# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eddy Current Overview</td>
<td>3</td>
</tr>
<tr>
<td>Sizing and Frames</td>
<td>4</td>
</tr>
<tr>
<td>Splitter Box</td>
<td>5</td>
</tr>
<tr>
<td>Rotor</td>
<td>6</td>
</tr>
<tr>
<td>Carbon Fiber Shell</td>
<td>7</td>
</tr>
<tr>
<td>Conveyor Drive Motor</td>
<td>8</td>
</tr>
<tr>
<td>Magnetic Rotor Drive Motor</td>
<td>8</td>
</tr>
<tr>
<td>Conveyor Belting</td>
<td>9</td>
</tr>
<tr>
<td>Bearings</td>
<td>10</td>
</tr>
<tr>
<td>• Shell bearings</td>
<td></td>
</tr>
<tr>
<td>• Rotor bearings (one fixed, one floating/expansion)</td>
<td></td>
</tr>
<tr>
<td>Eddy Current Setup &amp; Operation</td>
<td>11</td>
</tr>
<tr>
<td>Conveyor Belt Speed Control</td>
<td>12</td>
</tr>
<tr>
<td>Eddy Current Rotor Speed</td>
<td>13</td>
</tr>
<tr>
<td>Belt / Rotor Sequence</td>
<td>14</td>
</tr>
<tr>
<td>Ferrous Materials</td>
<td>15</td>
</tr>
<tr>
<td>Splitter Box Initial Setup</td>
<td>15</td>
</tr>
<tr>
<td>Daily Maintenance</td>
<td>16</td>
</tr>
<tr>
<td>Startup Sequence</td>
<td>16</td>
</tr>
<tr>
<td>Belt Change Procedure</td>
<td>17</td>
</tr>
<tr>
<td>Tracking tips</td>
<td>19</td>
</tr>
<tr>
<td>Shell Change Procedure</td>
<td>20</td>
</tr>
<tr>
<td>Shell Bearing Removal / Assembly</td>
<td>31</td>
</tr>
<tr>
<td>Replacement Parts List / Drawings</td>
<td>35</td>
</tr>
<tr>
<td>Appendix 1: Dodge Bearing</td>
<td>36</td>
</tr>
<tr>
<td>Appendix 2: Rulmeca Wiring Diagram</td>
<td>38</td>
</tr>
<tr>
<td>Toshiba Low Voltage Motor Manual</td>
<td>39</td>
</tr>
<tr>
<td>Limited Warranty</td>
<td>41</td>
</tr>
</tbody>
</table>
Eddy Current Overview

The Eddy Current Separator (ECS) is designed to separate conductive, non-ferrous metals from non-reactive / non-conductive materials. The applications for use of the ECS can vary, but there are some specific applications for which its use has proven to be the most effective, such as material recovery facilities (MRF) and scrap yards.

The Javelin Eddy Current Separator is manufactured in many combinations of polarities and sizes. Each unit is designed specifically for the application, capacity, and space requirements.

The eddy current operates as a volume device. The separation and recovery of material is highly dependent of the presentation of the material to the ECS. It is recommended to use a metering device, such as a vibratory feeder, to keep the burden depth to a single layer. If feeding with a conveyor, it is essential to have the proper speed ratio between the feed belt and the ECS belt to ensure proper spread of material. Operation of the ECS with deeper burden depths can decrease the recovery and purity of the sorted material. As all facilities and processes are different, it is up to the user to decide if running higher capacities at the potential expense of a lower recovery and purity percentage is a positive offset.
Sizing and Frames

Units are manufactured in standard widths of 24”, 30”, 36”, 48”, 60”, and 80”. Special widths will be considered upon request. Effective widths are as measured between the corrugated sidewall profiles on the material conveyor belt.

Standard lengths for the eddy currents are 90” and 144”. The lengths are as measured from the rotor centerline to the rear pulley centerline. Special lengths will be considered upon request.

The ECS main frame assembly is fabricated from heavy gauge steel, laser cut and formed along with welded tubular supports for stability. The finish is Durethane® coated to match specific RAL color codes or custom colors.

All guards are fabricated from mild steel and are designed for easy maintenance and removal. Side guards are screwed in place for ease of removal. All units are fitted with cleaning brushes to help minimize material migration. Guards are powder-coated safety yellow unless specified otherwise.

Rulmeca® belt drive pulley is mounted on take-up tensioning brackets for adjustment and tracking.

The rotor motor mount plate is equipped with jack screws to both align and tension V-belts on the motor.
Splinter Box

The splitter box is a combination of an adjustable splitter vane and chute to capture the separated process material. The splitter vane is a mechanical divider that is fabricated inside the opening of the splitter box to deflect parts into one of two areas of the splitter box. There is a single vane model as well as a double vane model. The single vane model separates the process material into non-ferrous and non-reactive only.

The double vane model is designed to separate process material into three (3) grouping types: non-reactive and two (2) non-ferrous cuts. The double vane model is used in applications where it is required to throw certain non-ferrous metals farther than other non-ferrous metals.

Since the ECS operates on specific gravity and conductivity, materials that are highly conductive and very light tend to be thrown farther than denser materials. Certain alloys may also react differently when being processed by the ECS.

The shape and size of process material will also affect the throw of the material.

Example 1: Aluminum is highly conductive and very light. Based on these physical properties, aluminum will throw farther than copper, zinc, brass, lead, etc.

Example 2: Aluminum sheet will throw farther than cast due to the difference in composition and density of the alloys.

Example 3: Non-ferrous material that is flat compared to non-ferrous material that is bent or folded may react differently due to the saturation of the material by the changing magnetic field at the point of separation.

The splitter vanes are used to separate the materials by types. Non-reactive material will fall closest to the rotor. The non-ferrous metal being excited by the eddy currents will be repelled from the belt and be deposited farther away from the rotor. Operating at higher belt speeds will discharge all the process material farther from the rotor. The vanes are adjustable, so they can be rotated into a position that will optimize recovery.

Particle size is very important in setting the position of the splitter box and adjusting the speed of the belt. Consistent recovery requires that the belt speed and splitter box position are adjusted and optimized together; the splitter vane may also need to be rotated towards or away from the rotor for consistent recovery.
Rotor

The magnetic rotors are offered in polarities of 8 poles or 16 poles. The two pole configurations are designed for specific material sizes, types of material, and applications.

The rotor is dynamically balanced to ISO 1940 G0.4 or better at the specified rotational speed. The nominal speeds for the rotors are as follows:

- 8 pole rotor: @ 60 Hz = 1760 RPM
- 16 pole rotor: @ 51 Hz = 3000 RPM

**NOTE:** Heat can severely damage the magnetic rotor. Once magnetism is lost due to heat, the degradation is permanent. Heat can be caused by the following factors:

- **FERROUS METAL:** Ferrous metal that is trapped in the magnetic field will become super-heated and can transfer heat to the magnetic rotor surface causing a magnetism loss or degradation.

