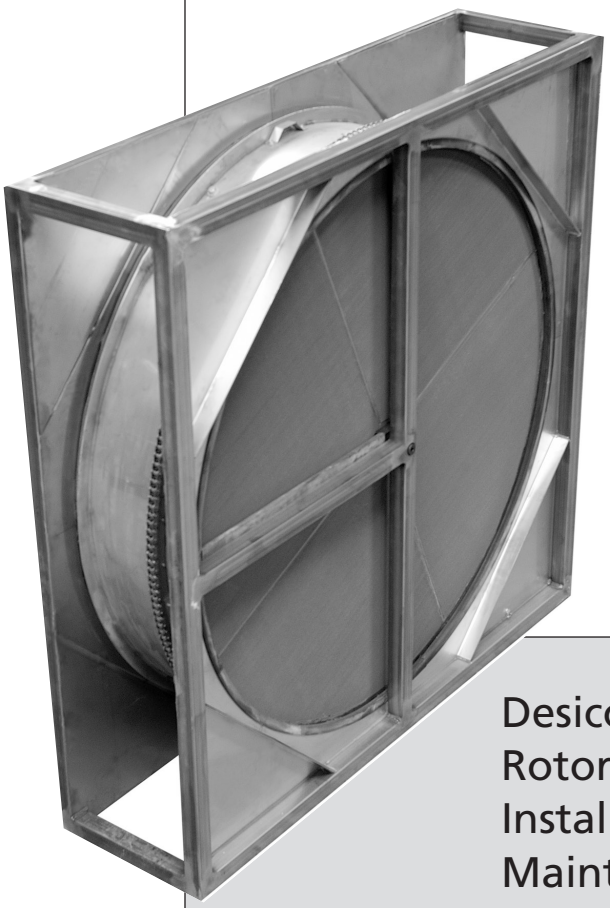
DESICCANT DEHUMIDIFICATION

TECHNICAL INFORMATION



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Desiccant Dehumidification Rotor and Cassette Installation, Operation and Maintenance Manual

ROTOR SOURCE

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INTRODUCTION

Purpose

PPSR Dehumidification Rotors and PPSC Dehumidification Cassettes are used in heat reactivated, as well as passive desiccant dehumidification systems. Moisture is adsorbed by the desiccant material within the structure of the media of the rotor, and is then de-sorbed by the heat of reactivation. Two (2) air streams (see principle of operation) are used in conjunction with the rotor and cassette. The cassette is designed for 10 years of continuous use (87,600 hours) with minimal required maintenance. Careful installation and performance of required maintenance items in accordance with this manual will ensure long life and top performance. This manual is provided to acquaint you with the cassette so that installation, operation and maintenance can proceed successfully. Ultimate satisfaction depends on the quality of installation and a thorough understanding of this equipment. The PPSR and PPSC-Series is built around tested engineering principles and has passed a thorough inspection for quality of workmanship and function.

Components

Desiccant Rotor

The desiccant rotor is a high capacity desiccant media captivated in a perimeter band with radial spokes. The spokes attach to a central hub with integral sealed ball bearings. The sealed bearings ride on a solid center shaft with spacer plates attached to the cassette structure with shoulder screws.

Desiccants

Rotor Source also offers alternate capacity dessicants: PPS–standard silica gel, PPH–hygenic silica gel, PPM–Molecular sieve, PPX–high capacity silica gel

Rotor Drive System

Drive systems vary by size, see the parts illustrations located in the back of the manual for the specific type.

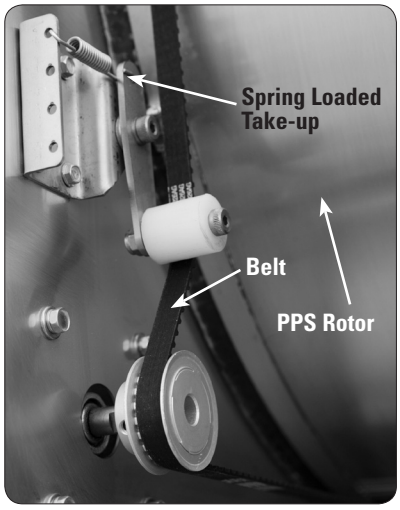
100MM and 200-R1 Belt Drive

Smaller cassettes use a timing pulley and belt and are driven by a fractional HP gearmotor. A pivot arm type spring loaded take-up ensures that the belt is sufficiently tensioned to engage the drive cleats around the perimeter of the desiccant rotor.

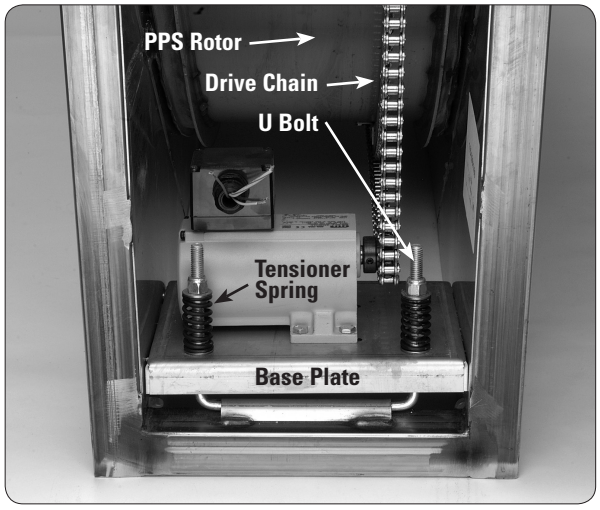
200MM Chain Drive

On larger cassettes, a #40 roller chain and drive sprocket is driven by a fractional HP gearmotor. The gearmotor is mounted to a pivoting, spring loaded plate. The motor/plate assembly maintains tension on the roller chain to ensure proper engagement to the perimeter sprocket on the desiccant rotor.

100 MM Belt Drive



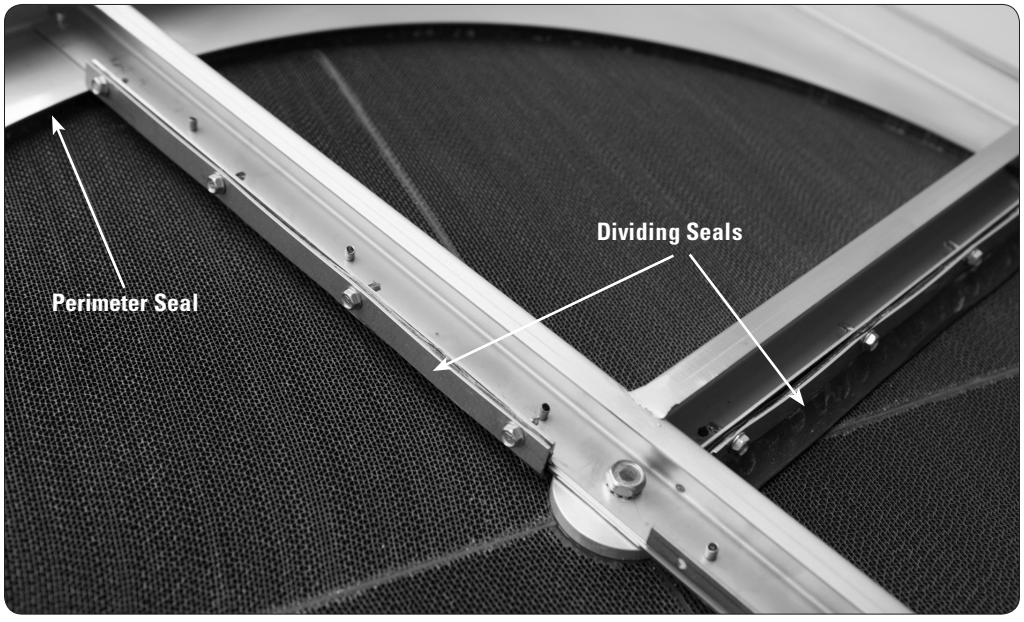
200 MM Chain Drive



Air Seals

Rotor seals are made of high temperature Viton rubber designed to provide a long service life. The seals are intended to seal the perimeter of the rotor on both flanges and dividing seals contact the face of the desiccant media to seal between the process and reactivation areas. Inspect the condition of the seals to ensure a positive seal between the rotor faces and metallic frame structure.

Perimeter and Dividing Seals



SPECIFICATIONS

Desiccant Rotor and Cassette Specifications

Desiccant Rotor shall be provided by Rotor Source, Inc. and shall conform to the following specifications:

Media shall be uniform in nature, comprised of corrugated fiberglass with an "in situation" formed silica gel desiccant. Corrugations shall be 0.059" tall by 0.118" wide, with a wall thickness of 0.007" ± 0.001". Media shall be nominally 12 lb per cubic foot with "dry" (reactivated) desiccant concentration of not less than 80% of the total media mass. Not more than 4% of the media, including face coat, shall be of an organic material. Rotor media is rated for continuous service between –100 FDB and + 320 FDB. Media must withstand temperatures to 2000 FDB without mechanical failure. Rotor media shall be independently tested in accordance with ASHRAE guidelines for performance and independently tested in accordance with ASTM E-84 for flame resistance and smoke production. ASTM E-84 result must be 0/0 for both flame and smoke rounded indexes. Independent test results must be furnished by the manufacturer upon request.

Rotor Frame shall be comprised of thick wall "DOM" carbon steel tubing (stainless steel alternate), with welded 10 gage spokes and welded internal 10 gage media retention strips (stainless steel alternate). Spoke ends shall terminate with welded heavy duty coupling nuts for bolt attachment of outer rim. Outer rim shall be manufactured from not less than 14 gage 304 stainless steel. When applicable, 14 gage minimum type 304stainless steel flanges shall be stitch welded to the outer rim on 4" centers. Flanges shall be additionally sealed to the outer rim using 400 FDB rated silicone sealant. Rotor Frame shall include non-maintenance sealed bearings rated for 200,000 hours continuous duty.

