Product Information Packet

ECP844206T-4
200HP, 1190RPM, 3PH, 60HZ, 449T, TEFC, FOOT,
### Product Information Packet: ECP844206T-4 - 200HP, 1190RPM, 3PH, 60HZ, 449T, TEFC, FOOT,

#### Part Detail

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A-C MOTOR
CONNECTION DIAGRAM
STANDARD 3 LEAD

T1  L1
T2  L2
T3  L3

(N.P. 1575-BA)
Installation & Operating Manual

Explosion Proof
TENV, TEAO, TEFCE Enclosures
ODP, WPI Enclosures
AC Induction Motors
Integral Horsepower

BALDOR RELANCER®

Product Information Packet: ECP844206T-4 - 200HP, 1,190RPM, 3PH, 60HZ, 449T, TEFC, FOOT.
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  - 5. Suggested bearing and winding RTD setting guidelines for Non-Hazardous Locations ONLY
  - 6. Extended Storage
  - 7. Troubleshooting Chart
  - 8. Maintenance & Troubleshooting

**Section 4**
- Doweling & Bolting
- Repair of Motors used in Hazardous Locations
- Safety Notice
- Storage
- Extended Storage
- General Information
This manual contains general procedures that apply to Baldor Motor products. Be sure to read and understand the Safety Notice statements in this manual. For your protection, do not install, operate or attempt to perform maintenance procedures until you understand the Warning and Caution statements.

**Warning:** A Warning statement indicates a possible unsafe condition that can cause harm to personnel.

**Caution:** A Caution statement indicates a condition that can cause damage to equipment.

Before you install, operate or perform maintenance, become familiar with the following:

- NEMA Publication MG-2, safety standards for construction and guide for selection, installation and use of electric motors and generators.
- ANSI C51.5, the National Electrical Code (NEC) and local codes and practices.
- UL and/or CSA electrical and safety standards.
- Before you install, operate or perform maintenance, become familiar with the following:

**Limited Warranty**

www.baldor.com/support/warranty

**Disclaimer**

The information contained herein is intended to include a comprehensive listing of all details for all procedures required for installation, operation and maintenance. If you have a question about a procedure or are uncertain about any detail, Do Not Proceed. Please contact your Baldor distributor for more information or clarification.

**Safety Notice:** This equipment contains high voltage! Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt installation, operation and maintenance of electrical equipment. Be sure that you are completely familiar with NEMA publication MG-2, safety standards for construction and guide for selection, installation and use of electric motors and generators, the National Electrical Code and local codes and practices. Unsafe installation or use can cause conditions that lead to serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.

**WARNING:** Do not touch electrical connections before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.

**WARNING:** Disconnect all electrical power from the motor windings and accessory devices before disassembly of the motor. Electrical shock can cause serious or fatal injury.

**WARNING:** Be sure the system is properly grounded before applying power. Do not apply AC power before you ensure that all grounding instructions have been followed. Electrical shock can cause serious or fatal injury. National Electrical Code and local codes and practices must be carefully followed.

**WARNING:** Avoid extended exposure to machinery with high noise levels. Be sure to wear ear protective devices to reduce harmful effects to your hearing.

**WARNING:** Surface temperatures of motor enclosures may reach temperatures which can cause discomfort or injury to personnel accidentally coming into contact with hot surfaces. When installing, protective devices should be provided by the user to protect against accidental contact with hot surfaces.

**WARNING:** This equipment may be connected to other machinery that has rotating parts or parts that are driven by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt to install, operate or maintain this equipment.

**WARNING:** Do not bypass or disable protective devices or safety guards. Safety features are designed to prevent damage to personnel or equipment. These devices can only provide protection if they remain operative.

**WARNING:** Avoid the use of automatic reset devices if the automatic resetting of equipment can be hazardous to personnel or equipment.

**WARNING:** Be sure the load is properly coupled to the motor shaft before applying power. The shaft key must be fully captive by the load device. Improper coupling can cause harm to personnel or equipment if the load decouples from the shaft during operation.

**WARNING:** UL Listed motors must only be serviced by UL Approved Authorized Baldor Service Centers if these motors are to be returned to a hazardous and/or explosive atmosphere.

**WARNING:** Thermostat contacts automatically reset when the motor has slightly cooled down. To prevent injury or damage, the control circuit should be designed so that automatic starting of the motor is not possible when the thermostat resets.
WARNING: Use proper care and procedures that are safe during handling, lifting, installing, operating and maintaining operations. Improper methods may cause muscle strain or other harm.

WARNING: Pacemaker danger
- Magnetic and electromagnetic fields in the vicinity of current carrying conductors and permanent magnet motors can result in a serious health hazard to persons with cardiac pacemakers, metal implants, and hearing aids. To avoid risk, stay away from the area surrounding a permanent magnet motor.