  It is highly recommended that a magnetic separation device be located and operating inline ahead of material discharge onto the ECS. See Ferrous Materials section on page 15 of this manual.

- **BROKEN OR DAMAGED SHELL:** A foreign object, such as dirt or process material may infiltrate a crack or hole in the carbon fiber shell. This will cause scraping or rubbing between the inside of the carbon fiber shell and magnetic rotor surface resulting in a build-up of heat due to friction. Visually inspecting the shell on a regular schedule can prevent shell and/or magnetic rotor damage.

Javelin Manufacturing, a division of Industrial Magnetics, Inc., does not warrant rotor damage due to negligence or improper maintenance and rotor warranty is limited to workmanship only. All spare parts are obtainable in the US either from Javelin or as noted later in the manual.
Carbon Fiber Shell

The ECS shell is constructed using high-strength carbon-fiber material. The completed shell is also equipped with ceramic coating to minimize wear due to abrasion. The ceramic has a 2-color indication system that will indicate when a shell is due to be replaced or recoated. The light blue color represents that a shell is still in operating condition; the red color indicates that the blue layer has been worn off the shell and should be recoated or replaced. The ceramic is a two-part, brush-on mixture that can be applied to the shell while it is in the machine if the structural integrity of the shell is not compromised. The ceramic coating is available in kits for field applications.

NOTE: The ceramic coating is designed to increase the life of the shell and is not intended to repair a broken shell. Failures such as holes or cracks will require the shell to be replaced. Regular inspection of the shell can prevent downtime by identifying wear before it leads to inoperable conditions. To inspect the shell, remove necessary guarding on the front end and both sides of the ECS unit and visually inspect the backside surface of the shell for uneven wear, grooves, holes, or cracks. It is recommended to keep a spare shell on the shelf for immediate replacement if damage is evident.

All spare parts are obtainable in the US either from Javelin or as noted later in the manual.
Conveyor Drive Motor

The Rulmeca® drive drum is an internally motorized pulley, 8.5” diameter with a crowned face. Pulley surface can be equipped with lagging or a knurled finish to prevent belt slippage. In harsh environments with corrosive chemicals or abrasive materials, the knurled finish is recommended.

The pulley shaft is equipped with labyrinth seals to prevent any damage from material winding around the shafts. The lubrication interval is relative to the operating conditions, materials handled, and environment. The grease will collect and trap contamination; pumping fresh grease in will purge out the contaminants. The objective is to keep a fresh, clean bead of grease at the outer diameter of the labyrinth. Contaminated grease left in place for an extended period could damage the shaft seals.

The Rulmeca® drive pulley is pre-lubricated from the manufacturer; it will require periodic oil changes and is provided with 2 oil fill/drain plugs in the end housing. The first oil change should be performed at 20,000 operational hours. All non-synthetic oils should be changed after each 10,000 operational hours. Synthetic oils may be changed after each 20,000 operational hours.

The magnetic oil plug should be cleaned during each oil change. A red dot indicates position of the magnetic oil plug. Only non-conductive oil should be used in the motorized pulley.

Oil seals, regardless of oil type used, should be changed after 20,000 operational hours of use. It is recommended that a Rulmeca® service technician change the oil seals. Local authorized dealers or technicians can be found on the Rulmeca® website http://www.rulmeca.com/en/. For detailed motor information, please refer to the Appendix documentation included with this manual.

Magnetic Rotor Drive Motor

The rotor motor is a Toshiba EQP Global 3-phase, general purpose electric motor. The RPM of each motor is specific to the application. The magnetic rotor is belt-driven by two (2) V-belts. The rotor motor mount plate is equipped with jack screws to both align and tension V-belts on the motor.

The specific motor model number and specifications are listed in the parts list contained in the Appendix.
Conveyor Belting

Javelin Manufacturing standard materials conveyor belt is a thin (0.090”), very durable polyurethane cover over a synthetic cross rigid carcass with an interwoven polyester monofilament. Belting is supplied with 1-¼” high corrugated sidewalls to minimize material migration under the belt. The belt has three (3) one-half inch (½”) high cleats. Standard belts are supplied with a Flexco® unibar clipper stainless steel lace. Heavy-duty Alligator® RS62 SS lacing is available upon request.

Red Novitane® belts are available upon request. These belts are equipped with a heavy-duty Alligator® RS62 SS lacing or can be heat welded endless by our vendor for single piece belt change, if design permits, or can be heat welded in the field with a heat welding kit supplied from the belt vendor.

**Note:** Heat welding kit is not included with the belts and is available for purchase upon request.
Bearsings

**Shell bearings** are XLS 5-1/2” open-type ball bearings with Micropoly® lubricant / potting. The rotational speed should never exceed 400 rpm. They are press fit into the shell bearing housing. These bearings do not need to be lubricated due to being equipped with the potting compound.

**Rotor bearings** are piloted Dodge® Imperial high-speed bearings rated at 3500 RPM. The ECS unit is equipped with one fixed bearing and one floating bearing to accommodate thermal expansion.

The rotor bearings are approximately 33% pre-lubricated from the factory and are ready for operation. Under normal operating conditions it is typical for a small amount of grease to purge from the seals at initial start-up. This will stop once the optimum fill is reached. New bearings will initially run a little hotter than normal and the temperature will level out after a break-in period. Normal operating temperatures can reach 180° F, and should not exceed 200°F. If temperatures exceed the normal operating temperature of 180° F, lubricate bearings according to recommended lubrication intervals found in the DODGE® bearings installation procedure located in the **APPENDIX** near the end of this manual.

Lubrication schedule for these bearings is at a frequency of once every 400 hours of run time. The grease that is recommended for these bearings should be equal to MOBIL Grease XHP 222 (Lithium grease). This grease is reversible, which means it will return to its original state when cooled. These bearings are equipped with labyrinth seals and cannot be damaged by over-lubrication, but excessive lubrication can purge grease into the rotor cavity on the inside of carbon fiber shell in extreme cases. Under normal circumstances and lubrication, the excess grease will purge from the outer labyrinth seals. (See parts list for specific model #’s.)

**NOTE:** Regarding greasing frequency, the above values are given as guidelines only. Individual operations may require more or less frequent greasing. Closely monitor the bearings during initial start-up, giving particular attention to heat and noise.

All spare parts are obtainable in the US either from Javelin or as noted later in the manual.
Eddy Current Setup & Operation

**Important Safety and Precautionary Advisory**

Any operation, service, maintenance and/or repairs to the Javelin Eddy Current Separation Conveyor System components should only be attempted by authorized, trained and qualified personnel familiar with all safety and lock-out / tag-out procedures, and those familiar with employing proper Personal Protective Equipment (PPE). Read and obey ALL Danger, Warning, Safety and other Notification Signs or Labeling on Control Panel(s) and Mechanical Equipment to assure all precautions are understood.