Rotor Perimeter shall be equipped with a carbon steel continuous perimeter sprocket (stainless steel alternate), rated for 87,600 hours of continuous use, and compatible with the specified drive system.

Desiccant Rotor Cassette shall be provided by Rotor Source, Inc. and shall conform to the following specifications:

Cassette Frame shall be manufactured from welded 304 stainless steel tubing. All welds shall be reasonably ground and dressed for appearance. Structural welds shall be continuous and non-structural welds shall be on 4" centers. Cassette face panels shall be 304 stainless steel and welded in place. Cassette motor drive base plate shall be of 304 stainless steel and shall attached to the cassette via a bolted ½" shaft. Rotor shaft shall be manufactured from 4140 Cold Rolled steel (stainless steel alternate) and shall be bolted to the cassette via oversized Allen head socket type shoulder screws. Rotor movement on the drive shaft shall be prevented by the use of two (2) machined anti rotation plates, which shall additionally prevent the rotor shaft from turning.

Specifications Continued

Rotor Seals shall be of "twin contact" design and manufactured from Viton material. Seals shall be rated for 87,600 hours of continuous use. Seals shall not require adjustment during their operable lifetime, or rotor removal for replacement.

Rotor Drive shall include a parallel shaft gear reducer with hardened steel gears and drive motor suitable for both 50 and 60 hz operation. Motor to be TEFC type rated IP 54 minimum. Cast aluminum motor gear case shall be permanently lubricated. Gear Reducer drive shall be equipped with a #40 chain hardened carbon steel ANSI drive sprocket (stainless steel alternate), nickel plated corrosion resistant drive chain and spring type automatic chain tensioning device. Automatic tensioner shall have manual backup. Drive Base Plate shall be stainless steel.

100 mm drive shall incorporate a timing belt which engages teeth formed within the perimeter seal retainer and driven by a self contained gear motor with appropriate timing pulley for proper rotational speed. Belt tension shall be accomplished by a self adjusting spring loaded tensioner.

INSTALLATION

Location

Dehumidification rotors should be located in cassettes similar to those provided by Rotor Source, Inc. Customer manufactured cassettes should securely support the rotor, minimize rotor movement (other than rotational) along the shaft, drive the rotor with minimum force exerted on the outer band of the rotor, and should provide for sealing in between process and reactivation air streams. Contact the factory at the cover address with questions or comments on rotor cassette construction. Note- rotors should be equipped with thrust type bearings if designed for horizontal mounting. Contact the factory at the cover address if the rotor is to be mounted in the horizontal position.

Rotor Source Dehumidification rotor cassettes may be located within a customer supplied air handler, within a ducted system or machinery room, or as a "stand alone" component with the proper exterior covers, insulation and weatherproofing. Cassette location should ensure that the dehumidification rotor and drive are protected from the elements or a direct impingement stream from cooling coil or humidifier, and should include sufficient structure to adequately support the cassette from distorting during transit or operation. Note- cassettes should be equipped with thrust type bearings for horizontal mounting. Contact the factory at the cover address if the cassette is to be mounted in the horizontal position.

Attachment to or within the Air Handler

Dehumidification Cassettes should be securely mounted in the customer supplied air handler as specified in location, above. Mounting may be by bolting, riveting, screwing or welding. Internal partition attachments to the cassette face may also be by bolting, riveting, screwing or welding. Note that the cassette must be installed with care: when drilling, exercise caution not to damage rotor seals, rotor face or rotating parts. When welding, ensure that seals and rotating parts are protected from the heat of welding. Weld in locations away from seals and moving parts. Cassette structure should be insulated to prevent condensation on the metal surfaces of the cassette. Access doors should be provided to allow for cassette and drive maintenance, as well as rotor removal. ***Note - partitions must not block rotor shaft bolts.*** All attachment within the customer supplied air handler should be additionally sealed to prevent loss of dry air from the process air stream or leakage of moist air from the reactivation air stream. Attachment should result in the cassette mounted without distortion of the frame of the cassette. Cassette faces on all six (6) "planes" should be square within 1/16 inch, such that the gap between the rotor and the cassette faces are equal to within 1/8" at all points around both faces of the rotor and cassette. Distortion of the cassette from improper mounting may result in substantially unequal clearance between the rotor face and the cassette. This can cause excessive drive torque requirement (reducing the life of the drive), uneven seal wear and reduced seal or media life.

Ducting to Rotor and Cassette

All ducting used within customer supplied air handlers or to the cassette as a stand alone component should be vapor tight, insulated, and should be sealed using silicone or alternate silicone free sealant. Ducting may be attached by bolting, riveting, screwing or welding. Note that the ducting must be installed with care: when drilling, exercise caution not to damage

rotor seals, rotor face or rotating parts. When welding, ensure that seals and rotating parts are protected from the heat of welding. Weld in locations away from seals and moving parts. Cassette structure should be insulated to prevent condensation on the metal surfaces of the cassette. Access doors should be provided to allow for cassette and drive maintenance, as well as rotor removal. ***Note-installed ducting must not block rotor shaft bolts.*** All attachment to the cassette should be additionally sealed to prevent loss of dry air from the process air stream or leakage of moist air from the reactivation air stream. Attachment should result in the cassette mounted without distortion of the frame of the cassette. Cassette faces on all six (6) "planes" should be square within 1/16 inch, such that the gap between the rotor and the cassette face is equal to within 1/8".

Cassette Wiring Diagrams

Rotor Source dehumidification cassettes use gear motors as per the parts information. Wiring diagrams are affixed to the cassette panel adjacent to the gear motor.

Installation Guidelines

PPSC-Series cassettes are designed to be located within a customer supplied air handler.

Cassette installation should ensure that the rotor and drive are protected from the elements and includes sufficient structure to adequately support the cassette frame from distorting during transport and operation.

Access doors should be provided to allow for cassette and drive maintenance, as well as rotor removal. At a minimum, the full height of the drive end of the cassette must be accessible for maintenance and service.

Provide clearance to adjacent walls or equipment to provide a minimum of one rotor diameter from the opening of cassette frame.

Reactivation duct attachment points to the cassette should be positioned not to block access to the center shaft support area (shaft bolts) of the frame. Verify heat source (gas and electric) is a minimum of 1 rotor diameter (or 24") from face of rotor. Steam or hot water coils can be located in closer proximity to the rotor as long as adequate air distribution is available.

Cassette attachment within an air handler may be by bolting, riveting, screwing or welding. Internal partition attachments to the cassette face may also be by bolting, riveting, screwing or welding. Note that the cassette must be installed with care: when drilling, exercise caution not to damage rotor seals, rotor face or rotating parts. When welding, ensure that seals and rotating parts are protected from the heat of welding. Weld in locations away from seals and moving parts. All attachments within the air handler should be additionally sealed to prevent leakage between the air streams. Attachment should result in the cassette mounted without distortion of the frame of the cassette. Cassette faces on all six (6) "planes" should be square within 1/16 inch, such that the gap between the rotor and the cassette faces are equal to within 1/8" at all points around both faces of the rotor and cassette. Distortion of the cassette

from improper mounting may result in substantially unequal clearance between the rotor face and the cassette. This can cause excessive drive torque requirements, causing wear to drive components, seals, and rotor.

Note: Adjustment of the rotor position may be required at installation and checked at start-up to ensure that the rotor face is parallel to the cassette frame and face panels. See Dehumidification Operation, Maintenance, and Repair.

OPERATION

Start-up Procedure Check List

This start-up procedure is provided to assist in proper commissioning of Rotor Source dehumidification cassettes.

Inspection

Cassette mounted securely and sealed between adjacent air streams _____

Access to drive system and center support shaft/bolts _____

Rotor centered within cassette frame _____

Seals contact perimeter and face of rotor _____

Drive motor and pulley/sprocket secure _____

Drive belt/chain properly tensioned _____

Verify proper supply voltage to motor _____

Start-up

Proper rotor direction of rotation _____

Proper set up of drive motor controller (VFD if applicable) _____

Establish design airflow through process and react air streams _____

Proper operation of system controls (react controls/limits) _____

Re-check drive belt/chain tension and adjust as necessary _____

**Refer to Dehumidification Cassette Installation Guidelines and Operation-Maintenance-Repair Manual for additional information*

OPERATION

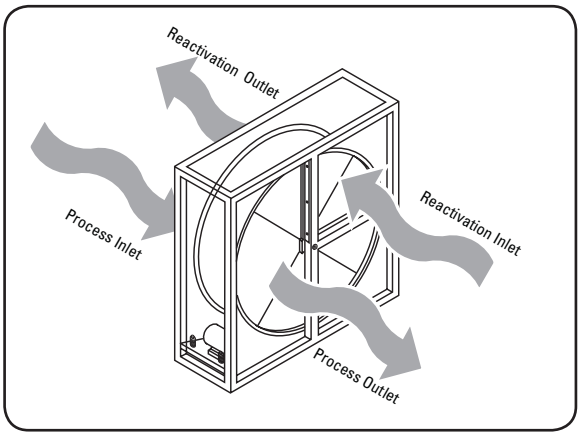
Start Up and Limits

Start up consists of having both the proper balanced flow and temperature through both process and reactivation air streams, as well as rotation of the wheel. At start up, all standard inspections (see inspections) should be performed to ensure the cassette is operating properly. Of particular importance is the alignment of the rotor in the cassette, and drive system operation. Maximum Limits are 350 FDB Operating Temperature/Recommended Safety Set Point and 1500 FPM velocity.

