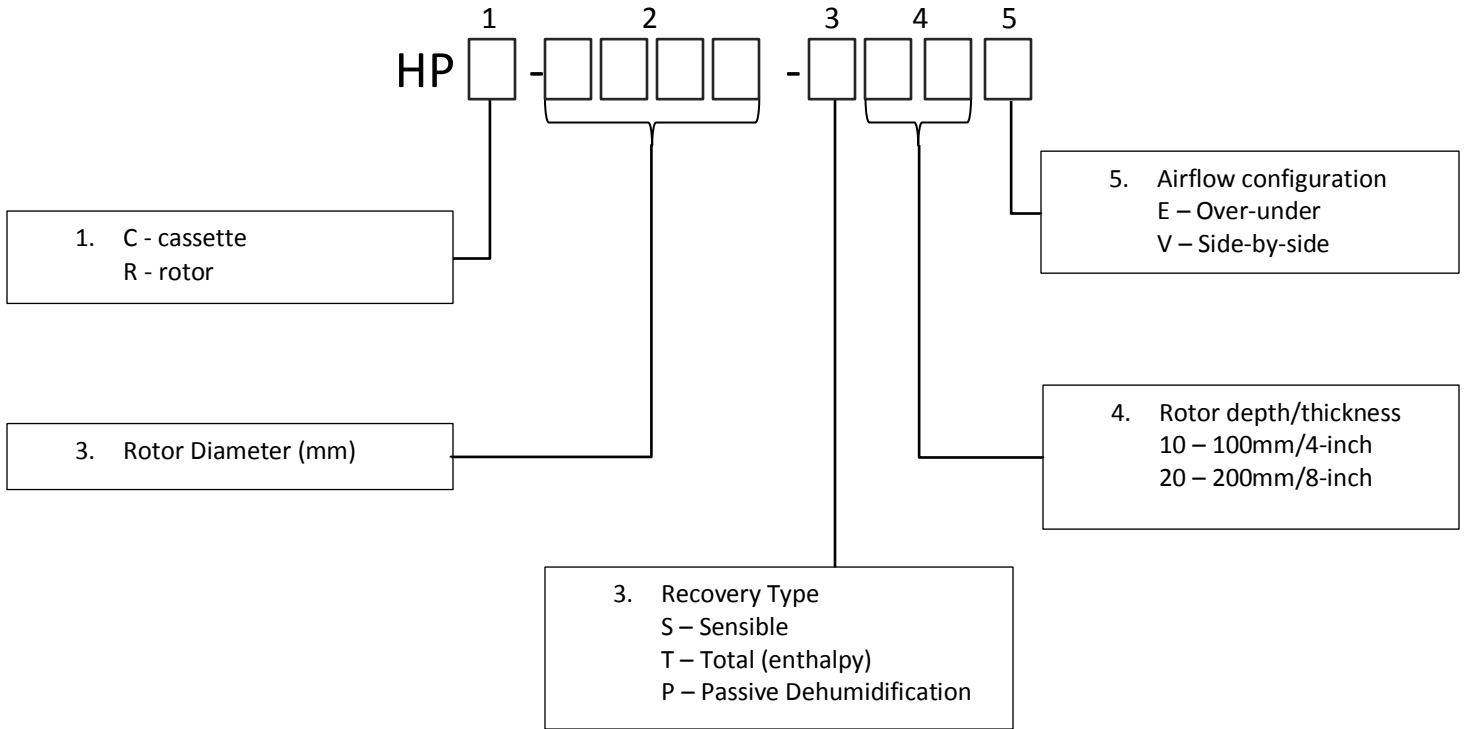
Installation, Operation and Maintenance Guide

March 4, 2016

Energy Recovery Cassette Installation, Operation and Maintenance Guide

Nomenclature

Hi-Panex® Enthalpy, Sensible and Passive DH Cassettes



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Energy Recovery Cassette Installation, Operation and Maintenance Guide

Introduction

The purpose of this specification is to provide the information required to select, install, start up and maintain SG America Hi-Panex® energy recovery cassettes. These cassettes will provide many years of service with a minimum of maintenance when appropriately selected and installed. Please review this document carefully and keep a copy on file for future reference.