This section of the instruction manual will give the user a general overview of the factors that influence how the Javelin Eddy Current Separation Conveyor System performs, what basic control adjustments are offered to the user, and what result each may have on the overall performance of the system. Adjustments to one factor may affect another, either positively or negatively.
Adjustments to the Javelin Eddy Current Separation Conveyor System will vary depending upon several factors, including:

- Mix (non-reactive versus reactive) of product(s) sorted
- Overall mass of product(s) traveling across the conveyor system
- Differential of non-ferrous material size(s)
- Amount of non-ferrous contamination (grease/oil, dirt, or other wastes)
- Adhesion of materials to each other
- Type and grade of non-ferrous material

The basic separation processes can be controlled by three (3) methods on the conveyor system:

- Conveyor Belt Speed
- Eddy Current Magnetic Rotor Speed
- Splitter Box Chute Angle

**Conveyor Belt Speed Control**

The Conveyor Belt Speed dictates the speed at which the product is conveyed across the unit. The speed is controlled via a Variable Frequency Drive (VFD) which may be located either in a dedicated Control Panel for the unit or in a local Main Control Panel (VFD may be supplied by IMI with the unit or provided by customer). The Speed Control will allow the overall belt speed to be increased or decreased by adjustments to the VFD controls. Only authorized, experienced personnel should adjust this control system, as the adjustment will require access inside the appropriate Control Panel. Contact authorized plant personnel prior to making any adjustments to this control feature.

If equipped, the VFD manufacturer’s User Manual has been included with the ECS Operator’s Manual. It is advised to insure the latest revision matches the installed unit. The internal drive pulley can be operated safely between 0-72 Hz. The motorized pulley will generate the same instantaneous torque throughout the listed range.

**NOTE:** At 60 Hz, the belt is traveling at 384 FPM.
**Eddy Current Rotor Speed**

The Eddy Current Rotor Speed dictates the speed at which the internal magnet array spins inside the carbon fiber shell assembly. Once the process materials reach close proximity to the rotor, the alternating magnet array generates the powerful eddy current that excites the reactive properties internal to the materials traveling across the conveyor.

The RPM (Revolutions-Per-Minute) speed of the magnet array is controlled via a VFD (Variable Frequency Drive) located either in a dedicated Control Panel for the unit or in a local Main Control Panel. The Speed Control will allow the rotation speed (RPM) to be increased or decreased by adjustments to the VFD controls. Only authorized, experienced personnel should adjust this control system, as the adjustment will require access inside the Main Control Panel. Contact authorized plant personnel prior to making any adjustments to this control feature.

Regarding the dynamic balancing and calculated critical speed of the magnetic rotor: running at higher RPM can cause excess vibration, irreversible damage to the rotor, and potentially premature failure of the rotor bearings. **Running at a higher RPM does not always facilitate better recovery.**

**Notes:**
1) During setup, it may be necessary to run at a slightly higher or lower RPM to eliminate excess vibration caused by a resonance frequency or harmonic. Adjustment should never exceed 2-3 Hz over recommended operational Hz stated below for both 8 pole and 16 pole rotors. Otherwise, it is advised to operate at or below recommended Hz.

   - 8 pole rotor: @ 60 Hz = 1760 RPM
   - 16 pole rotor: @ 51 Hz = 3000 RPM

2) The rotor is designed to spin in the same direction as the belt travel.
Belt / Rotor Sequence

To prevent damage to ECS components and the loss of material during start-up and shutdown of the ECS, the following proper sequencing needs to be programmed into the VFD. The ECS unit must start prior to all upstream equipment and must stop after all upstream equipment. The recommended sequencing is as follows:

Start-up: The conveyor belt should be free of material and can be started at the same time as the ECS rotor motor. There should be approximately 45 – 60 second delay from the start-up of the ECS before the upstream system is started. This will allow the ECS to achieve full operational speed before any material is fed onto the ECS.

Shutdown: During system shutdown, the ECS should not begin the shutdown process until all upstream equipment has stopped. The conveyor belt will need to run until the rotor has come to a complete stop. The kinetic energy of the rotor may allow it to spin up to 2-3 minutes before coming to a complete stop. Allowing the belt to run will discharge all material from the ECS belt and prevent any heat damage to the belt, shell or rotor.

**NOTE:** Take proper precaution to ensure that the belt is always running if the rotor is spinning. This will prevent any material from sitting in the changing magnetic field if the belt is static. If there are metals in the field and the belt is static, this will cause the metal to heat up and could damage the belt, shell, and magnet. Keep in mind that the splice for the conveyor belt is stainless steel. Even if the belt is free of process material, it is always recommended to have the belt moving if the rotor is turning.
Ferrous Materials

It is highly recommended that a magnetic separation device or a combination of multiple magnetic devices, i.e. drum magnet, head pulley magnet, and/or cross belt magnet be operating inline ahead of material discharge onto the ECS. Ferrous material can severely damage the Eddy Current Rotor, Shell, and Belt.

NOTE: Ferrous burnout is the result of ferrous material getting stuck in the changing magnetic field of the rotor and becoming superheated. As stated in the Belt / Rotor Sequence section, heat can severely damage the rotor. Once magnetism is lost due to heat, the degradation is permanent.

As no process is 100% efficient, it may be impossible to get all ferrous metal out of the stream prior to the ECS. Minimizing the amount of ferrous metal with multiple magnetic separators will decrease the chances of ferrous burnout. Ferrous burnout is not considered a warranty item.

Splitter Box Initial Setup

This splitter box is to be adjusted in the field at start-up. It should be placed in front of the rotor but not secured in place until test runs are complete to determine the best placement of the splitter box. For close adjustments the vanes can be rotated into positions that further pinpoint the desired divisions. These adjustments are made by moving a lever arm to the desired position and then locking that position in place by tightening the knob to the guide.

It should be noted that at initial start-up, the machine should be tested without metal in the process stream to set the vane. By doing this it can be seen where the waste or non-recoverable material is landing. The waste stream should be hitting 1" - 2" below the top of the first splitter vane. This adjustment is made by increasing or decreasing the speed of the belt via the VFD. Faster belt speed does not necessarily facilitate better separation.

Next, run the desired recoverable material to be sure it throws over the first vane. This is accomplished by adjusting the splitter vane by rotating the lever to capture the recoverable items. The belt speed, rotor RPM, and splitter box position are independent variables that need to work in sync with one another. Generally, once the rotor speed is set, there is no need to change the operating RPM for the rotor.
Daily Maintenance

1. Inspect and ensure that all guarding is installed.
2. Check for foreign objects that could jam inside the machine.
3. Blow out the entire machine with compressed air. Wipe off any material stuck to the discharge end (rotor / shell) of the ECS.
4. Replace all guarding if removed to inspect / clean the ECS unit.
5. Start the machine and run for 5 minutes to check belt tracking and tensioning (see Start-up Sequence below).
6. Visually inspect belt to see if there are any splits or holes.
7. Check brushes to make sure they are not damaged and are touching the belt surface.
8. Listen for any unusual bearing / motor noise after unit is at full operational speed.
9. Lubricate bearings if needed (refer to Bearings section page 10).