Flow

Air volume flow (Standard 75% dry air flow and 25% reactivation air flow is shown) are for two (2) air streams in counter-flow directions. Contact the factory at the cover address for co-current flow operation.

Flow Diagram



In the above diagram, "Process" flow passes through the unit, where the desiccant media structure removes moisture to dry the air stream. Simultaneously, heated reactivation airflow drives moisture from the desiccant media structure, where it is subsequently exhausted to an ambient location. The unit's drive system rotates the wheel at the pre-determined speed to provide for a continuous process. Seals located around the perimeter of the rotor face and between the process and reactivation air streams seal the unit to ensure that the dried process air and moisture laden reactivation air remain separated.

Drive System Operation

The drive system operates as follows: With power applied, the gearmotor rotates the drive sprocket (pulley) which rotates the drive chain (belt). The drive chain (belt) engages the rotor perimeter sprocket (belt teeth) providing rotation.

Measurement of Performance

Refer to the Principle Of Operation schematic below for location of readings. At each of the following locations, perform measurement of Dry Bulb Temperature, Dew Point and Air Volume flow:

1. Entering Process Inlet, Leaving Process Outlet

2. Entering Reactivation Inlet, Leaving Reactivation Outlet

Additionally, measure dry bulb temperature at the reactivation heater outlet, and time rotor speed of rotation. Lastly, measure process and reactivation air pressure drop and drive motor amperage.

Compare all measurements against the DSELECT software program results. Results should agree within a few percent (likely measurement error) of graph and software performance readings. In the event of substantial (>5%) difference between measured and predicted results, re perform measurements. Note that common measurement and calculation errors are:

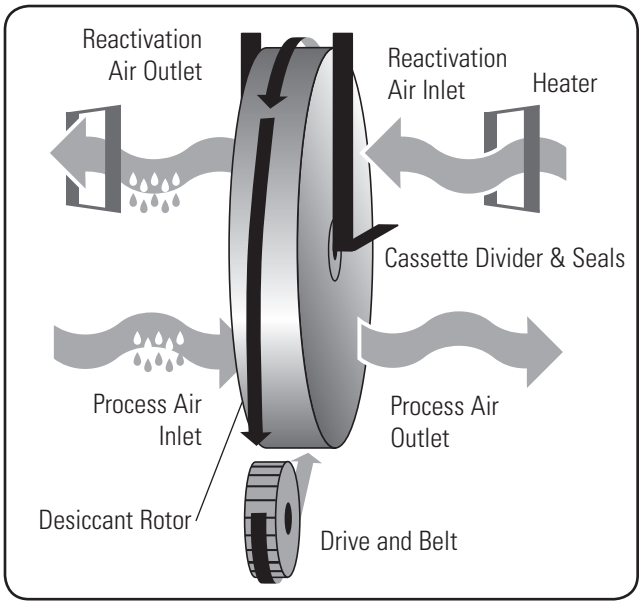
1. Process Leaving dew point is inaccurately determined by measuring wet bulb (or RH) and calculating dew point. In many cases, the leaving process air is so dry that even slight measurement errors in dew point (or RH) will have significant results. If possible use a chilled mirror dew point sensor for all dew point readings.

2. Turbulence in air streams causes variance in all readings. Take an average reading in a transverse across the face of the rotor in order to minimize variance due to turbulence.

3. Heat and mass transferred do not balance. The amount of heat gain in BTUH on the process side must match the heat loss in BTUH on the reactivation side. Also, the amount of moisture removed on the process side must match the amount of moisture gained on the reactivation side.

If mass and heat transfer do balance, it is likely that the readings obtained are correct. Refer to the troubleshooting section of this manual for additional actions.

Principle of Operation



Troubleshooting

In the event that a mass and heat balance was achieved following the measurement procedure on page 5, and performance still does not match (is > 5% difference) graph and software predictions, follow the chart below to determine and correct the cause.

Observed Trouble	Inspection	Corrective Action
Rotor Does Not Turn	Power Not On	Energize
	Check Rotor Free to Rotate	Determine Cause From Other Inspection
	Check Drive Motor Operational	Replace Drive Motor/Check Wiring & Capacitor
	Check Seal Clearance	Check Rotor Alignment/Seal Position
	Check Bearings Free to Rotate	Replace Bearings
	Check Rotor Perimeter Sprocket Engagement	Adjust or Replace
	Check Drive Tension Spring Adjustment	Adjust Tension Spring
Rotor Turns, But Drying Performance Is Poor	Perform Measurement of Performance	Determine Cause From Other Inspection
	Check Seal Clearance	Adjust or Replace seals
	Perform Plug Sample	Send Plug to Factory
	Bad result plug sample	Replace Rotor As Necessary
High Process Outlet Temperature	Check Seal Clearance	Check Rotor Alignment/Seal Position
	Check Rotor Speed	Contact Factory
Low Reactivation Outlet Temperature	Check Seal Clearance	Check Rotor Alignment/Seal Position
	Check Rotor Speed	Contact Factory
	Check Heated Temperature	Adjust to Setpoint

For trouble not covered by the chart above, contact the factory at the cover address.

Motor Troubleshooting

Variable frequency drives

For gear motors operated by variable frequency drives, we suggest that the drive be bypassed and the motors be operated on line voltage. This will verify that the gear motor, not the frequency drive is at fault.

Caution: Operation of VFD's on TENV motors below 10 hz can cause permanent damage to windings. Do not operate below 10hz.

Short or overload trips

Verify trip limit of variable frequency drives are set at the motor nameplate rating at a minimum (up to 1.25 x nameplate) to prevent nuisance trips upon starting.

Shorts or intermittent trips may occur if water enters the junction box of the motor. This may be caused by conduit running from the control enclosure (exposed to ambient or high humidity) through a cold air stream to the motor junction box. The resulting condensation can build to a point where it causes a temporary short or in some cases corrosion and failure of the motor. Damage from water exposure cannot be covered as warranty. Should the conduit need to be located in such an area, it is recommended that the conduit be internally sealed at the control enclosure and also at the motor junction box.

Please contact Rotor Source with questions or for troubleshooting assistance.

MAINTENANCE, SERVICE AND REPAIR

Routine Maintenance and Inspection

The desiccant rotor and cassette require little in the way of routine maintenance. Periodic inspections are required. Following the schedule below should result in years of trouble free operation.

Routine Maintenance Schedule

Frequency	Maintenance Item
At Start Up	Inspect Rotor Face, Seals & Drive
After 1 week	Inspect Rotor Face, Seals & Drive
Twice Yearly (1st Year)	Inspect Rotor Face, Seals & Drive
Once Yearly	Inspect Rotor Face, Seals & Drive
Pressure Drop >1.25 x New	Clean Rotor
Performance < 95% of New	Perform Measurement of Performance and Troubleshoot

Rotor Inspection

Carefully inspect the face of the desiccant rotor for signs of discoloration, damage, or clogging from contamination. Normally the desiccant media will be a medium gray color. Through use, some normal contamination build-up occurs, and the coloration will change to brown. If the face has a pink coloration, this would indicate that the face has been exposed to excessive temperatures (425° F or higher). If the rotor face has been damaged, the damaged areas will show up as light tan spots. Contact Rotor Source if overheating or damage is found.

Occasionally some minor separations will occur within the desiccant media. *These separations are strictly cosmetic and will not adversely affect performance*. If separations are found, verify that the desiccant media is still secure within the rotor framework by pressing lightly on the media face. No movement should occur. To repair the cosmetic separations, simply fill with 100% RTV and remove excess. See “Rotor Cleaning” and “Rotor Repair Procedures”.

Seal Inspection

Rotor seals are made of high temperature Viton rubber designed to provide a long service life. The seals are intended to seal the perimeter of the rotor on both flanges and dividing seals contact the face of the desiccant media to seal between the process and reactivation areas. Inspect the condition of the seals to ensure a positive seal between the rotor faces and metallic frame structure. The seals should be pliable, intact and should lightly contact the flanges and face of the desiccant media. A small amount of black residue from the seals will occur after extended use and is normal. If large amounts of residue are evident, closely inspect the seals for excessive wear, especially the dividing seals between process and reactivation. If excessive wear is evident, the seals should be scheduled for replacement at the next service interval. Also inspect to ensure a good seal exists between the metallic structure of the cassette and interconnecting ductwork. Any significant leakage in these areas affects overall performance and should be sealed.

Drive Inspection

The drive system supplied on the dehumidification cassettes is designed for long life and minimal maintenance. The rotor drive system is the most critical component in the dehumidification cassette. Damaged media and seals will still allow for some moisture removal, however if the drive system is not properly maintained and fails, the desiccant media will not longer remove moisture.

Inspect the condition of the drive sprockets and perimeter sprockets, as well as alignment between the two sprockets. Check to ensure the sprockets are secure to the motor shaft and rotor. Rotation should be smooth with no binding of the chain.

Proper chain tension is established by the compressed height of the springs on the motor mounting plate (See Drive Spring Compressed Height). Too little tension will result in the chain slipping on the drive sprocket. If this occurs, significant wear will be evident on the teeth of the motor sprocket. Too much tension will damage the outboard bearing of the gearmotor.

Rotor Cleaning

Periodically, the rotor may need cleaning from accumulated dust and debris. Generally, air handlers are equipped with air pressure drop monitoring devices, which indicate pressure drop through the rotor. If the air pressure drop exceeds 125% of the "new" pressure drop (with the correct airflow measured), the rotor should be cleaned by the following methods:

1. Preferred Method - With the air handler secured, clean & dry 100 psi air should be directed into the rotor (as per the picture below) while personnel simultaneously vacuum the opposite side of the rotor to catch dust and debris. A standard shop vacuum, equipped with a rubber hose adapter is typical. The air nozzle admitting the 100 PSI air should never come closer than 1" to the face of the rotor. Be careful not to damage the rotor face with extreme air pressure or with the metal body of the air nozzle. Clean thoroughly until residue no longer comes from rotor. Appropriate confined space entry requirements (as applicable) should be observed when entering the air handler.