All documentation specific to your unit has been provided separately and/or can be obtained by contacting SG America. Component manufacturer literature is similarly available if more detail is required on a specific component. If controls were provided by SG America, electrical schematics and sequence of operations are also available.

Note that the terms “rotor” and “wheel” may be used interchangeably in this manual and in the industry to refer to the self-same rotational device inside of the cassette. The term “wheel” may also be used to generally refer to the entire cassette as well, where “rotor” refers specifically to that component of the system.

Safety

Details identified with “Warning”, “Caution”, and “Important” notes can be found throughout this guide. Installation, maintenance and service personnel should note potential safety hazards, possible equipment damage by following specific instructions as outlined below. Installation should be carried out only by contractors or service personnel familiar with rotary heat recovery cassettes. Follow all safety codes.

Recommended Spare Parts

SG America Cassette components are selected for long-term reliability and a minimum of maintenance. At a minimum, a spare drive belt is recommended. Depending on wheel model and recovery application, a spare geared motor may optionally be recommended.

Pre-Installation Inspection

Inspect the cassette for damage or loose parts. File a claim with the shipping company if damage has been sustained. Any missing items from the carrier’s bill of lading should be noted. Contact SG America’s factory immediately if shipment has been damaged. No returns will be accepted without prior authorization.

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Installation

Installation and use of SG America heat recovery cassettes is subject to warranty terms. Warranty details and this installation guide must be reviewed carefully before proceeding. Failure to observe proper start-up procedures may void the standard warranty conditions. Specifically, failure to maintain particle-free airstreams and to properly set and secure air seals (where applicable), purge arms/seals and gear reducers may seriously damage the rotor/cassette, reduce its heat-transfer effectiveness, pressure drop and air leakage rate.

Consult local building/electrical codes for special installation requirements in addition to the requirements outlined in this manual.

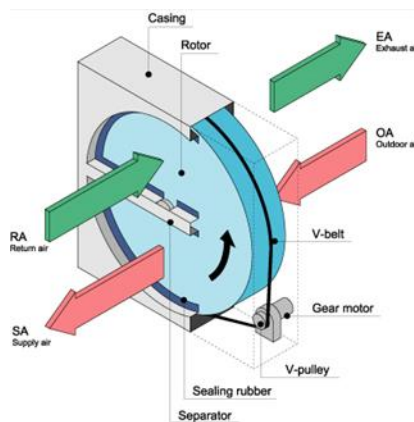
Rigging, Lifting and Assembling

All rigging equipment and labor (as applicable) is provided by an installing contractor, who is responsible for the unit's proper installation. All assembly hardware, including lifting lugs are provided with the cassette from the factory. For larger cassettes shipped in halves or sections that will be assembled at site, the drive belt, bolts and other hardware is stored for shipment behind one of the access panels in the bottom half of the cassette, usually in the motor compartment.

Remove all plastic and/or plywood packaging from the cassettes. Locate lifting lugs on the top of the cassette and cassette halves (if applicable). Cassette sizes below HPC-2400 are generally shipped in unibody structure. Cassettes larger than HPC-2400 may or may not be shipped in halves.

IMPORTANT: Before hoisting, setting or assembling any cassette in whole or in part, verify that the proper unit is being installed in the proper orientation with respect to airflows through the air handling unit.

IMPORTANT: Do not, under any circumstances, place or lift the cassette in a horizontal position unless it was specifically designed to be installed horizontally (extremely rare).