Start – Up Sequence

1. Make sure all power is energized.
2. Start conveyor belt and wait until it has come up to full speed.
3. Start rotor and wait until rotor has come up to full speed.
4. Begin feeding material slowly onto belt.
5. Adjust speed controls and splitter vane to optimum positions, if required.

NOTE:

Pay close attention to the ECS while it is working well to help identify potential mechanical problems in the future. If any erratic changes in functionality or excessive noise are observed, it is recommended to go through the daily maintenance checklist to eliminate any simple problems.

If there is any condition that requires special attention, i.e. bad bearing, broken carbon fiber shell, ripped belt, etc., please contact Javelin Manufacturing or the company through which the equipment was purchased to arrange a service call or to order replacement parts.
Belt Change Procedure


   **NOTE:** Extremely strong magnetic field will still be present after machine is de-energized. Use caution when working near the magnetic rotor. Do not forget that most hand tools are metal and could cause injury. Remember to remove cell phones and wallets from pockets prior to working near the magnetic rotor.

2. Remove yellow brush guards on each side of machine by removing all fasteners on top and inside. See Figure 1.

   ![Figure 1](image-url)
3. Remove tail pulley guarding exposing tracking adjustment bracket. Retract the rear pulley to loosen the belt by turning the threaded rod counter-clockwise. See Figure 2.

![Figure 2](image)

Loosen (4) locking bolts, then turn threaded rod clockwise to extend, counter-clockwise to retract.

4. Determine whether existing belt can be salvaged or saved for future emergency use. If belt is not usable, carefully cut the belt off with a razor blade. If it is intended to keep the existing belt, it will need to come off in one piece. Remove the belt by pulling the lacing pin out of the splice. Usually a new pin is required to reinstall belt. The splice pin is 304 stainless steel spring temper wire, 0.055” diameter. If belt is equipped with RS62S Alligator style lacing, it uses 0.090” diameter pin.

5. Prior to installing the new belt, it is recommended to clean any dirt or debris from the frame and carbon fiber shell surface. Also, visually inspect the carbon fiber shell for any signs of wear or damage, i.e. holes, grooves, cracks. If shell needs to be replaced, see instructions in the section of the manual labeled “Shell Change Procedure”.

Page 18 of 41
6. Reinstall new belt so that the splice is on the top slider bed of the machine. Clamps may be used to secure one end of the belt to the slider bed while the other end is pulled underneath the machine and over the top to meet the other end of the belt. Line up the splice teeth and insert the pin into the two splice halves connecting them together. Make sure the lacing pin is approximately 3” – 4” longer than the width of the belt. This will be trimmed off after lacing pin is installed.

**NOTE:** Filing the end of the pin to a point and turning when inserting will make it easier to install.

After pin is installed, bend excess over towards the inside of the belt on both sides and trim down to ½”. This will keep the pin securely fastened.

**NOTE:** Be sure to securely fasten the corrugated side wall ends together so that loose ends do not interfere with normal operation of belt. Stainless steel fastening brackets are available upon request for additional cost when ordering replacement belts; nylon zip ties can also be used. Nylon zip ties are non-reactive to the magnetic field and they provide flexibility when traveling around pulleys.

7. Extend the belt tensioning bracket by turning the threaded rod clockwise. Following proper LOCK-OUT/TAG-OUT procedure, start the conveyor portion of the eddy current unit to track the belt. Once the belt is tracked properly, shut off the power and re-assemble the unit by replacing all access panels and guards.

**Tracking tips**

When tracking the belt, start with the take-ups at an equal distance, then start machine to see how the belt tracks. Adjust belt tension and tracking accordingly. Belt tension should not be too tight; over-tightening the belt can damage carbon fiber shell and / or tear lacing. Tension the belt just tight enough to get it to grip on the motorized pulley and then extend ¼” further. There will be sag on the return strand of the belt. Make sure that the belt does not rub on any of the framework underneath.

If the belt consistently rides toward one side and does not seem to respond by adjusting take-ups, and if it has a stainless steel splice, pull the stainless lacing pin, move the tail end of the belt 1-2 teeth over towards the direction that the belt needs to move, and replace the lacing pin. Start tracking process with take-ups at an equal distance.
Shell Change Procedure

1. Remove belt as per instructions in **Belt Change Procedure**.

2. Remove motor guard / belt guard and off-side shaft cover. Machine should appear as in **Figure 3**.

![Figure 3](image_url)
3. Remove rotor drive V-belts. The jack screws will need to be loosened as well as the four 1/2” - 13 bolts securing the motor slide plate to the motor mount bracket. See Figure 4.

Note: Prior to moving the motor or V-belt sheaves, use a marker to indicate where the motor and sheaves are located. This can make the reassembly process a little easier and more efficient.

![Figure 4](image)

4. After loosening the jack screws and motor bolts, slide the motor forward to loosen the V-belts. Once the V-belts are removed, attach a strap or sling to the top of the motor and remove bolts securing the motor slide to the motor mount bracket. Remove the motor / slide plate with an appropriate lifting apparatus. The entire bolt-on motor mount may be removed from the main frame for convenience but it is not mandatory.
5. Remove V-belt sheave on the rotor shaft by removing the 3 bolts that lock the taper-lock bushing to the pulley. Then, using the same bolts, utilize the threaded holes on the bushing to separate it from the sheave.

**NOTE:** Evenly tighten the 3 bolts to separate bushing from sheave. This will prevent damage to the bushing by moving it straight and square to the pulley and shaft. Do not pry on the bushing. Machine should appear as in **Figure 5**.

![Figure 5](image)

6. After the V-belt sheave has been removed, the next step is to begin the process of removing the DODGE® rotor bearings. Using the threaded holes on each end of the shaft, insert 5/8”-11 lifting eyes. Using an appropriate lifting apparatus, attach a sling to the lifting eyes and apply slight upward tension on the sling.

The instructions for dismounting the DODGE® bearings are found in the appendix section of this manual labeled "DODGE® Bearings Install Procedure". **Before removing the rotor bearings, use a marker to indicate where the edge of each rotor bearing is on the rotor shaft. This will help center the rotor during the reassembly process. A more detailed method of centering the rotor shaft is found in step 14.**
Once the rotor bearings are loosened as per the "DODGE® Bearings Install Procedure", and with the sling still pulling tension on the rotor shaft, gently slide the pilot of the rotor bearing out of the pilot insert of the vertical mount weldments. This process will require the bearing on each side to be removed independently.