2. Water Wash Method - The rotor may be removed from the cassette and washed with non alkaline water. Essentially, the rotor is "dipped" into a suitable tank, and the water allowed to drain from the rotor. Subsequently, the rotor should be dried using 600 feet per minute velocity 200 degree (Fahrenheit) air until dry. Since wash water impurities may contaminate the desiccant surface of the rotor, and frequently a suitable drying oven is not available, this method is not recommended. Contact the factory for additional discussion prior to cleaning the rotor by this method.

Rotor Alignment

Desiccant dehumidification cassettes are shipped fully assembled from Rotor Source, including dehumidification rotor, seals and drive system. The rotor and drive system are carefully aligned within the cassette frame. The rotor is supported by a central shaft and shaft bolts which pass through a clearance hole in the vertical center support member of the cassette frame. Alignment of the rotor is maintained by the rotor shaft position (vertical and horizontal) within the cassette. This position may be adjusted by loosening the shaft bolts, aligning the rotor to its desired position within the cassette frame, and re-tightening the shaft bolts. Small wooden wedges, inserted between the rotor perimeter and rotor seal are sufficient to align the rotor to the desired position.

Should rotor or sprocket misalignment be evident in the field as a result of transport, the following procedures apply to troubleshooting and correcting the alignment. Please note that this rotor alignment must be correct prior to attempting any adjustment to the factory location of the perimeter sprocket mounted on the outer band of the dehumidification rotor.

1. Verify that the rotor is improperly aligned within the framework by checking the gap in-between the rotor flange and cassette panels where the perimeter seals are attached. Misalignment will be evidenced by a smaller gap at one edge of the rotor from the other. This may be witnessed in a vertical or horizontal plane.

2. Operate the drive system and verify the gap is consistent during rotation. If the gap is consistent, misalignment is the cause. If the gap changes during rotation, it may be run out of the rotor around the central axis or a run out of the perimeter flange of the rotor.

3. Correct the misalignment by loosening the center shaft bolts and adjusting the rotor position. Small wooden wedges, inserted between the rotor perimeter and rotor seal are sufficient to align the rotor to the desired position. Position the rotor such that equal gaps exist between the rotor flange and cassette panels. After adjustment, operate the drive to ensure that the gap is consistent during rotation.

4. If run out is evident (change of gap spacing during rotation) verify if the rotor band or flange is causing the variation. The band position would indicate the amount of run out, the flange position can be adjusted perpendicular to the band manually with a slotted tool, at the thickness and width of the flange.

If an adjustment is made in the position of the rotor within the frame, the location/alignment of the perimeter sprocket must be checked in relationship to the cassette panels and drive sprocket. If adjustment is necessary, the following procedures apply:

1. Operate the drive system and check the position of the perimeter sprocket in relationship to the drive sprocket and a fixed spot on the cassette frame. The perimeter sprocket should track with a consistent gap between the frame. To adjust position, it will be necessary to loosen or possibly remove the attachment screws holding the sprocket to the rotor band.

2. Move the perimeter sprocket left or right as required to establish the proper gap and re-secure with the attachment screws. Repeat this process as required to establish a consistent gap and alignment with the drive sprocket. A minimum of three or four attachment screws per bracket are required to properly secure the sprocket. If only two attachment screws have been used, additional screws must be installed to prevent rotation of the sprocket around it's centerline.

Upon completion of the perimeter sprocket alignment, the drive chain and sprocket engagements should be smooth with consistent vertical chain alignment. Some vibration of the rotor may be evident from friction generated by the perimeter seals. This should be mild and will not affect the operation of the drive system.

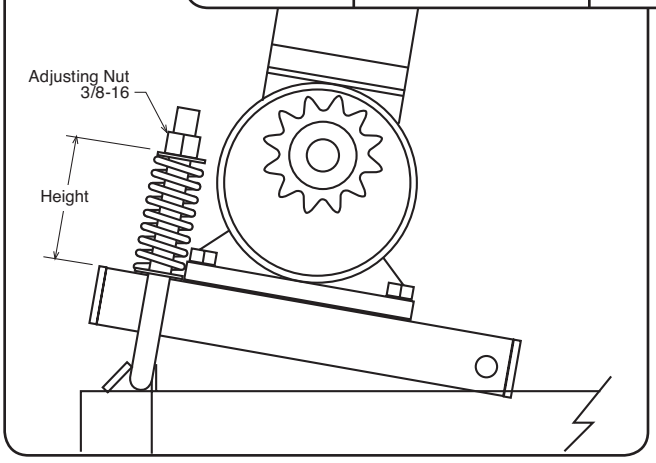
The dividing seals separating the reactivation area should also be checked to ensure proper contact with the face of the rotor. Normally the gap between the rotor face and seal mounting angle should be approximately 3/4".

Chain Drive Adjustment

Compression springs are used to properly tension drive system. The resulting compressed heights allow for more than sufficient tension on the chain without exceeding the motor overhung load capacity. Two springs are used in the drive assembly. During assembly of the cassette drive system, spring height is to be set at the values shown in the table below. If performing service activity on cassettes, the compressed height values should also be checked. When making adjustments, the spring nearest the drive sprocket should always be tightened first to prevent twisting of the motor plate. Should a twist occur in the motor plate from compressing the springs, the spring furthest from the drive sprocket may be relaxed slightly to eliminate the twist.

Drive Spring Compressed Height*

Height	Spring Diameter	Motor	Cassette Models
1 7/8"	7/8"	BGLM12-240SC1C	PPSC-550 Through 1070
1 3/4"	7/8"	BGLM15-240SD1C	PPSC-1220 Through 1525
1 5/8"	7/8"	BGLM18-240SE1C	PPSC-1730 Through 2190
2"	1 1/4"	BGLM18-240SE1C	PPSC-2438 Through 3050



*Drive spring compressed height (minimum) includes overall height of spring and retainers

Over compressing spring may result in premature motor failure

2 springs per assembly

Rotor Repair

Small gaps and imperfections can be repaired in the field. For damaged or severely contaminated media, the rotor can be sent to Rotor Source for repair or complete media replacement as required.

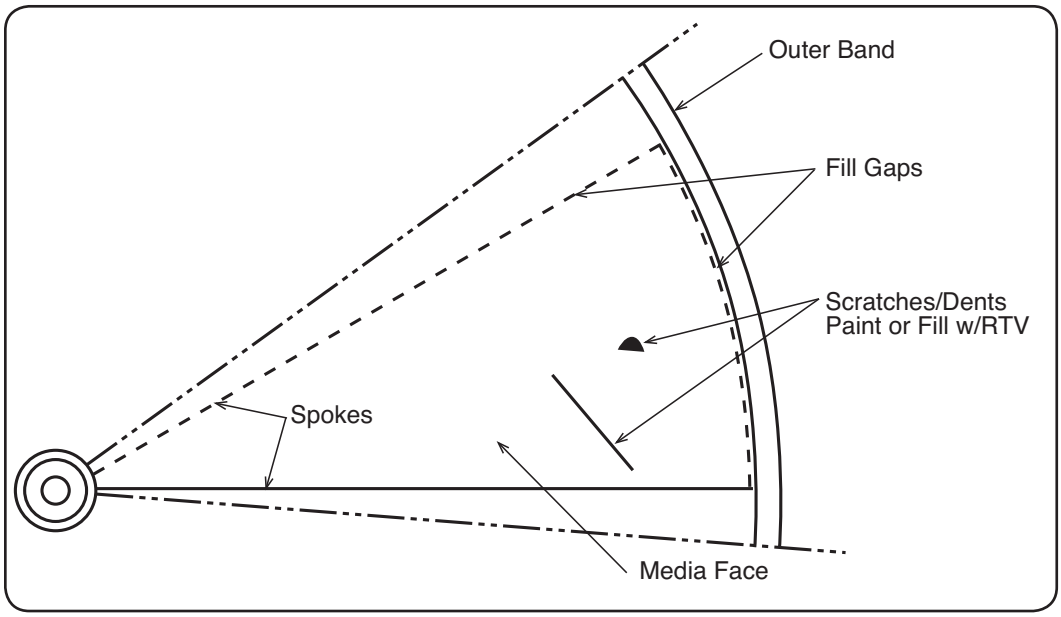
Media shrinkage, separation, gaps at spokes or perimeter band

All gaps can be filled with clear Silicone RTV adhesive. Adhesives such as Dow 734 or GE 118 with minimum 350-400°F temperature rating are recommended. To fill gaps, carefully apply RTV adhesive into gaps and remove excess with a putty knife or similar object so that the finished surface is flush with the media face.

Small dents or imperfections in the media face

Small dents or scratches in the media face can be repaired one of two ways. For very small spots, application of a special urethane face coating available from Rotor Source will cover light areas and re-harden the face of the media. Allow to dry overnight. For deeper scratches or dents, RTV adhesive may be applied to the effected area. Remove excess with a putty knife or similar object so that the finished surface is flush with the media. Allow to dry overnight. Grey RTV will better hide the repair area than clear RTV.