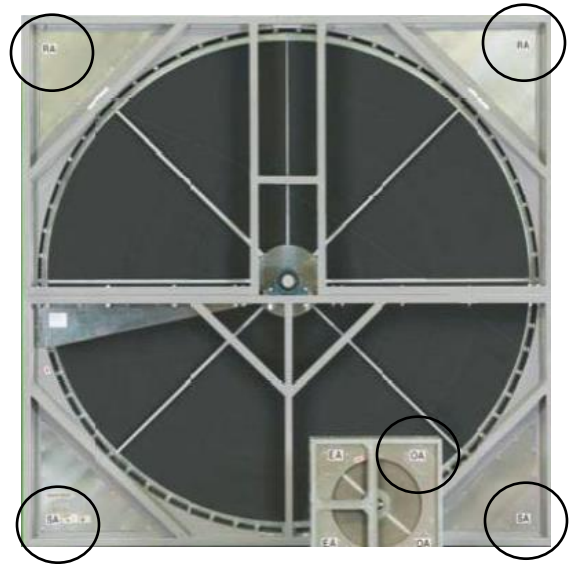


Verify that match marks and other airflow indicating decals are observed when assembling cassettes shipped in two or more pieces. Outside air (OA)/exhaust air (EA) and return air (RA)/supply air (SA) sides/halves will be clearly marked with decals. Rotation direction is indicated on each side of the cassette by an elongated red

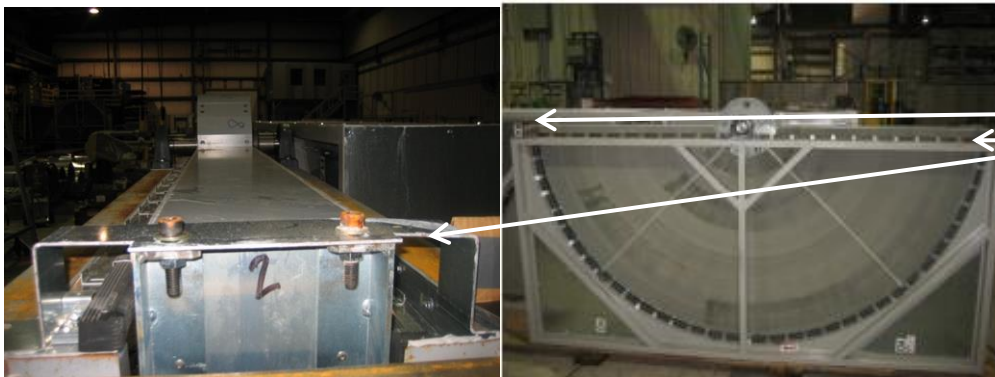
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arrow. Note that the purge section, if applicable, is found on the supply air (SA) leaving side of the cassette to the space/building.

Match mark example (below) and decals indicating airflow direction (right).



IMPORTANT: For cassettes delivered in halves, the bottom half of the rotor is already mounted to the hub/shaft assembly inside the bottom half of the frame. Two brackets that keep the bottom half of the rotor from swaying during shipment must be removed before the top half of the rotor is lowered onto the bottom half but only after the bottom half of the cassette frame has been installed.



Stabilizer brackets on bottom of split cassette (one bracket at each end).

IMPORTANT: For cassettes delivered in halves, the top half of the rotor is secured within the top half of the cassette frame by hanging brackets and supported from the pallet below by standoffs. The brackets are accessible by removing the triangular access panels on the top half of the cassette. Do not remove the hanging brackets until the top of the cassette has been placed on and secured to the bottom of the cassette frame. The suspended top half of the rotor may then be gently lowered onto the hub already installed with the lower half of the wheel within the bottom half of the frame.

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Do NOT remove hanging brackets until top of cassette frame is securely attached to bottom of frame. Gently lower top half of rotor onto the bottom half by loosening nuts on hanging bracket bolts.

Remove stabilizer brackets from top half of cassette before lowering onto bottom half.

IMPORTANT: Do not loosen or adjust the pillow block bearings holding the shaft of the rotor to the bottom of the frame. These have been pre-aligned and set at the factory.

CAUTION: Ensure that the hanging brackets and lifting lugs are secure and have not become loose during shipment prior to lifting the cassette halves into position.

Bolt the top and bottom of the cassettes together using the large bolts, flanged nuts and washers provided. Once the frame is bolted together, gradually and simultaneously lower the top of the rotor onto the bottom half/hub assembly by loosening the nut from the bolt that suspends the hanging bracket. Once seated onto the bottom half and hub, do not fully remove the nuts/brackets until the top of the rotor is bolted to the hub and to the outside flanges of the bottom half of the rotor. Once the hub bolts and flange bolts are installed, remove the hanging bracket nuts from the bolts and the steel brackets from the rotor.