**NOTE:** If bearings do not slide freely, verify that they are loosened. Using the bearing bolts and threaded holes on the bearing housing, thread the bolts into the threaded holes and use them to push bearing pilot out of pilot hole in vertical mount weldment. Keep fingers clear of frame; rotor may shift after bearing pilots are removed from pilot holes.

See **Figure 6 & Figure 7**.
The rotor / shell front end assembly can now be removed from the vertical mount weldments. The non-drive side vertical mount weldment may need to be loosened to facilitate front end assembly removal. See Figure 8.

NOTE: Exercise caution while removing front end assembly from sub-frame. The magnetic rotor could swing and become attracted to surrounding framework or other machines.

Transport the front end assembly to a clean and safe work environment that can accommodate the shell replacement. If front end cannot be transported due to limited space, the slider bed pan can be used. If slider bed location is to be used for shell change procedure, remove all debris from slider bed pan prior to removing front end assembly.

NOTE: Always keep a pallet or other type of non-metallic buffer between the rotor and the slider bed. Place exposed rotor shaft ends on wood blocks or risers to elevate rotor so that the weight of the rotor does not rest on the carbon fiber shell. See Figure 9.
7. After the front end assembly has been moved to a location to change the shell, the next step is to remove the bearing mount / bearing hub assembly from each end of carbon fiber shell. Use compressed air to remove as much dirt or debris as possible from the front end assembly before removing the bearing mount / bearing hub assemblies.

Using a ¼” allen wrench remove the four (4) stainless steel socket head bolts attaching the shell to the bearing hub on each end. Verify that there is not any dirt on exposed threads of the bolts. Any dirt can cross thread bolts and/or damage threaded holes on bearing hub flange.

**NOTE:** Most units will have 5/16-18 nylon locking nuts threaded onto end of bolts. Remove and replace. See Figure 10.
8. After the four (4) socket head cap screws are removed from each bearing mount / bearing hub assembly, use a 3” ID pipe that is at least 2 feet longer than the length of the carbon fiber shell to cantilever the rotor by securing a strap on one end. See Figure 11. Exercise caution when lifting the end of the rotor with the pipe to make sure the other end of the rotor shaft does not roll off the wood 4x4 support.

![Figure 11](image)

**Figure 11**

9. Once end of rotor is supported, slide bearing mount / bearing hub assembly onto the pipe and replace 4x4 under the rotor shaft. Gently lower rotor back onto 4x4’s. Remove bearing mount / bearing hub assembly and shell from pipe. Remove bearing mount / bearing hub assembly from other end by using a strap to hang rotor for removal. See Figures 12 & 13.

![Figure 12](image)

**Figure 12**
10. Rotor should appear as in Figure 14.

11. Visually inspect rotor for any foreign objects that may be on surface of rotor. Clean rotor to remove dirt, debris, etc. Visually check bearing mount / bearing hub assembly for damage and spin hub to make sure shell bearings are in proper working condition. Use compressed air to remove any build-up of debris within assembly. If shell bearings are damaged or need replacement, follow instructions in “Shell Bearing Removal / Assembly” section of this manual.

12. Replace new shell and offset bearing mount / bearing hub assemblies by using the same method outlined in Steps 8 & 9. Securely fasten socket head bolts into shell and bearing hub flange, replace nylon locking nuts.
NOTE: The bearing mount / bearing hub assemblies are identical, and the orientation of the bolt hole pattern is important. This is explained in Step 14.

13. Place front end assembly back into the vertical mount weldments of the unit. Vertical mount weldments may need to be loosened to re-install front end assembly. This can be done by loosening the bolts on each side of the sub-frame vertical mount weldments. If one or both vertical mount weldments are loosened, use a marker to outline the original position of the weldments for future reference. This will help to center the front end in the machine.

NOTE: The machined base of the sub-frame that the vertical mount weldments attach to are slightly oversized for centering and belt tracking purposes. If adjusting for belt tracking, loosen vertical mount weldments on the non-drive side to avoid exerting binding forces on the shell bearings. See Figure 15.

The machined base features a step (in red circle) which serves as a positive stop for positioning the vertical mount weldment.
14. Slide rotor bearings onto the shafts and insert bearing pilots into the vertical mount weldments and into the bearing mounts. Be sure to install the fixed bearing on the motor side and the expansion bearing on the non-drive side. The difference between the bearings is that the expansion bearing has a floating shaft collar.

Before inserting the four 5/8 – 11 bearing bolts, determine the desired position of the “magnetic hot spot” of the rotor. The arrow on the bearing mount will indicate where the “magnetic hot spot” is with relation to the carbon fiber shell circumference. See Figure 16. Certain “magnetic hot spot” settings will work better for various material types. The various settings will determine where and how long the material is in the changing magnetic field. Recommended settings are usually top center or toward the discharge end of the ECS.

Follow installation procedure outlined in "DODGE® Bearings Install Procedure". Make sure the floating bearing collar is pushed in towards the center of the machine.

**NOTE:**

Before tightening bearings onto the shaft, the rotor will need to be centered. This can be accomplished with the following procedure:
- Push on the end of the shaft until the rotor reaches the positive stop.
- Mark the shaft with a marker at the edge of the bearing collar.
- Push the shaft in the other direction until it reaches the positive stop.
- Mark the shaft again at the edge of the same bearing collar.
- Measure the distance between the two lines; divide this distance by two and place a mark in the center of the two original lines.
- Move the shaft so that the center line is at the edge of the bearing collar. The rotor should now be centered in the machine.
15. Replace the V-Belt sheave on the rotor. Take care not to overtighten the bolts for the taper grip bushing. Torque each bolt evenly to 9 ft/lbs until all bolts are tight.

16. Replace motor and motor mount. If the original location of the motor and motor mount were marked during the disassembly process in Step 3, move the motor and motor mount back to this location.

    NOTE: The markings are intended to achieve close alignment, then may require fine adjustments. Use jack screws to align the V-belt sheaves.

17. For V-belt installation, reduce the center distance so the belts may be placed in the sheave grooves without force. Arrange the belts so that both the top and bottom spans have about the same amount of sag. Apply tension to the belts by increasing the center distance until the belts are snug and have a live, springy action when struck with the hand.

    Operate the drive a few minutes to seat the belts in the sheave grooves. Observe the operation of the drive under its highest load condition (usually starting). A slight bowing of the slack side of the drive indicates adequate tension. If the slack side remains taut during the peak load, the belts are too tight. Check the tension on a new drive several times during the first 24 hours of operation by observing the slack side span.

    Keep the drive free of foreign material which might cause slippage or damage to the belt and sheave surfaces. If a V-belt slips, it is too loose. Increase the tension by increasing the center distance. Never apply belt dressing, as this will damage the belt and cause early failure.