Small Dent and Scratch Repair

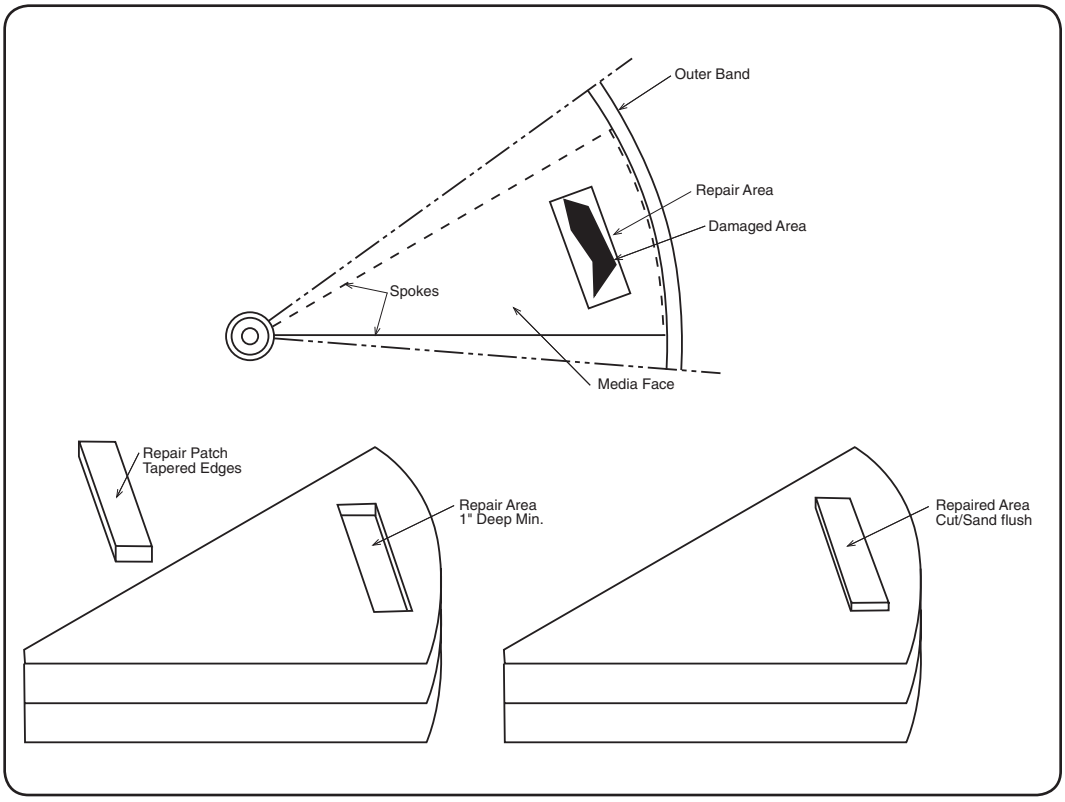


Large dents or damaged areas

For repair of large damaged areas, it will be necessary to remove the affected area and replace the media with a "plug" or "patch" (Contact Rotor Source for repair media).

Remove the effected area with a router and cutting bit to a depth of at least 1". Blow excess dust from the repair area using compressed air. Carefully fit a new section of media to the cut-out area, tapering the sides slightly so that a force fit is required. Apply RTV adhesive to the perimeter of the routed area, as well as a bead in the routed face approximately every 3-4". Carefully press the patch into place using a small block of wood and a hammer. Tap the patch until it bottoms out in the repaired area. Using a drywall saw or similar tool, carefully cut the patch height to protrude slightly above the face of the media. Using a sanding block with medium grit drywall screen, carefully sand the patch flush with the face of the original media. Blow excess dust from the repaired area and coat with Acrylic Urethane paint available from Rotor Source. The paint may be applied by spraying or a brush. If a brush is used to paint the effected area, blow the flutes clean with compressed air. Allow to dry overnight.

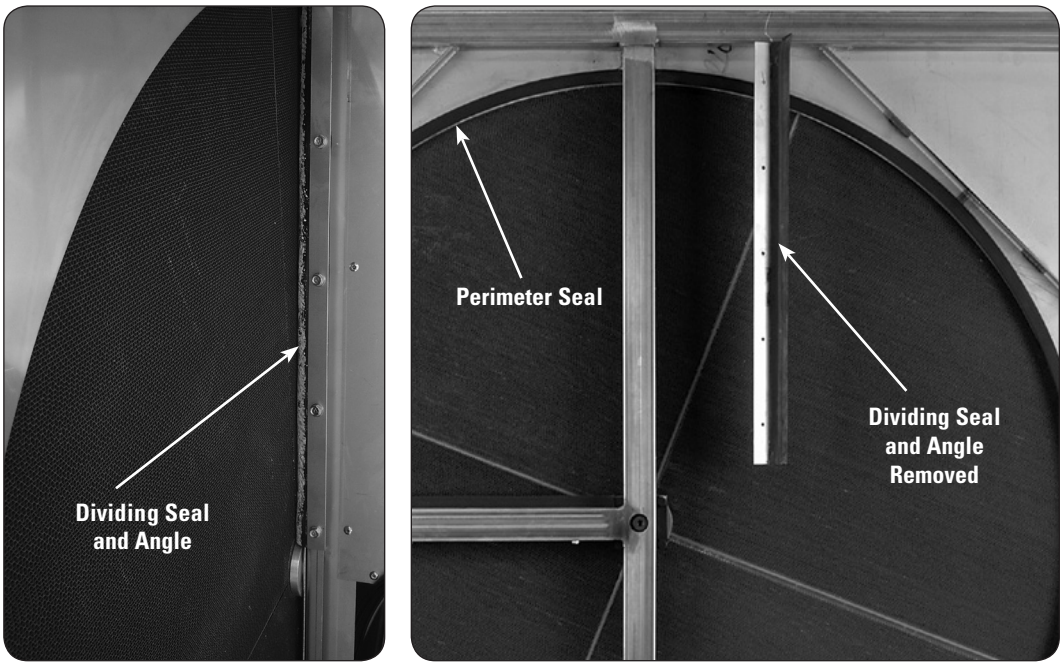
Large Damage Repair



Replacing Seals

Air seals are attached with RTV silicone adhesive. Dividing seals are attached to metal angles which can be removed from the cassette without removing the rotor. Simply remove the sheet metal screws attaching the seal angle and remove from the cassette. The rotor will need to be removed to replace the perimeter seals. Remove the desiccant rotor (See Rotor Removal) and pull the perimeter seal from the cassette panels. Clean up any residual adhesive from the cassette panels. Lay out the new seal, cut one end square and apply a bead of RTV (1/8"-3/16" diameter) into the small groove in the seal. Press the groove over the sheet metal edge of the cassette panel and press into place. Continue working around the perimeter of the sheet metal until the seal joins together. Trim the seal at a 45° angle with approximately 1/2" overlap on the fingers. Note the seal angle removed and shown for clarity on the photo below.

Perimeter and Dividing Seals



Rotor Removal and Replacement

1. Secure the air handler and observe applicable safety precautions regarding confined space entry and electrical tag out.

2. Determine if the rotor will be removed from the drive side of the cassette (requires drive system removal) or the opposite side of the cassette. If the rotor is to be removed from the drive side of the cassette, disassemble the drive system, referring to the photographs on page 5, as follows:

   a. Remove electrical connections for the drive motor.

   b. Unbolt and remove both tension spring adjustment nuts, top and bottom spring retainers and tension springs.

   c. Tilt drive plate up and tilt retention spring U-Bolt under away from the drive plate.

   d. Remove the drive plate pivot shaft by removing the push nut from one (1) end of the drive plate pivot shaft.

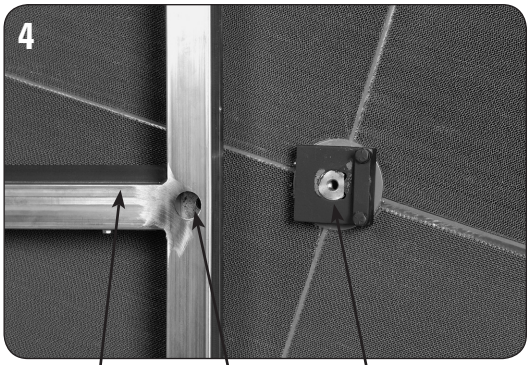
   e. Unwrap chain from gear motor drive sprocket, and pull drive plate and motor out of the unit.

3. Once the drive system is disassembled and removed, or if removing the rotor from the side of the cassette opposite the drive, support the rotor with a ratchet strap of appropriate capacity per the picture #3. Do not over tighten the strap at this time as it is just being used to gently support the rotor.

4. At the center shaft of the rotor, loosen and remove both shaft end bolts. Gently slide the rotor a few inches towards the side it will be removed from (see photo 4). Be sure that the ratchet strap described in 3., previous, is tightened as necessary to support the rotor when removing the shaft end bolts.

3

4

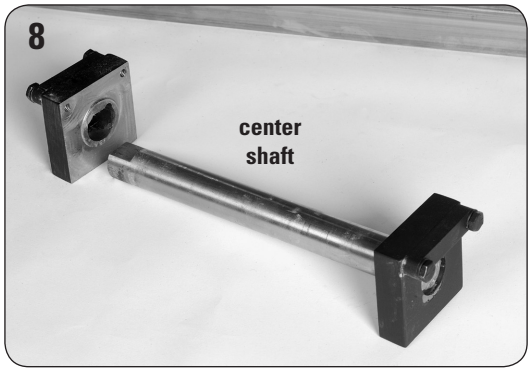


cassette frame center shaft spacer plate

5. Place suitable wooden blocking under the rotor.

6. After removing both shaft end bolts and sliding the rotor a few inches towards the removal side of the cassette, carefully loosen the ratchet strap and allow the rotor to gently slide to the bottom of the cassette, onto the wooden blocking. Slide the shaft and shaft spacer blocks out of the rotor. Disconnect the ratchet strap from around the cassette, and re-route the top of the strap over the rotor, but below the cassette top.