WARNING: Before performing any motor maintenance procedure, be sure that the equipment connected to the motor shaft cannot cause shaft rotation. If the load can cause shaft rotation, disconnect the load from the motor shaft before maintenance is performed. Unexpected mechanical rotation of the motor parts can cause injury or motor damage.

WARNING: Do not use non UL/CSA listed explosion proof motors in the presence of flammable or combustible vapors or dust. These motors are not designed for atmospheric conditions that require explosion proof operation.

WARNING: Motors that are to be used in flammable and/or explosive atmospheres must display the UL label on the nameplate along with CSA listed logo. Specific service conditions for these motors are defined in NFPA 70 (NEC) Article 500.

WARNING: Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions, should be permanently guarded to prevent accidental contact by personnel. Accidental contact with body parts or clothing can cause serious or fatal injury.

Caution: To prevent premature equipment failure or damage, only qualified maintenance personnel should perform maintenance.

Caution: Do not over-tension belts. Excessive tension may damage the motor or driven equipment.

Caution: Do not lift the motor and its driven load by the motor lifting hardware. The motor lifting hardware is adequate for lifting only the motor. Disconnect the load (gears, pumps, compressors, or other driven equipment) from the motor shaft before lifting the motor.

Caution: If eye bolts are used for lifting a motor, be sure they are securely tightened. The lifting direction should not exceed a 20° angle from the shank of the eye bolt or lifting lug. Excessive lifting angles can cause damage.

Caution: To prevent equipment damage, be sure that the electrical service is not capable of delivering more than the maximum motor rated amps listed on the rating plate.

Caution: If a HI POT test (High Potential Insulation test) must be performed, follow the precautions and procedures in NEMA MG1 and MG2 standards to avoid equipment damage.

If you have any questions or are uncertain about any statement or procedure, or if you require additional information please contact your Baldor distributor or an Authorized Baldor Service Center.

Receiving

Each Baldor Electric Motor is thoroughly tested at the factory and carefully packaged for shipment. When you receive your motor, there are several things you should do immediately.

1. Observe the condition of the shipping container and report any damage immediately to the commercial carrier that delivered your motor.

2. Verify that the part number of the motor you received is the same as the part number listed on your purchase order.

Handling

The motor should be lifted using the lifting lugs or eye bolts provided.

Caution: Do not lift the motor and its driven load by the motor lifting hardware. The motor lifting hardware is adequate for lifting only the motor. Disconnect the load (gears, pumps, compressors, or other driven equipment) from the motor shaft before lifting the motor.

1. Use the lugs or eye bolts provided to lift the motor. Never attempt to lift the motor and additional equipment connected to the motor by this method. The lugs or eye bolts provided are designed to lift only the motor. Never lift the motor by the motor shaft or the hood of a WPII motor.

2. To avoid condensation inside the motor, do not unpack until the motor has reached room temperature. (Room temperature is the temperature of the room in which it will be installed). The packing provides insulation from temperature changes during transportation.

3. Do not lift the motor and its driven load from the motor lifting hardware. The motor lifting hardware is designed to lift only the motor and its driven load. The motor lifting hardware must be removed before the motor and driven load can be lifted separately.
4. If the motor must be mounted to a plate with the driven equipment such as pump, compressor etc., it may not be possible to lift the motor alone. For this case, the assembly should be lifted by a sling around the mounting base. The entire assembly can be lifted as an assembly for installation. Do not lift the assembly using the motor lugs or eye bolts provided. Lugs or eye bolts are designed to lift motor only. If the load is unbalanced (as with couplings or additional attachments) additional slings or other means must be used to prevent tipping. In any event, the load must be secure before lifting.

Storage

Storage requirements for motors and generators that will not be placed in service for at least six months from date of shipment.

Improper motor storage will result in seriously reduced reliability and failure. An electric motor that does not experience regular usage while being exposed to normally humid atmospheric conditions is likely to develop rust in the bearings or rust particles from surrounding surfaces may contaminate the bearings. The electrical insulation may absorb an excessive amount of moisture leading to the motor winding failure.

A wooden crate "shell" should be constructed to secure the motor during storage. This is similar to an export box but the sides & top must be secured to the wooden base with lag bolts (not nailed as export boxes are) to allow opening and reclosing many times without damage to the "shell".

Minimum resistance of motor winding insulation is 5 Meg ohms or the calculated minimum, which ever is greater. Minimum resistance is calculated as follows:

\[ R_m = kV + 1 \]

where: \( R_m \) is minimum resistance to ground in Meg ohms and \( kV \) is rated nameplate voltage defined as Kilo Volts.

Example: For a 480VAC rated motor \( R_m = 1.48 \) meg ohms (use 5 MΩ).

For a 4160VAC rated motor \( R_m = 5.16 \) meg ohms.

Preparation for Storage

1. Some motors have a shipping brace attached to the shaft to prevent damage during transportation. The shipping brace, if provided, must be removed and stored for future use. The brace must be reinstalled to hold the shaft firmly in place against the bearing before the motor is moved.