18. Replace conveyor belt as per instructions in Belt Change Procedures and Instructions.
Shell Bearing Removal / Assembly

The shell bearings are an open type NTN® XLS 5-1/2” cartridge bearing with a MicroPoly® lubricant. MicroPoly® is self-lubricating and will never require manual lubrication. When the bearings heat up, the MicroPoly® potting compound will lubricate the bearings. The MicroPoly® also acts as a seal to keep out foreign objects and dirt.

The following steps will guide the user through the process of replacing the shell bearings. Following these steps will minimize the risk of damage during installation.

1. Disassemble the ECS machine by following the instructions in the “Belt Change Procedure” and “Shell Change Procedure” sections of the manual.

2. Disassemble to the point that the bearing mount assemblies are removed from the shell. See Figures 10-14.

When changing bearings, it is recommended that the shell is removed from the magnetic rotor. Always verify that there is no contamination or foreign objects on the surface of the rotor. Offset bearing mount assembly is shown in Figure 17.

![Figure 17](image)
3. The bearing can be removed by using a press to separate the rotor bearing mount and the shell bearing mount from the XLS bearing. **Figure 18** shows an exploded view of the rotor bearing mount / shell bearing mount assembly.

![Figure 18](image)

4. This step will require a 5.625" diameter x ¼" thick plate.

Insert the plate into the front of the shell bearing mount as shown in **Figure 19**. The plate will be used to capture the outer race of the XLS bearing.

![Figure 19](image)
5. Place spacers under the flange portion of the shell bearing mount on the opposite side from where the plate was inserted. This will support the shell bearing mount while the bearing and rotor bearing mount are pressed apart from the shell bearing mount. See Figure 20.

![Figure 20]

Use shop press to separate shell bearing mount from bearing and rotor bearing mount

6. Once the shell bearing mount is separated from the XLS bearing and rotor bearing mount, clean any residual retaining compound out of the shell bearing mount using a putty knife. Clean with denatured alcohol.

7. Separate the XLS bearing from the offset rotor bearing mount by utilizing the four (4) holes shown in Figure 21. Insert drift pins into holes and press bearing off of bearing mount.

![Figure 21]

Use drift pins and shop press to remove XLS bearings from bearing mount

8. Once the XLS bearing is separated from the rotor bearing mount, clean any dirt or debris from the bearing mount by using compressed air and denatured alcohol.
9. To overcome the functional design tolerances between the XLS bearing/mount and shell bearing mount, assembly can be facilitated using thermal expansion and contraction: cool the bearing and rotor bearing mount, heat the shell bearing mount.

Preparation: place the bearing and rotor bearing mount in a freezer; place the shell bearing mount in front of a floor heater or in an oven. The shell bearing mount should be heated to 225° F - 240° F.

10. Once the components have been adequately heated / cooled (estimate 1-2 hours), the cold bearing should slip into the bearing cavity of the shell bearing mount.

**NOTE:** If the fit is loose between the XLS bearing and the shell bearing mount, retaining compound can be applied to the cavity portion of the shell bearing mount. Loctite® Retaining Compound 609 is recommended. See Figure 22.

This process requires the assembler to work quickly to take advantage of the difference in component temperatures. If the bearing does not seat completely into the hub, use a shop press to completely seat the bearing into the shell bearing mount so that the outer race of the bearing seats against the raised lip on the bearing cavity of the mount.

If the fit is loose, a bead of retaining compound can be applied around the cavity portion of shell bearing mount.

**Figure 22**

11. Once the XLS bearing has been installed into the shell bearing mount, raise the temperature of the assembly using either the floor heater or oven.

12. After the XLS bearing and shell bearing mount have been heated, insert the shaft portion flange of the offset rotor bearing mount into the inner race of the XLS bearing. This does not require the use of retaining compound. If the XLS bearing does not seat completely against the raised lip for the inner race of the XLS bearing, use a shop press to seat the bearing.

13. After the rotor bearing mount, XLS bearing and shell bearing mount have been assembled, let the temperature normalize back to room temperature before installing.
Replacement Parts List

1  Rulmeca Motorized Tail Pulley
2  Tail clamp ring
3  Brush assembly
4  Belt
5  Rotor motor
6  V-belt
7  Double V-belt sheave

8  Front End Assembly
9  Piloted flange bearing
10 Vertical mount weldment
11 Offset (rotor) bearing mount
12 XLS cartridge bearing
13 Shell bearing mount
14 Magnetic rotor
15 Carbon fiber shell assembly
Appendix

1. DODGE® Bearings Install Procedure (page 1 of 2)

Instruction Manual for Dodge Imperial & ISAF Bearing

These instructions must be read thoroughly before installation or operation. This instruction manual was accurate at the time of printing. Please see baldor.com for updated instruction manuals.

Note: The manufacturer of these products, Baldor Electric Company, became ABB Motors and Mechanical Inc. on March 1, 2016. Nameplates, Declaration of Conformity and other collateral material may contain the company name of Baldor Electric Company and the brand names of Baldor-Dodge and Baldor-Reliance until such time as all materials have been updated to reflect our new corporate identity.

WARNING: To ensure the drive is not unexpectedly started, turn off and lock-out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

WARNING: All products over 25 kg (55 lbs) are noted on the shipping package. Proper lifting practices are required for these products.

Inspection
Inspect shaft to ensure it is smooth, straight, clean, and within commercial tolerances.

Mounting
Install the Non-Expansion unit first.

1. Remove lock plate located on the face of the locknut.
2. Turn locknut counterclockwise until bearing will freely slide onto the shaft.
3. Slide bearing to the desired position on the shaft.
4. The “ZERO Reference Point” is defined as the point where the clearance between the adapter sleeve, shaft and bearing bore has been removed.

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are either provided by ABB or are the responsibility of ABB. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

To reach the “ZERO Reference Point” rotate locknut clockwise, using both hands, as tight as possible. When mounting bearing with shaft sizes 3-1/16” and larger, the following TEST must be performed. As a test to insure you have reached the “ZERO Reference Point” tap on the O.D. of the nut with a hammer and attempt to rotate the nut using both hands. If the nut will not rotate then you have reached the “ZERO Reference Point” and you should proceed to step 5. If you can rotate the nut, using both hands, then you have not reached the true “ZERO Reference Point”, and should repeat step 4A until “ZERO Reference Point” is obtained. When the “ZERO Reference Point” is reached, the bearing will not be able to move by hand axially on the shaft.

5. Scribe a line through the locknut face and adapter race.
6. Using a Spanner or Drift & Hammer, rotate locknut clockwise by the number of turns shown in Table 1.