7. Using the strap by holding both ends, gently pull the rotor out of the cassette. Alternatively, the drive chain can be used in lieu of the strap. Be careful not to damage seals or the perimeter sprocket while sliding the rotor out of the cassette. Remove angle mounted seals as necessary.



8. Replace the rotor using the reverse procedure. Again, be sure not to damage seals while sliding the rotor back into the cassette. Reinstall drive as necessary. See "Drive Adjustment" section on page 11.

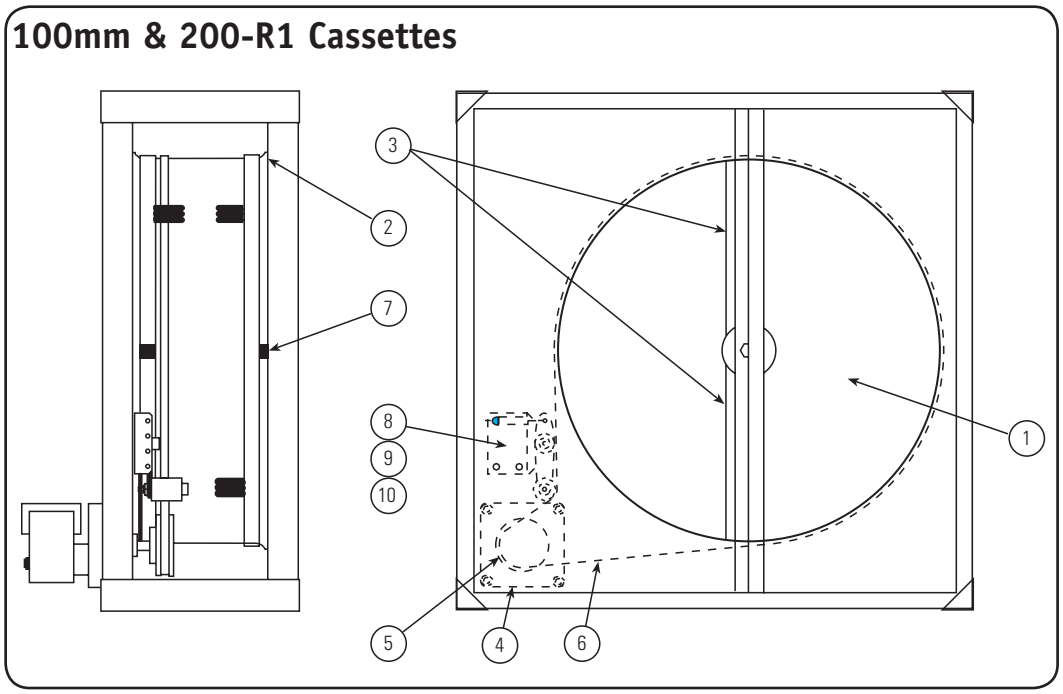
Note construction of the shaft and shaft spacer blocks as shown in photo 8.

Belt Drive Rotor Removal

Rotor removal from belt drive systems is similar. simply remove tensioner and drive motor, remove rotor shaft bolts, and slide rotor from casing. A wooden 2x4 can be used underneath the rotor to support the rotor for shaft bolt removal.

PARTS AND DRAWINGS

Dehumidification Cassette Parts Illustration 100mm & 200-R1 Cassettes



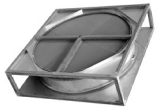
See following page for information about parts labeled above.

Dehumidification Cassette Parts Information

100mm and 200-R1 Cassettes

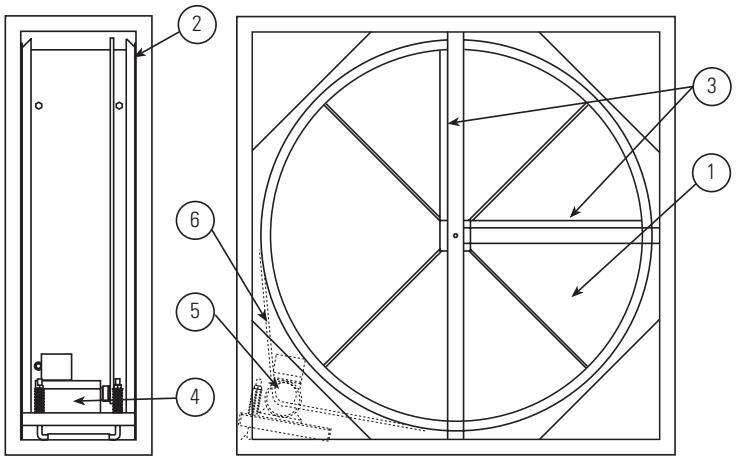
1-Rotor	PPSR-220-100	PPSR-320-100	PPSR-440-100	PPSR-550-100	PPSR-660-100	PPSR-770-100	PPSR-550-200-R1	PPSR-770-200-R1
2-Perimeter Seal	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01
3-Divider Seal, 2ea.	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01	Rotor Source VSS-01
4-Drive Motor	Grainger 2Z805	Grainger 2Z805	Grainger 2Z805	Grainger 6Z906	Grainger 6Z906	Grainger 6Z906	Grainger 6Z906	Grainger 6Z907
5-Drive Pulley	14XL037-6FA4	20XL037-6FA5	28XL037-6FA4	18XL037-6FA5	21XL037-6FA5	24XL037-6FA5	21XL037-6FA5	20XL037-6FA5
6-Drive Belt	320XL037NG	460XL037NG	608XL037NG	736XL037NG	888XL037NG	1020XL037NG	736XL037NG	1020XL037NG
7-Drive Band, 2ea	Rotor Source DB-220	Rotor Source DB-320	Rotor Source DB-440	Rotor Source DB-550	Rotor Source DB-660	Rotor Source DB-770	Rotor Source DB-550	Rotor Source DB-770
8-Tensioner Ass'y	Rotor Source BT-100	Rotor Source BT-100	Rotor Source BT-100	Rotor Source BT-100	Rotor Source BT-100	Rotor Source BT-100	Rotor Source BT-100	Rotor Source BT-100
9-Spring*	McMaster Carr 96605K28	McMaster Carr 96605K28	McMaster Carr 96605K28	McMaster Carr 96605K28	McMaster Carr 96605K28	McMaster Carr 96605K28	McMaster Carr 96605K28	McMaster Carr 96605K28
10-Roller**	McMaster Carr 8625K35	McMaster Carr 8625K35	McMaster Carr 8625K35	McMaster Carr 8625K35	McMaster Carr 8625K35	McMaster Carr 8625K35	McMaster Carr 8625K35	McMaster Carr 8625K35

NOTES: * Springs are shipped in packages of 5 each
** Roller Material is 6' in length. Fabrication required.



Dehumidification Cassette Parts Illustration

200mm & 400mm Cassettes



Dehumidification Cassette Parts Information

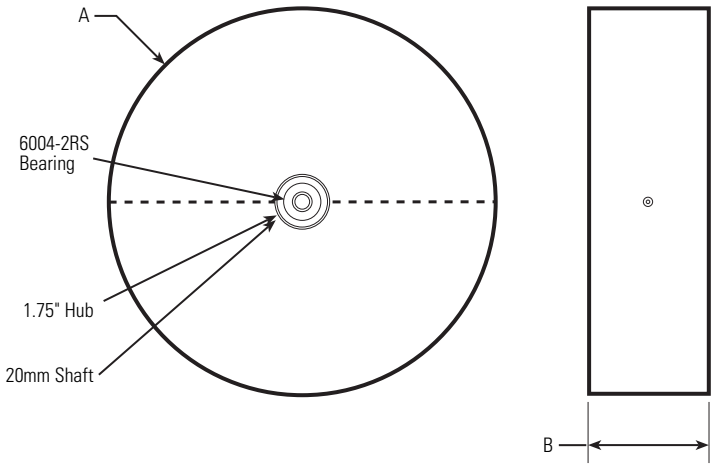
200mm and 400mm Cassettes

1-Rotor	2-Perimeter Seal	3-Divider Seal	4-Drive Motor	5-Drive Sprocket	6-Drive Chain
PPSR-550-200 PPSR-770-200	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM12-240SC1C	W.W. Grainger 6L835	W.W. Grainger 6L073
PPSR-550-400 PPSR-770-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM12-240SC1C	W.W. Grainger 6L835	W.W. Grainger 6L073
PPSR-965-200 PPSR-965-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM12-240SC1C	W.W. Grainger 6L835	W.W. Grainger 6L073
PPSR-1070-200 PPSR-1070-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM12-240SC1C	W.W. Grainger 6L835	W.W. Grainger 6L073
PPSR-1220-200 PPSR-1220-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM15-240SD1C	W.W. Grainger 6L838	W.W. Grainger 6L073
PPSR-1525-200 PPSR-1525-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM15-240SD1C	W.W. Grainger 1L113	W.W. Grainger 6L073
PPSR-1730-200 PPSR-1730-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM18-240SE1C	W.W. Grainger 1L123	W.W. Grainger 6L073
PPSR-1940-200 PPSR-1940-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM18-240SE1C	W.W. Grainger 1L131	W.W. Grainger 6L073
PPSR-2190-200 PPSR-2190-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM18-240SE1C	W.W. Grainger 1L138	W.W. Grainger 6L073
PPSR-2438-200 PPSR-2438-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM18-240SE1C	W.W. Grainger 6L853	W.W. Grainger 6L073
PPSR-2743-200 PPSR-2743-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM18-240SE1C	W.W. Grainger 6L863	W.W. Grainger 6L073
PPSR-2896-200 PPSR-2896-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM18-240SE1C	W.W. Grainger 1L143	W.W. Grainger 6L073
PPSR-3050-200 PPSR-3050-400	Rotor Source VWS-01	Rotor Source VWS-01	Brother BGLM18-240SE1C	W.W. Grainger 6L876	W.W. Grainger 6L073