2. Store in a clean, dry, protected warehouse where control is maintained as follows:
   a. Shock or vibration must not exceed 2 mils maximum at 60 hertz, to prevent the bearings from brinelling. If shock or vibration exceeds this limit vibration isolation pads must be used.
   b. Storage temperatures of 10°C (50°F) to 49°C (120°F) must be maintained.
   c. Relative humidity must not exceed 60%.
   d. Motor space heaters (when present) are to be connected and energized whenever there is a possibility that the storage ambient conditions will reach the dew point. Space heaters are optional.

3. Measure and record the resistance of the winding insulation (dielectric withstand) every 30 days of storage.
   a. If motor insulation resistance decreases below the minimum resistance, contact your Baldor District office.
   b. Place new desiccant inside the vapor bag and re-seal by taping it closed.
   c. If a zipper closing type bag is used instead of the heat-sealed type bag, zip the bag closed instead of taping it. Be sure to place new desiccant inside bag after each monthly inspection.
   d. Place the shell over the motor and secure with lag bolts.

4. Where motors are mounted to machinery, the mounting must be such that the drains and breathers are fully operable and are at the lowest point of the motor. Vertical motors must be stored in the vertical position. Storage environment must be maintained as stated in step 2.
5. Motors with anti-friction bearings are to be greased at the time of going into extended storage with periodic service as follows:
   a. Motors marked “Do Not Lubricate” on the nameplate do not need to be greased before or during storage.
   b. Ball and roller bearing (anti-friction) motor shafts are to be rotated manually every 3 months and greased every 6 months in accordance with the Maintenance section of this manual.
   c. Sleeve bearing (oil lube) motors are drained of oil prior to shipment. The oil reservoirs must be refilled to the indicated level with the specified lubricant (see Maintenance). The shaft should be rotated manually at least 10 to 15 revolutions per month to distribute oil to bearing surfaces.
   d. “Provisions for oil mist lubrication” – These motors are packed with grease. Storage procedures are the same as paragraph 5b.
   e. “Oil Mist Lubricated” – These bearings are protected for temporary storage by a corrosion inhibitor. If stored for greater than 3 months or outdoor storage is anticipated, connected to the oil mist system while in storage. If this is not possible, add the amount of grease indicated under “Standard Condition” in Section 3, then rotate the shaft 15 times by hand.
5. All breather drains are to be operable while in storage (drain plugs removed). The motors must be stored so that the drain is at the lowest point. All breathers and automatic “T” drains must be operable to allow breathing and draining at points other than through the bearings around the shaft.
6. Coat all external machined surfaces with a rust-preventing material. An acceptable product for this purpose is Exxon Rust Ban #392.
7. Carbon brushes should be lifted and held in place in the holders, above the commutator, by the brush holder fingers. The commutator should be wrapped with a suitable material such as cardboard paper as a mechanical protection against damage.
8. Non-regreasable Motors
   a. Non-regreasable motors with “Do Not Lubricate” on the nameplate should have the motor shaft rotated 15 times to redistribute the grease within the bearing every 3 months or more often.
   b. All Other Motor Types
      1. Before storage, the following procedure must be performed.
         a. Remove the grease drain plug, if supplied, on the bottom of each bracket prior to lubricating the motor.
         b. The motor with regreasable bearing must be greased as instructed in Section 3 of this manual.
         c. Replace the grease drain plug after greasing.
         d. The motor shaft must be rotated a minimum of 15 times after greasing.
   c. Motor Shafts are to be rotated at least 15 revolutions manually every 3 months and additional grease added every nine months (see Section 3) to each bearing.
9. Removal From Storage
   1. Remove all packing materials.
   2. Measure and record the electrical resistance of the winding insulation resistance meter at the time of removal from storage.
   3. Regrease the bearings as instructed in Section 3 of this manual.
   4. The motor shaft must be rotated a minimum of 15 times before greasing.
   5. Before the motor is placed in service, the electrical resistance of the winding insulation resistance meter at the time of going into extended storage with the new motor is to be measured.
IEC certified products have special markings that identify the protection concept and environment.

<table>
<thead>
<tr>
<th>Ex Protection Concept (ExnA)</th>
<th>Gas Group (IIC)</th>
<th>Temperature Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEX Specific Marking of Explosion Protection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Operation on Frequency Converters**

If the motor is evaluated for operation with an adjustable speed drive, the type of converter (for example, PWM for Pulse Width Modulated) and safe speed ranges (for example, 0–120 Hz) will be specified in the certification documents or on motor nameplates. It is necessary to consult the adjustable speed drive manual for proper set up.

Specific Conditions of Use:

If the motor certificate number is followed by the symbol “X”, this indicates that the motor has specific conditions of use which are indicated on the certificate. It is necessary to review the product certification conditions as well as the information on this instruction manual.