![Figure 1](image1)
![Figure 2](image2)
![Figure 3](image3)

Table 1 - Locknut Rotation from “Zero Reference Point”

<table>
<thead>
<tr>
<th>Shaft Size (inches)</th>
<th>Locknut Rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/8 - 1 7/16</td>
<td>3/4 to 3/8 turn</td>
</tr>
<tr>
<td>1-1/2</td>
<td>3/4 to 3/8 turn</td>
</tr>
<tr>
<td>1-1/2</td>
<td>7/8 to 1 turn</td>
</tr>
<tr>
<td>1-5/8 - 2</td>
<td>7/8 to 1 turn</td>
</tr>
<tr>
<td>2-3/16 - 3</td>
<td>1 to 1 1/4 turn</td>
</tr>
<tr>
<td>3-3/16 - 4</td>
<td>1 1/4 to 1 1/2 turns</td>
</tr>
<tr>
<td>4-7/16 - 4 1/2</td>
<td>1 1/8 to 1 3/8 turns</td>
</tr>
<tr>
<td>4-15/16 - 5 1/2</td>
<td>1 3/8 to 1 5/8 turns</td>
</tr>
<tr>
<td>5-15/16 - 6</td>
<td>1 1/4 to 1 turn</td>
</tr>
<tr>
<td>6-17/16 - 7</td>
<td>1 1/8 to 1 3/8 turns</td>
</tr>
</tbody>
</table>

* IMPERIAL IP & ISAF
** IMPERIAL IP With Type E Dimensioned Housing
Field Conversion of a Non-Expansion Bearing into an Expansion Bearing

Imperial IP
1. Move snap ring opposite collar side, to the outmost snap ring groove.
2. Remove Non-Expansion nameplate and re-label as an Expansion bearing.

ISAF
1. Remove bearing cap.
2. Remove stabilizing ring.
3. Reassemble cap on base and torque cap bolts to values in Table 2.

Successful operation is dependent upon adequate lubrication. Precaution should be taken during handling and recycling grease, oil or water glycol mixes.

Grease Lubrication

DODGE IP and ISAF bearings are pre-packed with NLGI #2 Lithium Complex grease. For re-lubrication select a grease that is compatible with a #2 Lithium Complex grease. Re-lubricate in accordance with Table 3.

Storage or Special Shutdown

If exposed to wet or dusty conditions or to corrosive vapors, extra protection is necessary. Add grease until it shows at the seals; rotate the bearing to distribute grease; cover the bearing. After storage or idle period, add a little fresh grease before running.

<table>
<thead>
<tr>
<th>Shaft Size (inches)</th>
<th>2 Bolt Base</th>
<th>4 Bolt Base</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bolt Size</td>
<td>Torque</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ft-Lbs.</td>
</tr>
<tr>
<td>1-7/16 - 1-11/16</td>
<td>3/8 - 16</td>
<td>24 - 30</td>
</tr>
<tr>
<td>1-15/16 - 2-3/16</td>
<td>7/16 - 14</td>
<td>40 - 50</td>
</tr>
<tr>
<td>2-7/16 - 2-1/2</td>
<td>1/2 - 13</td>
<td>60 - 75</td>
</tr>
<tr>
<td>2-11/16 - 2</td>
<td>5/8 - 11</td>
<td>120 - 150</td>
</tr>
<tr>
<td>3-3/16 - 4-3/4</td>
<td>3/4 - 10</td>
<td>208 - 260</td>
</tr>
<tr>
<td>3-3/8 - 4</td>
<td>3/8 - 10</td>
<td>259 - 299</td>
</tr>
<tr>
<td>4-1/8 - 4-3/4</td>
<td>1 - 8</td>
<td>512 - 640</td>
</tr>
</tbody>
</table>

Table 2 - Re-Lubrication Intervals (Months) Based on 12 hours per day, 150°F M
Appendix

2. Rulmeca® Wiring diagram

![Wiring Diagram](image)
LOW VOLTAGE MOTORS INSTRUCTION MANUAL (IM)

INSTRUCTIONS:

INSTALLATION AND MAINTENANCE FOR POLYPHASE AC INDUCTION MOTORS

- Frames 143 through 5810 Open Drip Proof
- Frames 56 through 5811 Totally Enclosed Fan Cooled
- Frames 143 through 449 Explosion Proof

- Frames 56 through 5811 Totally Enclosed Air Over
- Frames 56 through 449 Totally Enclosed Non-Ventilated
- Frames 143 through 5811 Totally Enclosed Blower Cooled

NOTE: Condensed manual only. Contact TOSHIBA below for Complete Installation, Operations & Maintenance (IOM) Manual. These instructions are not intended as a complete listing of all details for all procedures required for storage, installation, operation, and maintenance. If you have any questions concerning any of the procedures, Do Not Proceed, and contact Toshiba International Corporation.

STORAGE:

1. Store motor in a clean, dry location and cover completely with plastic. (Leave opening for ventilation.)
2. Motor must be thoroughly dry before applying power.
3. Every six months, give winding a megger test. A minimum of 10 megohms are recommended.

These NOTES & WARNINGS are to be read and understood along with the Low Voltage Motors Instruction Manual before installing, operating, or maintaining the electric motors. This will help avoid unsafe conditions that can cause harm to personnel or damage to equipment.

- Each TOSHIBA electric motor is thoroughly tested at the factory and carefully packaged for standard shipping. Confirm the overall packaging condition upon receipt.
- The equivalent lead wire markings per NEMA(IEC) are: T1(U1), T2(V1), T3(W1), T4(U2), T5(V2), T6(W2), T7(U5), T8(V5), T9(W5), T10(U6), T11(V6), T12(W6).
- All dimensions are in inches (in) or (mm). Divide inches by 25.4 to convert to millimeters (mm).
- Any motor operated on an Adjustable Speed Drive is subject to potential premature bearing failures due to the increased shaft currents caused by common mode voltages inherent with operation on a sinusoidal power source. TOSHIBA recommends insulating both bearings on frame sizes 444 and larger due to the higher risk of bearing failure. Smaller motors are at risk as well and should be considered after review of the application and installation.

- Contact TOSHIBA for a complete copy of TOSHIBA’s “Standard Motor Warranties” policy.
- Do not disable or bypass any safety guards or protective devices.
- WARNING: 140 frame motors should be lifted by two (2) people.
- WARNING: Avoid touching the hot surfaces of the electric motor without wearing proper protection.
- WARNING: Hearing protection is required around noise levels exceeding 80 dBA.
- WARNING: Protection for overload and peak starting currents, and short circuit and ground fault currents, should be in strict accordance with the National Electrical Code Article 430, and local electrical building codes.
- WARNING: Proper circuit protection is required to prevent automatic reset devices from automatically restarting the electric motor if it can be hazardous to personnel or equipment.
- WARNING: Only qualified maintenance personnel should be permitted to perform maintenance in an effort to prevent equipment failure or damage.