Dehumidification Rotor General Arrangement

100mm & 200-R1

Rotor Diameter-mm x Depth	220-100	320-100	440-100	550-100	660-100	770-100	550-200	770-200
A (Outer Band Dia.-inches)	8.76	12.69	17.42	21.75	26.08	30.41	21.75	30.41
B (Rotor Depth)	3.937	3.937	3.937	3.937	3.937	3.937	7.874	7.874
No. of Spokes	2	2	2	4	4	4	4	4

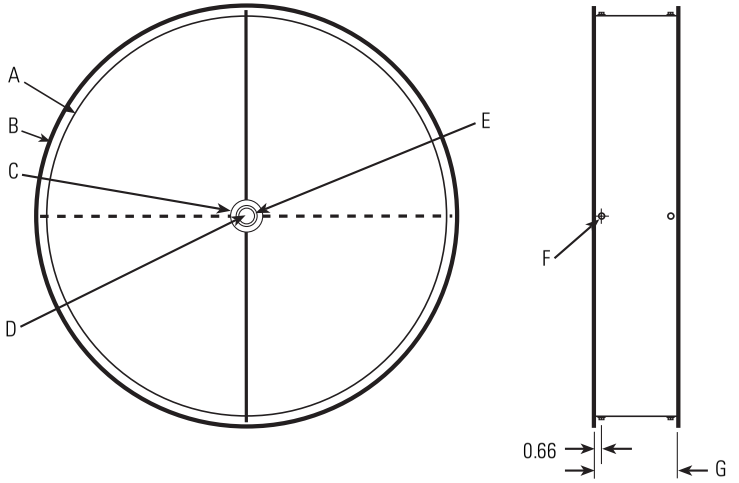


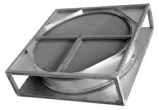
See following page for information about parts labeled above.

Dehumidification Rotor General Arrangement

200mm and 400mm

Rotor Diameter-mm	550	770	965	1070	1220	1525	1730	1940	2190	2438	2743	2896	3050
A (Outer Band Dia. in)	21.65	30.32	37.99	42.13	48.03	60.04	68.11	76.38	86.22	95.98	107.99	114.02	120.08
B (Outer Flange Dia. in.)	23.5	32.16	39.84	43.97	49.88	62.88	70.95	79.22	88.98	98.74	110.75	116.78	122.84
C (Hub Dia.-inches)	1.75	1.75	3	3	3	4	5	5	5	5	5	5	5
D (Shaft Dia.-inches)	.625	.625	1	1	1	1.375	1.772	1.772	1.772	1.772	1.772	1.772	1.772
E (Bearing)	Z99R10	Z99R10	Z99R16	Z99R16	Z99R16	6307-2RS	6309-2RS	6309-2RS	6309-02RS	6309-2RS	6309-2RS	6309-2RS	6309-2RS
F (Bolt Size)	1/4-20	1/4-20	1/4-20	1/4-20	1/4-20	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16
G (200mm Depth)	7.874	7.874	7.874	7.874	7.874	7.874	7.874	7.874	7.874	7.874	7.874	7.874	7.874
G (400mm Depth)	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75
No. of Spokes	4	4	4	4	4	4	8	8	12	12	12	12	12

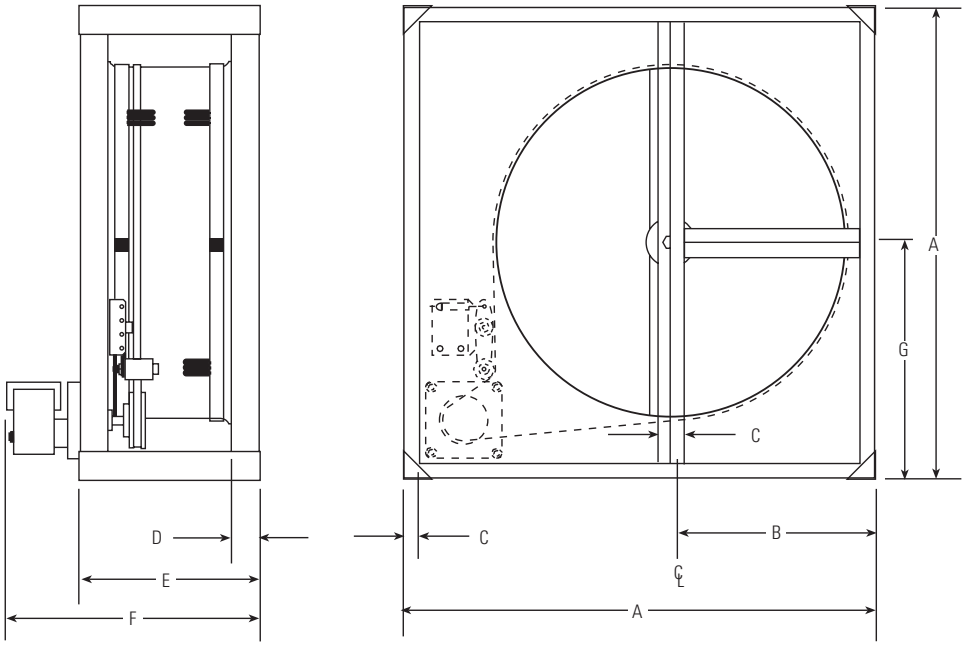




Dehumidification Cassette General Arrangement *Unitized Series*

100mm & 200-R1

Rotor Diameter-mm	220	320	440	550	660	770	550	770
Rotor Depth-mm	100	100	100	100	100	100	200	200
A (inches)	13.5	17	22	26	30	34	26	34
B (inches)	5.75	7.13	9.38	12.13	14.49	16.75	12.13	16.75
C (inches)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
D (inches)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
E (inches)	6.54	6.54	6.54	6.54	6.54	6.54	10.37	10.37
F (inches)	9.13	9.13	9.13	9.13	9.13	9.13	13.62	13.62
G (inches)	n/a	n/a	n/a	n/a	n/a	n/a	13.25	17.25
Process Area (ft2)	.20	.42	.81	1.27	1.83	2.50	1.27	2.50
React. Face Area (ft2)	.20	.42	.81	1.27	1.83	2.50	1.27	2.50

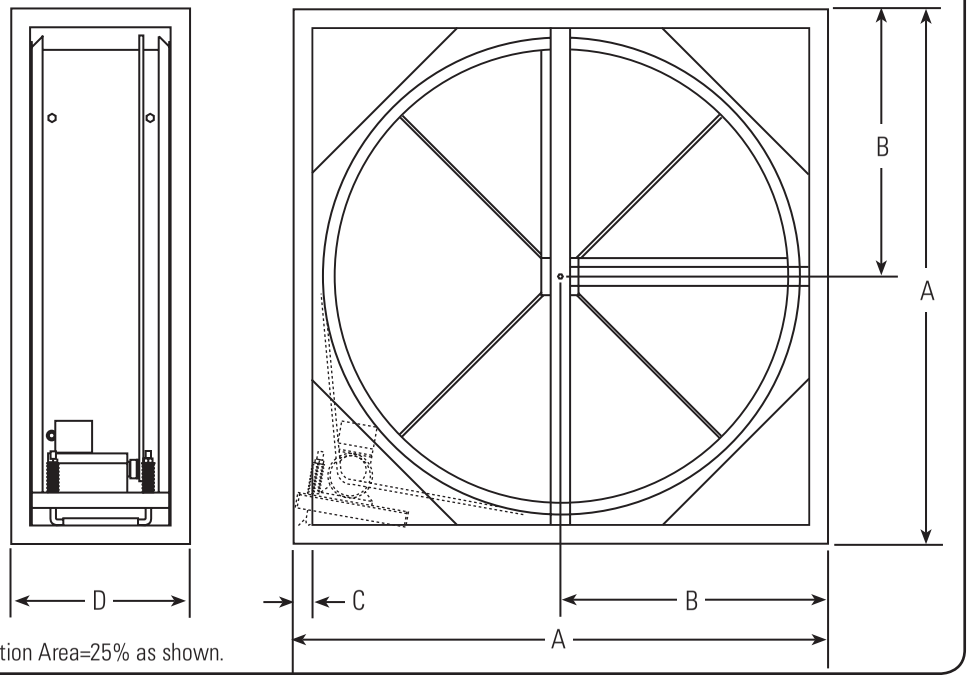


Note: 75/25 Process to Reactivation split available as an option on 550 & 770.

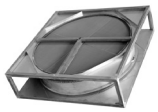
Dehumidification Cassette General Arrangement *Frame Series*

200mm & 400mm

Rotor Diameter-mm	550	770	965	1070	1220	1525	1730	1940	2190	2438	2743	2896	3050
A (inches)	27.2	35.8	43.5	48.1	54	67	76.1	84.4	94.2	106	118	124.1	130.1
B (inches)	13.6	17.9	21.7	24.1	27	33.5	38.1	42.2	47.1	53	59	62	65
C (inches)	1.25	1.25	1.25	1.5	1.5	1.5	2	2	2	3	3	3	3
D 200mm Depth	12	12	12	12.5	12.5	12.5	13.5	13.5	13.5	15.5	15.5	15.5	15.5
D 400mm Depth	19.8	19.8	19.8	20.3	20.3	20.3	21.3	21.3	21.3	23.3	23.3	23.3	23.3
Process Area (ft2)	1.92	3.76	5.90	7.26	9.43	14.74	18.97	23.85	30.39	37.67	47.68	53.18	58.95
React. Face Area (ft2)	.64	1.25	1.97	2.42	3.14	4.91	6.32	7.95	10.13	12.56	15.89	17.73	19.65



Note: Standard Reactivation Area=25% as shown.