Retaining brackets (2, left picture) are temporarily fitted to both sides of the top of the rotor. Do NOT remove them until the top of the rotor is in place on the hub and the hub bolts/spring washers have been inserted (right picture).

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Bolt the two halves of the rotor together at the outside flange (left) as well as to the hub. Ensure that the flange surfaces are flush with one another before tightening.

Setting Seals and Support Casters

IMPORTANT: Do not power the rotor until seals and casters have been set by carefully following the following instructions.

Hi-Panex cassettes are supplied with standard contact-type or heavy-duty, non-contact polymeric labyrinth seals. For shipment, non-contact seals are set at the point farthest from the rotor face and flanges to avoid any damage to the surface of the rotor during shipping and installation. Once the cassette has been assembled, however, the seals must be set as close as possible to the rotor without touching it (a gap of 2mm-3mm is preferable) by loosening the seal clips, adjusting the position of the seals incrementally and checking the gap by hand-turning the wheel a full revolution after each section of seal has been set. Failure to hand turn the wheel and adjust the seals to the wheel media/flange surfaces' closest approach can cause binding of the rotor/current tripping of the drive motor and/or damage to the rotor media and seals.

Once the seals have been set and the seal clips tightened with the clearances between the wheel and seals as described and checked by hand-turning, the casters may be set. Zero, two or four casters may be found on each of the exhaust air and supply air sides of the cassette depending on the scheduled airflows, face velocities and differential pressures specific to an installation. The casters are designed to oppose the force of the airstreams that would otherwise cause the rotor to deflect slightly and rub against the labyrinth seals. The casters ensure that the gap between the circumferential flanges of the rotor and the seals are maintained. Casters should be such that they just contact the rotor rim flange at the points at which the flange most closely approaches the seals.

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Drive Belt

Belts in cassettes of smaller, standard (galvanized) construction are factory mounted and utilize a spring tensioner. The tensioner is located behind a triangular access panel opposite the drive motor compartment. When replacing the belt on this model it is important that the segmented drive belt be installed around both the drive motor pulley and the tensioner pulley such that, after being sized by adding or removing links in the belt, the tensioner is exerting sufficient tension on the belt.



Standard Cassette Drive Pulley

Heavier, steel-tube construction cassettes are furnished with either a gravity type or sliding type motor mounting and tensioning systems. The belt provided with the cassette is multi-link and has been sized and tested at the factory on the unit. In the case of split cassette shipments it can be found packaged with the cassette assembly hardware or behind a panel in the drive motor compartment. The belt must be installed with directional arrows pointing in the direction of the rotor's rotation. Using a piece of tape and working from the motor compartment of the cassette, secure one open end of the belt to the outside of the heat wheel and slowly rotate the wheel one complete revolution such that the end affixed to the outside of the rotor with tape arrives back in the motor compartment. Attach the belt ends together and put the belt tab through two links on the other end of the belt at once. Flex the belt further and insert the second tab through the link by twisting the tab with your thumb. Once connected, reverse the tabs so that they face the inside of the belt and insure that the belt as a whole has the belt tabs facing the inside.

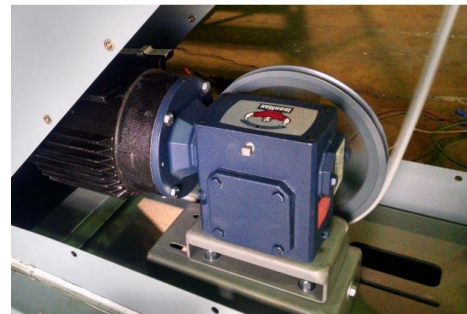
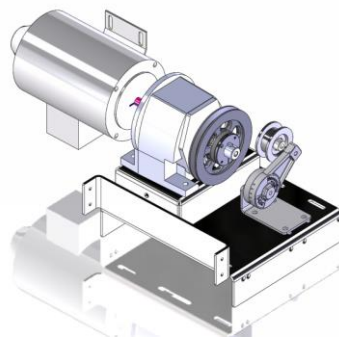
Before threading the assembled belt around the reducer pulley, ensure that the slide mechanism of the adjustable motor mount is at the location of its travel that allows the most room for final tensioning once the belt has been put around the pulley. This can be done by ratcheting the head of the single longitudinal threaded bolt in the base counter-clockwise (loosening) until the base reaches the furthest point opposite the