**Equipment Marking for IEC Certified Product**

IEC certified products have special markings that identify the protection concept and environment.

![Diagram showing equipment markings for IEC certified product](image-url)
Section 2
Installation & Operation

Overview
Installation should conform to the National Electrical Code as well as local codes and practices. When installing the motor, the following information is to be considered:

- The standard motor base is designed for horizontal mounting. Adjustment or skidding the motor should be avoided.
- To avoid electrical hazards, all wiring and electrical connections should be made in accordance with local codes and practices.
- When installing, be sure to secure the motor to the foundation to minimize vibration and maintain alignment.
- The motor should be installed in a location compatible with the motor enclosure and specific ambient conditions.
- A minimum of the P dimension plus 2 inches (50mm) is required for exhaust at the motor. The P dimension is shown on the motor dimension sheet.

Table 2-1 Endurance Enclosures

<table>
<thead>
<tr>
<th>Enclosure Type</th>
<th>Exhaust</th>
<th>Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEFC / TENV (IC0141)</td>
<td>Fan Cover Air Intake</td>
<td>180° - 210° Frame 1 (25mm)</td>
</tr>
<tr>
<td>IE1 100 - 150 Frame</td>
<td>Fan Cover Air Intake</td>
<td>250° - 449° Frame 4 (100mm)</td>
</tr>
<tr>
<td>IE1 175 - 185 Frame</td>
<td>Fan Cover Air Intake</td>
<td>180° - 210° Frame 1 (25mm)</td>
</tr>
<tr>
<td>IEC 112 - 132</td>
<td>Exhaust Envelope equal to the P Dimension on the motor</td>
<td></td>
</tr>
<tr>
<td>IEC 160 - 280</td>
<td>Exhaust Envelope equal to the P Dimension on the motor</td>
<td></td>
</tr>
</tbody>
</table>

Hazard Location

- Hazardous locations are those where there is a risk of explosion due to the presence of combustible gases, vapors, dust, fibers, or flyings.
- Facilities requiring special equipment for hazardous locations are typically classified in accordance with local requirements.
- In the US market, guidance is provided by the National Electric Code.

Mounting Location

- The motor must be securely installed to a rigid foundation or mounting surface to minimize vibration and maintain alignment between the motor and load.
- Failure to provide a proper mounting surface may cause vibration, misalignment, and bearing damage.
- Foundation caps and sole plates are designed to act as spacers for the equipment they support. If these devices are used, be sure that they are evenly supported by the foundation or mounting surface.
- When installation is complete and alignment is achieved, the base should be grouted to the foundation to maintain this alignment.

Adjustable or sliding rails are designed for horizontal mounting only. Consult your Baldor distributor or authorized Baldor Service Center for further information.
Some motors have standardized frames containing 6 or 8 mounting holes.

**Frame Mounting Holes**

Some motors have standardized frames containing 6 or 8 mounting holes. Choose the proper mounting holes to use.

**Figure 2-2 6 & 8 Hole Motor Frame Mounting**

![Diagram of 6 & 8 hole motor frame mounting]

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After proper alignment is verified, dowel pins should be inserted through the motor feet into the foundation. This will maintain the correct motor position should motor removal be required. (Baldor/C0083 Reliance motors are designed for doweling.)

1. Drill dowel holes in diagonally opposite motor feet in the locations provided.
2. Drill corresponding holes in the foundation.
3. Ream all holes.
4. Install proper fitting dowels.
5. Mounting bolts must be carefully tightened to prevent changes in alignment.

Use a flat washer and lock washer under each nut or bolt head to hold the motor feet secure. Flanged nuts or bolts may be used as an alternative to washers.

**WARNING:** Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions, should be permanently guarded to prevent accidental contact by personnel. Accidental contact with body parts or clothing can cause serious or fatal injury.

**Guarding**

Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions. This is particularly important where the parts have surface irregularities such as keys, keyways or set screws. Some satisfactory methods of guarding are:

1. Covering the machine and associated rotating parts with structural or decorative parts of the driven equipment.
2. Providing covers for the rotating parts. Covers should be sufficiently rigid to maintain guarding during normal service.

**Power Connection**

Motor and control wiring, overload protection, disconnects, accessories and grounding should conform to the National Electrical Code and local codes and practices.

For ExnA hazardous location motors, it is a specific condition of use that all terminations in a conduit box be fully insulated. Flying leads must be insulated with two full wraps of electrical grade insulating tape or heat shrink tubing.

**Grounding**

In the USA consult the National Electrical Code, Article 430 for information on grounding of motors and generators, and Article 250 for general information on grounding. In making the ground connection, the installer should make certain that there is a solid and permanent metallic connection between the ground point, the motor or generator terminal housing, and the motor or generator frame. In non-USA locations consult the appropriate national or local code applicable.