ROTORSOURCE

Motor Data

Size	Motor	HP	Voltage	Phase	Frequency	Full Load Amps
220-100	2Z805	1/400	115	1	60	0.4
320-100	2Z805	1/400	115	1	60	0.4
440-100	2Z805	1/400	115	1	60	0.4
550-100	6Z906	1/90	115	1	60	0.8
660-100	6Z906	1/90	115	1	60	0.8
770-100	6Z906	1/90	115	1	60	0.8
550-200-R1	6Z906	1/90	115	1	60	0.8
770-200-R1	6Z907	1/90	115	1	60	0.8
550-200	BGLM12-240SC1C	1/50	115	1	60	0.33
770-200	BGLM12-240SC1C	1/50	115	1	60	0.33
965-200	BGLM12-240SC1C	1/50	115	1	60	0.33
1070-200	BGLM12-240SC1C	1/50	115	1	60	0.33
1220-200	BGLM15-240SD1C	1/30	115	1	60	0.45
1525-200	BGLM15-240SD1C	1/30	115	1	60	0.45
1730-200	BGLM18-240SE1C	1/20	115	1	60	0.62
1940-200	BGLM18-240SE1C	1/20	115	1	60	0.62
2190-200	BGLM18-240SE1C	1/20	115	1	60	0.62
2438-200	BGLM18-240SE1C	1/20	115	1	60	0.62
2743-200	BGLM18-240SE1C	1/20	115	1	60	0.62
2896-200	BGLM18-240SE1C	1/20	115	1	60	0.62
3050-200	BGLM18-240SE1C	1/20	115	1	60	0.62

Weights/Dimensions

Size	Rotor Weight	Cassette Wt	Basic Dim's
220-100	4.4	30	13.5x13.5x9.5
320-100	7.3	35	17x17x9.5
440-100	11.7	40	22x22x9.5
550-100	17.9	45	26x26x9.5
660-100	23.8	50	30x30x9.5
770-100	30.6	55	34x34x9.5
550-200-R1	42	66	26x26x10.38
770-200-R1	74	92	34x34x10.38
550-200	45.3	110	27x27x12
770-200	82.4	180	36x36x12
965-200	120.5	245	43x43x12
1070-200	140.1	305	48x48x12.5
1220-200	170.5	400	54x54x12.5
1525-200	256.0	620	67x67x12.5
1730-200	366.9	795	76x76x13.5
1940-200	435.3	1000	84x84x13.5
2190-200	578.7	1275	94x94x13.5
2438-200	681.8	1530	106x106x15.4
2743-200	819.8	2000	118x118x15.5
2896-200	893.7	2200	124x124x15.5
3050-200	971.2	2475	130x130x15.5

LIMITED WARRANTY

Seller warrants to the original Purchaser of its Desiccant Dehumidification & Energy Recovery Rotors and Cassettes ("Products"), subject to the enclosed exclusions and conditions, that the Products will be free from defects in materials and workmanship as described herein.

Rotor and Cassette metallic structure, including hub, shaft, spokes, perimeter band, cassette sheet metal and tubing structures (as applicable) are warranted for a period of sixty (60) months from the date of shipment, and are specifically warranted, in addition to being free of defects in material and workmanship, for the following:

1. Structures including welds and base materials shall not fail due to corrosion from normal ambient sources (corrosive industrial environments are excluded).
2. Structures shall not fail due to normal operating pressures and subsequent developed stresses.

Media and Substrate are warranted for a period of twenty four (24) months from the date of shipment, and are specifically warranted, in addition to being free of defects in material and workmanship, for the following:

1. Material will not fail due to exposure of saturated (100% relative humidity) air streams.
2. If installed and operated in accordance with the manufacturer's instructions, media shall perform as per data published by the manufacturer.

Additional Components such as rotor bearings, seals, belts, chains, sprockets, drive motors and controls (as applicable) are warranted for a period of twelve (12) months from the date of shipment, and are specifically warranted, in addition to being free of defects in material and workmanship, for the following:

1. Equipment shall not fail due to insufficient torque and/or duty for selected application.
2. Material shall not wear to the point of failure, within the period, from normal operating stresses.

Seller's sole obligation under this Limited Warranty, is to repair or replace, at its option, free of charge to the original purchaser (except as noted), F.O.B. the Seller's factory, any Product determined by the Seller (in its sole discretion) to be defective. Seller's Limited Warranty excludes defects, failures and reduced performance caused, either directly or indirectly, by improper installation, abuse, misuse, misapplication, improper maintenance, lack of maintenance, negligence, accident or normal deterioration, including wear and tear. This Limited Warranty additionally shall not apply to failures, defects or reduced performance, resulting either directly or indirectly, from any use or purpose other than desiccant dehumidification and or energy recovery (as applicable), or from exposure to corrosive environments (liquid or gaseous) or liquid water, in the form of impingement from a moving air stream. This Limited Warranty additionally excludes damages due to natural disasters and Force Majure. This Limited Warranty does not include costs for transportation (including without limitation,

freight and return freight charges, costs and insurance), cost from removal or re-installation of parts or equipment, premiums for overtime, or labor for performing repairs or replacement to equipment in the field. Seller is not responsible for damages during transport of any product to or from Seller's location.

THE OBLIGATION AND LIABILITY OF THE SELLER UNDER THIS LIMITED WARRANTY DOES NOT INCLUDE LOSSES, DIRECT OR INDIRECT, FOR INCIDENTAL, SPECULATIVE, INDIRECT, OR CONSEQUENTIAL DAMAGES, RESPECTIVE OF THE FORSEEABILITY OF ANY SUCH DAMAGES. THIS LIMITED WARRANTY IS PROVIDED EXCLUSIVELY TO THE ORIGINAL PURCHASER OF PRODUCTS AND MAY NOT BE TRANSFERRED OR ASSIGNED WITHOUT THE EXPRESS WRITTEN CONSENT OF THE SELLER. THIS LIMITED WARRANTY IS IN LIEU OF, AND SELLER HEREBY EXPRESSLY DISCLAIMS, ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. In no event shall the Seller's liability to Purchaser hereunder, or in any respect of the transactions contemplated hereby, whether direct or indirect, exceed the amount paid by the Purchaser in respect of the products from which any such liability is said to arise.

Material Safety Data Sheet (MSDS)

Rotor Source, Inc.- PPS silica gel dehumidification Rotor mediasizes 50 mm to 5000 mm diameter and 50 mm to 500 mm depth.

General Information

Item Name	Desiccant rotor media
Company Name	Rotor Source, Inc.
Company Street	17444 Opportunity Ave.
Company City	Baton Rouge
Company State	Louisiana
Company Zip Code	70817
Company Info #	225-753-1700
Company Emergency #	225-753-1700
Date Prepared	18 Aug 1999
Prepared By	S.K. Goland
Unit of Issue	Each
Type of Container	Monolithic Substrate
Net Unit Weight	16 LBS./ per CUFT

Identity Information

Proprietary	Yes
Ingredient	Silica Gel 82%, 7 Micron Glass Fiber 16%, Face Coating 2%
OSHA PEL	80 MG/ M3 / SiO2
ACGIH TLV	10 MG/ M3

Physical/Chemical Characteristics

Appearance	Dry white/gray corrugated structure
Odor	None
Specific Gravity	2.1
Solubility in H20	Insoluble
Ph	2.8

Fire and Explosion Hazard data

Description	Non-Flammable
Extinguish using	Not Applicable

Reactivity Data

Stability	Yes
Condition to Avoid	None Specified
Materials to Avoid	Reacts w/ HF
Hazardous Decomp	None specified

Health Hazard Data

Route of Entry Inhalation	Yes when degraded
Route of Entry Skin	No
Route of Entry Ingestion	No
Health Hazard	Low potential for adverse health effects. Product can be considered a nuisance dust when degraded. In degraded form (dust) can act as drying irritant to mucous membranes and skin in cases of severe exposure.
Carcinogenicity- NTP	No
Carcinogenicity- IARC	No, non respirable
Carcinogenicity- OSHA	No

Health Hazard Data continued

Explanation	PER MSDS this product and its components are not listed on IARC/ NTP/ OSHA Carcinogens lists.
Symptom Overexposure	In degraded form (dust). Drying & irritation of mucous membranes and skin in cases of severe exposure.
Emergency First Aid	For degraded form (dust) Eyes- immediately wash w/ large amounts water, occasionally lifting upper and lower eyelids. Seek medical attention. Skin- wash w/ soap and water. Ingest- material will pass through body normally. Inhale-Remove to fresh air.

Precautions for Safe Handling & Use

Steps if Released	Sweep or vacuum, flush to sewer
Waste Disposal	Contains no toxic chemical in excess of applicable minimus concern as specific under 313 of title III SARA. Dispose in approved landfill to Fed./ State/Local regulations. Cover promptly to avoid blowing dust.
Handling	Avoid prolong exposure to dust in degraded form.
Other	No known adverse effect on Aquatic environment- insoluble and non-toxic.

Control Measures

Respiratory Protect	Use approved NIOSH/ MSHA dust mask when handling in degraded form.
Ventilation	None Specified.
Protective Gloves	See other protective equipment
Eye Protection	See other protective equipment
Other Protect Equip	Wear long sleeves and close knit cotton gloves w/ tight wristlets when handling in degraded form.
Hygenic Practices	Wash hands w/ soap & water after handling.

Transportation Data

Dot/ IATA/ IMO	Not Regulated, Non Hazardous Material
Other	Per MSDS, Not classified as Hazardous Material

Disposal Data

Classification	Not classified as hazardous material
Disposal	Dispose in approved landfill to Fed./ State/ Local regulations. Cover promptly to avoid blowing dust.

Label Data

Label Required	None Required