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tensioning direction (i.e. toward the rotor). **IMPORTANT: DO NOT FORCE THE THREADED BOLT OF THE SLIDE BASE BEYOND THIS POINT OR IT MAY BE DAMAGED.** Once this has been done, wrap the belt around the drive pulley as tightly as possible. Next, manually rotate the wheel by hand or with a VFD in manual mode to allow the belt to adjust its tracking around the rotor. Doing so will release some tension in the belt as the belt tracking becomes straighter than when it was initially threaded using the tape. If too loose, remove one or more links from the belt and re-thread over the pulley. Once the belt has been re-threaded around the pulley as tightly as possible by hand, use a ratchet to tighten the tensioning bolt in the tensioning direction (clockwise) until the base has moved between 0.5" and 1". Test the operation of the belt if possible by slowly starting at low frequencies (2-5hz) and increasing the frequency of the drive in manual mode to ensure that the belt is operating properly. **IMPORTANT: New belts of this kind can stretch up to between 2% and 4% of their length in the initial week of use and may need more than one adjustment depending on the initial setting of the adjustable motor mount or tensioner.**

IMPORTANT: Heavier, steel-tube construction cassettes are furnished with either a gravity type or sliding type motor mounting and tensioning systems.

Examples of motor mounting and tensioning arrangements.



Motor and Electrical Connections

The cassette contains a VFD-rated 3 phase motor and (optional) AC proximity sensors. Your unit may have also included a control head, variable frequency drive (VFD) and averaging temperature sensors. Check the separately supplied, detailed information on the motor specifications and sequence of operation for the motor and (optional) controls included with the cassette. The motor and (optional) proximity sensor will already be attached to the cassette and found behind the motor compartment access panel. Controls, VFDs and temperature sensors, if supplied by SG America, will have shipped in separate packaging.

IMPORTANT: The drive motor is integrated with grease or oil lubricated type speed reduction gears and an electric motor in one body or supplied as an assembly. If any abnormal noise, vibration or heating are noticed check the entire drive system. Grease or oil lubrication is factory installed in the gearbox and the motor bearings. ATTENTION: Cast iron gear reducer models are supplied with vent plugs that must be fitted in an appropriate location at the final installation. Failure to do so voids the standard and any other SG America warranty covering those components.

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WARNING: The unit must be electrically grounded in accordance with local codes and/or the National Electrical Code. Failure to follow these and/or other codes can result in personal injury for which the installer may be liable.

IMPORTANT: Wire nuts and other electrical connectors (if required) must be supplied by the Electrical Contractor.

Check motor nameplate for correct power supply and fully-loaded ampere requirements. The motor and reducer have been selected to run the rotor over a range of <1RPM to 20-24 RPM using variable frequencies of <2Hz to 60Hz respectively. On larger units, motors may be driven up to 90Hz/30RPM, but the very small increase in recovery effectiveness beyond 20-24RPM does not justify the extra cost of driving the rotor to 30 RPM.

CAUTION: Electrical components must be protected from metal shavings created during the process of drilling holes for electrical access. These connections must be air- and liquid-tight and must not potentially affect the structural integrity and air-tightness of the cassette.

Start-up

Pre Start-up Check

Before starting up the cassette, check the following items (as applicable):