WARRANTY:

Generally TOSHIBA will correct at it's option, by repair or replacement (FOB a TOSHIBA-AUTHORIZED SERVICE SHOP), any defect in material and workmanship when properly used for a period of one year after installation or 18 months after shipment, whichever comes first. TOSHIBA is not responsible for apparatus returned without proper authorization and identification, improper handling or storage, misapplication of the motor or driven equipment or device, or improper circuit protection. The amount of liability shall not exceed the purchase price of the product. In no event shall TOSHIBA have any liability for commercial loss, claims for labor, removal and installation charges or consequential damages of any type. It is expressly agreed that Buyer's remedies expressed in this paragraph are Buyer's exclusive remedies.

RENEWAL PARTS:

1. Use only genuine TOSHIBA renewal parts.
2. When ordering, specify complete information (at least Model Number and Serial Number) of the motor. Specify quantity and describe part. See the IOM Manual.
3. For information and service, contact TOSHIBA INTERNATIONAL CORPORATION.

WARNING:

EXPLOSION-PROOF MOTORS are constructed to comply with the UL Label Service Procedure Manual. Repairs of EXPLOSION-PROOF MOTORS must be made by the manufacturer or UL Listed service center to maintain the UL Listing.
MOTOR MAINTENANCE:

INSPECTION:
Inspect motor at regularly scheduled intervals. Keep motor clean and ventilation openings clear of dust, dirt, or other debris.

LUBRICATION:
(1) All motors that are supplied with grease fittings should be lubricated in accordance with the grease label attached to the motor. See IOM Manual.
(2) Bearings and grease must be kept free of dirt.
(3) Do not overgrease. Excessive lubrication will cause overheating, reduce bearing life, and may cause premature bearing failure.
(4) Oil leakage around bearing caps is an indication of over greasing and excess grease should be purged out by operating motor temporarily with grease relief open.

Recommended Greases for STANDARD Applications
Use the greases listed in the IOM Manual for the given temperature range, unless otherwise shown by the motor’s grease nameplate.

Recommended Greases for SPECIAL Applications
The greases shown in the IOM Manual recommended for special applications only should be used only for motors specifically built for such conditions. In general it is not recommended to mix greases of different brands. The mixing of different types of thickeners may destroy the composition and physical properties of the grease. In the event that a different grease is required by the end user, the following steps can be taken. Using the instructions for lubrication, open grease outlet and purge the system as much as possible of the old or unwanted grease. Repeat this same operation after one (1) week of service.

READ CAREFULLY BEFORE INSTALLING AND STARTING MOTOR
(OWNERS RESPONSIBILITY TO SAVE THESE INSTRUCTIONS)

RECEIVING:
(1) Check Nameplate.
(2) Check whether any damage has occurred during transportation. (Motors are normally shipped FOB factory. Freight claims must be submitted by the consignee to the carrier.)
(3) When supplied - be sure to remove bearing lock plate before start-up.
(4) Turn shaft by hand to check that it turns freely.

LOCATION:
(1) All motors should be located in an area where ventilation is not restricted and affects the operation of the motor.
(2) Open Drip Proof Motors are designed for installation in a well ventilated place where the atmosphere is reasonably free of dirt and moisture.
(3) Totally Enclosed Motors may be installed where dirt, moisture (not running water) and corrosion are present, or in outdoor locations.
(4) Explosion Proof Motors are designed and built for hazardous locations. They are UL listed and nameplated for a specific hazardous area of classification as well as CSA listed.

MOUNTING:
(1) Mount motor securely on a firm, flat base. All ball and roller bearing normal thrust motors through the 447 frame should be capable of mounting in any position, mechanically. Consult TOSHIBA for frames larger than 447. Proper drain and construction may be required due to the present environment.
(2) Align motor accurately, using a flexible coupling, if possible. For drive recommendations, consult with drive or equipment manufacturer, or TOSHIBA.
(3) V-belt Sheave Pitch Diameters should not be less than the NEMA recommended values.
(4) Do not overtension the belts as excess tension may damage the motor or driven equipment. Belt speed should not exceed 500 ft. per minute.
(5) Motors must not be subjected to vibration exceeding 0.5 G force. (Motors should not be mounted to shaker screens.)

POWER SUPPLY & CONNECTIONS:
(1) Nameplate voltage and frequency should agree with power supply. Motor will operate satisfactorily on line voltage within 10% of nameplate value; or frequency within 5%, combined variation not to exceed 10%. 230 Volt motors can be used on 220-volt network systems, but with slightly modified performance characteristics.
(2) Dual voltage motors can be connected for the desired voltage by following the connection diagram shown on the nameplate, or by the connection diagram found in the conduit box cover. Alternate starting connections are shown in the conduit box connection diagrams. See IOM Manual.
(3) Explosion Proof Motors have Temperature Limiting Devices in the motor enclosure to prevent excessive external surface temperature of the motor in accordance with UL standards. Terminals of thermal protectors shall be connected to the motor control equipment. Wiring instructions for thermal protectors are listed on the nameplate.
(4) Wiring of motor, control, overload protector and grounding should be in accordance with the National Electrical Code and local building codes.
(5) Disconnect motor from power supply before opening conduit box or working on motor.
(6) Megger test before energizing. A minimum of 10 megohms are recommended.

FOR FURTHER INFORMATION CONTACT:
TOSHIBA INTERNATIONAL CORPORATION
INDUSTRIAL EQUIPMENT DIVISION
11351 WEST LITTLE YORK ROAD, HOUSTON, TX 77041
PHONE (713) 456-0277 FAX (713) 466-0773 TOLL FREE (800)231-1412
WWW.TOSHIBA.COM/IND

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Page 40 of 41
Limited Warranty

JAVALIN MANUFACTURING, a division of INDUSTRIAL MAGNETICS, INC. warrants this eddy current separator to be free from defects in material and workmanship under normal operating conditions for a period of one year from date of shipment to original purchaser. One year represents 2080 operating hours. Without limitation, use or service in highly corrosive environments is not deemed normal. JAVELIN MANUFACTURING does not warranty against magnetic rotor damage caused by ferrous burnout, neglect, or any use that is deemed abnormal. JAVELIN MANUFACTURING sole obligation under this warranty is limited to repairing or replacing any piece of equipment or part that is determined to have been defective within one year of shipment. Defective parts shall be returned to JAVELIN MANUFACTURING, FOB our shop and a replacement part shall be returned to purchaser FOB our shop. JAVELIN MANUFACTURING does not warranty components manufactured by others, but will submit upon purchaser’s request, the warranty of the specific manufacturer. JAVELIN MANUFACTURING does not warranty installation or labor associated with replacement parts granted under the normal warranty conditions. In the case of a motor failure please contact the nearest authorized service center of the motor manufacturer.

The foregoing represents the entire liability of JAVELIN MANUFACTURING to the purchaser. JAVELIN MANUFACTURING makes no other warranties either express or implied. In no event will JAVELIN MANUFACTURING be liable for any direct or indirect, incidental or consequential loss or damages or economic loss (including, but not limited to, loss of product, production time, or equipment) to any person or property arising from operation of this equipment.