Motors with resilient cushion rings usually must be provided with a bonding conductor across the resilient member. Some motors are supplied with the bonding conductor on the concealed side of the cushion ring to protect the bond from damage. Motors with bonded cushion rings should usually be grounded at the time of installation in accordance with the above recommendations for grounding of group motors. WHERE BONDING CONDUCTORS ARE USED IN MULTI-MOTOR INSTALLATIONS EMPLOYING GROUP PROTECTION, THE BONDING OF THE CIRCUIT OR SYSTEM SHOULD BE DESIGNED TO ASSURE THAT IT IS SEPERATE FROM THE BONDING OF THE ENTIRE INSTALLATION. IF A SECONDARY AC ID SHIELDING IS USED IN THE INSTALLATION, IT SHOULD NOT BE CONNECTED TO THE BONDING CONDUCTOR. IN MULTIPLE MOTOR INSTALLATIONS, THE MOISTURE PROTECTION CONDUCTORS SHOULD BE CONNECTED TO THE BONDING CONDUCTOR USING A CONDUCTOR WITH A CROSS-SECTIONAL AREA OF AT LEAST 4 MM².

**Cross-sectional area of phase conductors:**

| Minimum cross-sectional area of the corresponding protective conductor |
|--------------------------|------------------|
| Sₚ | 0.5 S |

**Cross-sectional area of phase conductors:**

<table>
<thead>
<tr>
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<td>0.5 S</td>
</tr>
<tr>
<td>16 S</td>
<td>16 S</td>
</tr>
<tr>
<td>35 S</td>
<td>35 S</td>
</tr>
</tbody>
</table>

**Equipotential bonding connection shall be made using a conductor with a cross-sectional area of at least 4 mm².**

**Additional Annotations:**

- Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions by personnel. Accidental contact with body parts or clothing can cause serious or fatal injury.
- Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions, should be permanently guarded to prevent accidental contact by personnel. Accidental contact with body parts or clothing can cause serious or fatal injury.
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**WARNING:** Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions, should be permanently guarded to prevent accidental contact by personnel. Accidental contact with body parts or clothing can cause serious or fatal injury.
Conduit Box

For ease of making connections, an oversize conduit box is provided. Most conduit boxes can be rotated 360° in 90° increments. Auxiliary conduit boxes are provided on some motors for accessories such as space heaters, RTDs, etc.

AC Power

Motors with flying lead construction must be properly terminated and insulated. Connect the motor leads as shown on the connection diagram located on the name plate or inside the cover on the conduit box. Be sure the following guidelines are met:

1. AC power is within ±10% of rated voltage with rated frequency. (See motor name plate for ratings).

OR

2. AC power is within ±5% of rated frequency with rated voltage.

OR

3. A combined variation in voltage and frequency of ±10% (sum of absolute values) of rated values, provided the frequency variation does not exceed ±5% of rated frequency.

Performance within these voltage and frequency variations are shown in Figure 2-4.

Figure 2-3 Accessory Connections

- One heater is installed in each end of motor. Leads for each heater are labeled H1 & H2. (Like numbers should be tied together).
- Three thermistors are installed in windings and tied in series. Leads are labeled TD1 & TD2.
- Winding RTDs are installed in windings (2) per phase. Each set of leads is labeled 1TD1, 1TD2, 2TD1, 2TD2, etc.
- * One bearing RTD is installed in Drive endplate (PUEP), leads are labeled RTDDE.
- * One bearing RTD is installed in Opposite Drive endplate (FREP), leads are labeled RTDODE.
- * Note RTD may have 2 Red/1 White leads; or 2 White/1 Red Lead.

AC Power Inverters used to supply adjustable frequency power to induction motors produce wave forms with lower order harmonics with voltage spikes superimposed. Turn-to-turn, phase-to-phase, and ground insulation of stator windings are subject to the resulting dielectric stresses. Suitable precautions should be taken in the design of these drive systems to minimize the magnitude of these voltage spikes. Consult the drive instructions for maximum acceptable motor lead lengths, and proper grounding.

Rotation

All three phase motors are reversible. To reverse the direction of rotation, disconnect and lock out power and interchange any two of the three line leads for three phase motors. For single phase motors, check the connection diagram to determine if the motor is reversible and follow the connection instructions for lead numbers to be interchanged.

AC Power

Motors with flying lead construction must be properly terminated and insulated. Connect the motor leads as shown on the connection diagram located on the name plate or inside the cover on the conduit box. Be sure the following guidelines are met:

1. AC power is within ±10% of rated voltage with rated frequency.

OR

2. AC power is within ±5% of rated frequency with rated voltage.

OR

3. A combined variation in voltage and frequency of ±10% (sum of absolute values) of rated values, provided the frequency variation does not exceed ±5% of rated frequency.

Performance within these voltage and frequency variations are shown in Figure 2-4.