1. Check that the electrical disconnect is in the "Off" position.
2. Check that that all shipping brackets have been removed
3. Check that all bolts connecting the hub to the rotor segments have been inserted and are tight (both sides)
4. Check that all flange bolts at the perimeter of the rotor have been inserted and tightened and that all caster-facing flange surfaces on both sides of the rotor are flush with one another at their interfaces.
5. Check that the bolts fastening the top and bottom of the frame together are all installed and have been tightened.
6. Check that the drive belt has been installed and that the belt is oriented in the direction of wheel rotation. Wheel rotation direction is indicated on cassette by red arrows; belt direction is indicated on the belt by black arrows marking every several belt links.
7. Hand turn the rotor (it will offer some resistance as it is by this time connected by the belt to the reducer) and ensure that the separator seals and circumferential seals do not contact the rotor media and rotor rim flanges respectively.
8. While hand turning to check the seals, similarly check the setting of the casters, which should lightly touch the flange at certain points of the wheel's rotation
9. Check that all holes made by the Installing Contractor after receiving the unit have been well sealed to prevent air infiltration.
10. Check that the gap between the proximity sensor's detection target attached to the outside of the rotor does not impact the proximity sensor (sensor is located in the upper part of the motor compartment) but that the target approaches within 5-10mm of the proximity sensor as the wheel rotates.

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Proximity Sensor and Target (may vary by model)

Start-up Procedure

WARNING: Electric shock can cause injury or death. Only qualified service personnel should install and service this equipment. All units are factory tested. If the motor runs backwards, disconnect power and switch two of the three phases to ensure proper rotation and to avoid damage.

1. Check that all access panels and doors are closed.
2. Turn the unit's disconnect to the "on" position.
3. The unit can be started up by using the VFD keypad. Before running with the fans on (unless they are interlocked) start with a frequency of 5-10Hz.
4. Check current draw and compare to the motor plate's fully loaded amp rating at the voltage being applied. In most cases, the VFD parameter for current –based tripping will have already been set for the nameplate amps. Excessive current draw by the motor is usually caused by friction between the wheel and the labyrinth seals/support casters or an unseen obstruction.
5. Check that the wheel is rotating in the right directions with respect to the arrows indicating direction and with respect to the purge zone (if applicable) on the supply air (air to the space) side of the cassette. Listen for any unusual sounds that may indicate an issue. A light clicking or bumping sound of the casters riding against the flanges is normal, and may slightly increase in frequency and/or intensity after the fans are applied.
6. Increase the frequency of the drive in 10-Hz steps until 60Hz/20-24RPM rotation speed is reached, continuing to check for unusual sounds or for signs of seal issues.
7. Repeat steps 3-6 above with the fans also turned on.
8. A controls technician should separately evaluate whether the code programmed into the heat wheel cassette control is working correctly with respect to the other components in the system and with the building automation system (BAS) if applicable.

IMPORTANT: Fans speed/air pressure against the OA and RA surfaces of the rotor should be applied gradually during start up. Excessive pressure and/or inappropriately set seals and casters can cause binding/excessive current draw and possibly serious damage to the rotor if startup is not approached in the step-wise manner described herein.

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Purge Swing Arm and Seal Adjustment (Where applicable)

The swing arm of the purge section is factory set to 4° (four degrees) and secured by a bolt with flanged/locking nuts and with one or more additional screws along its length. If the purge angle is adjusted the swing arm **MUST** be adjusted to the desired angle and re secured with the factory supplied bolts, nuts and screws (which requires re-drilling of the triangular purge panel to accommodate re- insertion of the locking sheet metal screws). **Failure to adjust and re-fasten the purge arm in this manner voids the standard and any other warranty on the cassette.** In addition, the seal on the swing arm must be adjusted such that it does not come in contact with the rotor face at any point in the rotors rotation cycle, both when hand turned and when running at full speed and airflow. **Failure to adjust the seals in this manner similarly voids the standard and any other warranty on the cassette.**



Purge Zone Detail

Maintenance

Inspection of Drive Belt

Check the drive belt to establish if it is worn. Check to see if there are any cracks in belt. Check the belt tension. If the drive belt slips, it may stop the wheel or render the rotation unstable therefore reducing the heat exchange. Adjust the tensioning spring or adjustable motor mount in order to maintain the proper tension.

Drive Motor and Reducer

The drive motor is integrated with grease or oil lubricated type speed reduction gears and an electric motor in one body or supplied as an assembly. If any abnormal noise, vibration or heating are noticed check the entire drive system. Grease or oil lubrication is factory installed in the gearbox and the motor bearings.

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IMPORTANT: Cast iron gear reducer models (if applicable) are supplied with vent plugs that must be fitted in an appropriate location at the final installation. Failure to do so voids the standard warranty and any other SG America warranty.