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Rotation

All three phase motors are reversible. To reverse the direction of rotation, disconnect and lock out power and interchange any two of the three line leads for three phase motors. For single phase motors, check the connection diagram to determine if the motor is reversible and follow the connection instructions for lead numbers to be interchanged.
Note: Main power leads for CE Marked Motors may be marked U/V/W – for standard configurations. Please consult connection diagrams.
Connection Diagrams

AC Motor Connection Diagram

2.6 Installation & Operation

MN408

Continued
Initial Lubrication

Before the erection, motors are supplied from the factory with the bearings properly packed with grease, and ready to operate. Where the unit has been subjected to extended storage (6 months or more) the bearings should be relubricated (after assembly) prior to starting. When motors are shipped for field erection, it is recommended that consideration be given to the bearing lubrication at this time, since motors are normally equipped with automatic grease which may be frozen in place as received.

1. First Time Start Up

Be sure that all power to motor and accessories is off. Be sure the motor shaft is disconnected from the load and will not cause mechanical rotation of the motor shaft.

1. Make sure that the mechanical installation is secure. All bolts and nuts are tightened etc.
2. Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical insulation.
3. Verify that the motor is oriented to ensure that the load is not connected.
4. Be sure all shipping materials and braces (if used) are removed from motor shaft.
5. Manually rotate the motor shaft to ensure that it rotates freely.
6. Replace all panels and covers that were removed during installation.
7. Momentarily apply power and check the direction of rotation of the motor shaft.
8. If motor rotation is wrong, be sure power is off and change the motor lead connections.
9. Start the motor and ensure operation is smooth without excessive vibration or noise.
10. After 1 hour of operation, disconnect power and connect the load to the motor shaft.

If so, run the motor for 1 hour with no load connected.

Verify rotation direction before you continue.

Changes in Motor Performance (%)

Figure 2-4 Typical Motor Performance VS Voltage Variations

Voltage Variations (%)

Full-Load Current

Full-Load Power

Efficiency

Maximum Torque

Initial Lubrication 2-7

1. Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical insulation.
2. Verify that the motor is oriented to ensure that the load is not connected.
3. Be sure all shipping materials and braces (if used) are removed from motor shaft.
4. Manually rotate the motor shaft to ensure that it rotates freely.
5. Replace all panels and covers that were removed during installation.
6. Momentarily apply power and check the direction of rotation of the motor shaft.
7. If motor rotation is wrong, be sure power is off and change the motor lead connections.
8. Start the motor and ensure operation is smooth without excessive vibration or noise.
9. After 1 hour of operation, disconnect power and connect the load to the motor shaft.
10. If so, run the motor for 1 hour with no load connected.

Verify rotation direction before you continue.

Changes in Motor Performance (%)

Figure 2-4 Typical Motor Performance VS Voltage Variations

Voltage Variations (%)

Full-Load Current

Full-Load Power

Efficiency

Maximum Torque

Initial Lubrication 2-7
Coupled Start Up

This procedure assumes a coupled start up. Also, that the first time start up procedure was successful.

1. Check the coupling and ensure that all guards and protective devices are installed.
2. Check that the coupling is properly aligned and not binding.
3. The first coupled start up should be with no load. Apply power and verify that the load is not transmitting excessive vibration back to the motor though the coupling or the foundation. Vibration should be at an acceptable level.
4. Run for approximately 1 hour with the driven equipment in an unloaded condition. The equipment can now be loaded and operated within specified limits. Do not exceed the name plate ratings for amperes for steady continuous loads.

Jogging and Repeated Starts

Repeated starts and/or jogs of induction motors generally reduce the life of the motor winding insulation. A much greater amount of heat is produced by each acceleration or jog than by the same motor under full load. If it is necessary to repeatedly start or jog the motor, it is advisable to check the application against the equipment with the local Baldor distributor or Baldor Service Center.

Heating

- Duty rating and maximum ambient temperature are stated on the motor name plate.
- In the US and in most international markets, areas are classified in Zones.
- In some newer installations, areas are classified with regard to risk and exposure to the hazard. In the US market, areas are classified with regard to risk and exposure to the hazard.
- In Europe, Class I Division 1 / Zone 1 (Equipment Group I (mining) or II (surface), Equipment Protection Level (EPL) Gb, Mb).
- The Baldor Reliance / ECP844206T-4 motors are typically designed to meet Class I (Division 1) Group C and D (explosion proof) or Ex d IIB (flameproof).
- An application note regarding equipment applied in accordance with the US National Electric Code (NFPA 70A-2008) - according to NFPA 70A (E). 

Hazardous Locations

Hazardous locations are those where there is a risk of ignition due to the presence of combustible gases, vapors, dust, fibers, or flyings. 