Inspection of Wheel Surface

Inspect the wheel surface to ensure it is free from dust, dirt, lint or any other foreign materials per the above schedule. If dust, dirt, lint or other materials accumulate on the wheel surface, then frequent inspection and cleaning is recommended. In such cases, it is recommended that a higher efficiency filter be installed. Light dust can be removed with an industrial vacuum cleaner. If there is a heavy accumulation of dust stuck to the wheel surface remove it by cleaning with a brush, vacuum or, by blowing compressed from the other side. Be careful not to damage the corrugated structure. Unlike cooling or heating coils there is not comb to straighten out the corrugations. Damage to corrugations (flutes) will reduce the total air flow through the wheel or increase the air velocity through other flutes thereby reducing the wheel effectiveness.

Adjustable Air Seals (If applicable)

Air seals are installed to control leakage around the wheel and on structural cross members/zone separators. They may be contact wiper, full contact brush, or, a non-contact multi-pass labyrinth seals. When conducting the seal inspection, check to ensure that the rubber or brush is not worn out. If the seal condition is bad, replace it with a new one, taking care to observe the seal adjustment instructions for the purge swing arm above (failure to adjust the purge swing arm seal per these instructions voids any remaining factory warranty).

When checking multi-pass labyrinth seals, be sure that the gap between the wheel and the seal is a minimum close running gap of 2-3 mm. Too wide a gap will cause significant seal leakage. For this purpose a seal gauge can be made from 18-gauge sheet metal or for convenience use a seal holding clip as a gauge.



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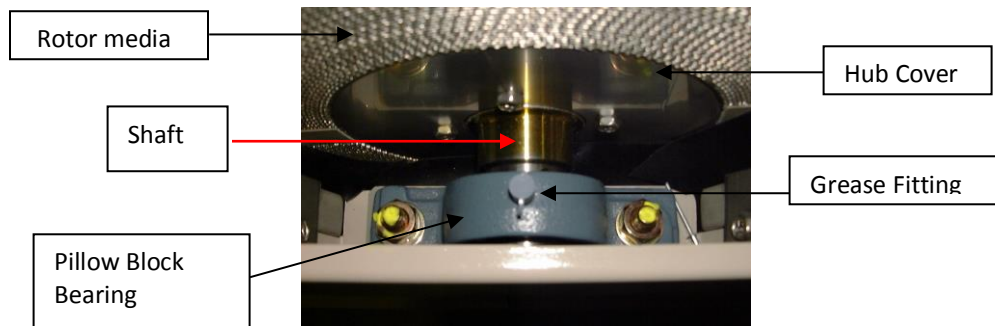
Support Casters (If applicable)

For cassettes intended to operate with a differential pressure between the supply and return (Exhaust) air streams of more than 4" w. c., casters are installed on the seal ring and operate against the wheel flange. The rollers include two precision life-lubricated ball bearings. The rollers are installed to prevent the wheel from being pushed by the air differential pressure against the seals. The rollers maintain the proper gap between the wheel flange and the multi-pass labyrinth seal. Units with multi-pass labyrinth seals and rollers installed require much less seal maintenance. Check that the casters are barely touching the flange at its highest point in the wheel rotation (by hand-turning with the unit locked out) and for excessive wear on the casters.



Bearings

Inspect the wheel bearings twice per year. Although the bearings are sealed and are designed to perform as-is beyond the lifetime of the rotor itself, it may be necessary to refill the grease through the grease fittings provided on the pillow block housing. Ensure that the grease gun is squarely on to the fitting to ensure penetration into the bearing. Use the bearing grade grease for low speed power transmission bearings. If any abnormal heating, vibration or noise is discovered, it may be necessary to replace both bearings. In such cases, check the alignment of the shaft and the pillow blocks. You must find and correct the cause of the bearing failure and replace the bearing assemblies. If the shaft is damaged then, repair or replace it along with the new bearings.



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FOR QUESTIONS, PARTS INQUIRIES AND SERVICE, CONTACT OUR REGIONAL SALES REPRESENTATIVE OR CONTACT:

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