Protection Concepts

Class I Division 1 / Zone 1 (Equipment Group I (mining) or II (surface), Equipment Protection Level (EPL) Gb, Mb)

The Baldor Reliance / ECP844206T-4 motors are typically designed to meet Class I (Division 1) Group C and D (explosion proof) or Ex d IIB (flameproof).
If thermostats are provided as a condition of certification, it is the installer's responsibility to make sure that these devices are properly connected to a suitable switching device. The ATEX directive requires that motor shutdown on thermal trip be accomplished without an intermediate software command.

Flameproof motors, internationally referred to as Ex d use a protection concept similar to that used in Class I Division 1 motors, with minor differences in the flameproof joints and cable entry designs. Flameproof and explosion proof motors are both type tested. Representative motors are connected to a reference gas and ignited in laboratory conditions to verify that the flame is not transmitted outside the motor enclosure and to determine the maximum internal pressure encountered.

Explosion proof and Flame proof motors shipped without a conduit box require use of a certified box of suitable dimensions and that is appropriate for the classification.

Class I Division 2 / Zone 2 Ex nA, [Equipment Protection Level (EPL) Gc]
This protection concept relies on having no sources of ignition present such as arcing parts or hot surfaces. For this protection concept, internal temperatures as well as external temperatures are considered. In many cases, the internal temperatures are higher than the external temperatures and therefore become the limiting factor in determination of temperature code designation. In these applications, it is very important to use a motor that has been evaluated thermally for use with an inverter or converter, if variable speed operation is desired. Thermostats used for Class I Division 2 and Ex nA motors are used to protect the motor only. For motors using flying lead construction, it is important to use connection lugs and insulate with heat shrink tubing or a double wrap of insulation grade electrical tape to avoid the risk of spark or ignition.

Class II Division 1 / Zone 21 [Equipment Group III, Equipment Protection Level (EPL) Db]
This area classification is one where the risk of ignitable concentrations of dust is present at all or some of the time. The protection concepts used for Class II Division 1 is similar to flamepath, except with additional dust exclusion paths designed for the rotating shaft. In the international designations, this concept is referred to as dust ignition proof or Ex tD. External surface temperature remains the limiting factor. Thermal limiting devices such as thermostats, thermistors or RTDs may be provided on these motors. If thermostats are provided as a condition of certification, it is the installer's responsibility to make sure that these devices are properly connected to a suitable switching device.

Note: In the North American area classification system, Class III exists for fibers and flyings. In the IEC designation, both dusts and flyings are absorbed into Group III.

Class II Division 2 / Zone 22 [Equipment Group III, Equipment Protection Level (EPL) Dc]
This area classification is one where the risk of exposure to ignitable concentrations of dust are not likely to occur under normal operating conditions and rely heavily on the housekeeping practices within the location. The use of electrical equipment that is not listed and labeled is not permitted. Equipment mounted within the area must be listed and labeled as suitable for the classification.

Sine Wave Power Operation for Division 1 or 2 and Zone 1 or 2 and Zone 21 or 22 Hazardous Location.
These motors are designed to operate at or below the maximum surface temperature (or Tₘₐₓ) stated on the nameplate. Failure to operate the motor properly can cause this maximum surface temperature to be exceeded. If applied in a Division 1 or 2 / Zone 1 or 2 and Zone 21 or 22 environment, this excessive temperature may cause ignition of hazardous materials. Operating the motor at any of the following conditions can cause the marked surface temperature to be exceeded.

1. Motor load exceeding service factor nameplate value
2. Ambient temperatures above nameplate value
3. Voltages above or below nameplate value
4. Unbalanced voltages
5. Loss of proper ventilation
6. Voltage above or below nameplate value
7. Frequency of operation
8. Improper installation
9. Improper ventilation
10. Overheated motor

Variable Frequency Power Operation for Division 1 or 2 and Zone 1 or 2 and Zone 21 or 22 Hazardous Location
Only motors with nameplates marked for use on inverter (variable frequency) power, and labeled for specific hazardous areas may be used in those hazardous areas on inverter power. The motor is designed to operate at or below the maximum surface temperature (or Tₘₐₓ) stated on the nameplate. Failure to operate the motor properly can cause this maximum surface temperature to be exceeded.
If applied in a Division 1 or 2 / Zone 1 or 2 and Zone 21 or 22 environment, this excessive temperature may cause ignition of hazardous materials. Operating the motor at any of the following conditions can cause the marked surface temperature to be exceeded.

1. Motor load exceeding service factor nameplate value
2. Ambient temperature above nameplate value
3. Voltage (at each operating frequency) above or below rated nameplate value
4. Unbalanced voltages
5. Loss of proper ventilation
6. Operation outside of the nameplate speed / frequency range
7. Altitudes above 3300 feet / 1000 meters
8. Single phase operation of polyphase equipment
9. Unstable current wave forms
10. Lower than name plate minimum carrier frequency

Thermal Limiting

1. Motor load exceeding service factor nameplate value
2. Ambient temperature above nameplate value
3. Voltage (at each operating frequency) above or below rated nameplate value
4. Unbalanced voltages
5. Loss of proper ventilation
6. Operation outside of the nameplate speed / frequency range
7. Altitudes above 3300 feet / 1000 meters
8. Single phase operation of polyphase equipment
9. Unstable current wave forms
10. Lower than name plate minimum carrier frequency

If applied in a Division 1 or 2 / Zone 1 or 2 and Zone 21 or 22 environment, this excessive temperature can cause ignition of hazardous materials.
WARNING: UL and EX Listed motors must only be serviced by UL or EX Approved Authorized Baldor Service Centers.

Ball Bearing Motors

Type of Grease
A high grade ball or roller bearing grease should be used. Recommended grease for standard service conditions is PENNZOE EXXON POLYREX EM (Exxon Mobil). Do not mix greases unless compatibility has been confirmed.

Ball Bearing Motors

Operating Temperature

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEXACO, INC.</td>
<td>-25 to 50</td>
</tr>
<tr>
<td>MOBIL</td>
<td>-25 to 50</td>
</tr>
<tr>
<td>CHEVRON</td>
<td>-25 to 50</td>
</tr>
<tr>
<td>PENNZOE</td>
<td>-25 to 50</td>
</tr>
<tr>
<td>BLACK PEARL</td>
<td>-25 to 50</td>
</tr>
</tbody>
</table>

Relubrication & Bearings

Bearing grease will lose its lubricating ability over time and can cause early motor failure.

Relubrication & Bearings

1. Check all electrical connections to be sure they are tight.
2. Perform a dielectric test on the insulation to ensure the integrity of the winding insulation.
3. Check the motor to ensure the alignment is correct and the bearings are not worn.
4. Check the motor to ensure the alignment is correct and the bearings are not worn.

WARNING: Do not touch electrical connections before the power has been disconnected.

General Instructions

Inspection, operation, and maintenance of the equipment.

Inspection, operation, and maintenance of the equipment.

Inspection, operation, and maintenance of the equipment.

Inspection, operation, and maintenance of the equipment.
Relubrication Intervals

Recommended relubrication intervals are shown in Table 3-2. It is important to realize that the recommended intervals of Table 3-2 are based on average use. Refer to additional information contained in Tables 3-3, 3-4 and 3-5.

Table 3-2 Relubrication Intervals

<table>
<thead>
<tr>
<th>NEMA / (IEC) Frame Size</th>
<th>Rated Speed - RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 210 incl. (132)</td>
<td>**2700 Hrs.</td>
</tr>
<tr>
<td></td>
<td>5500 Hrs.</td>
</tr>
<tr>
<td></td>
<td>12000 Hrs.</td>
</tr>
<tr>
<td></td>
<td>18000 Hrs.</td>
</tr>
<tr>
<td>Over 210 to 280 incl. (180)</td>
<td>**3600 Hrs.</td>
</tr>
<tr>
<td></td>
<td>9500 Hrs.</td>
</tr>
<tr>
<td></td>
<td>15000 Hrs.</td>
</tr>
<tr>
<td>Over 280 to 360 incl. (225)</td>
<td>**2200 Hrs.</td>
</tr>
<tr>
<td></td>
<td>7400 Hrs.</td>
</tr>
<tr>
<td></td>
<td>12000 Hrs.</td>
</tr>
<tr>
<td>Over 360 to 449 incl. (315)</td>
<td>*2200 Hrs.</td>
</tr>
<tr>
<td></td>
<td>3500 Hrs.</td>
</tr>
<tr>
<td></td>
<td>7400 Hrs.</td>
</tr>
<tr>
<td></td>
<td>10500 Hrs.</td>
</tr>
</tbody>
</table>

* Relubrication intervals are for ball bearings.

For vertically mounted motors and roller bearings, divide the relubrication interval by 2.

** For motors operating at speeds greater than 3600 RPM, contact Baldor for relubrication recommendations.

Table 3-3 Service Conditions

<table>
<thead>
<tr>
<th>Severity of Service</th>
<th>Hours per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>8</td>
</tr>
<tr>
<td>Severe</td>
<td>16 Plus</td>
</tr>
<tr>
<td>Extreme</td>
<td>&gt;50° C</td>
</tr>
</tbody>
</table>

Ambient Temperature

<table>
<thead>
<tr>
<th>Atmospheric Contamination</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean, Little Corrosion</td>
<td>40° C</td>
<td>30° C</td>
</tr>
<tr>
<td>Moderate dirt, Corrosion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe dirt, Abrasive dust, Corrosion, Heavy Shock or Vibration 16 Plus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For motors operating at speeds greater than 3600 RPM, contact Baldor for relubrication recommendations.

For vertically mounted motors and roller bearings, divide the relubrication interval by 2.

Relubrication intervals are for ball bearings.

Table 3-4 Relubrication Interval Multiplier

<table>
<thead>
<tr>
<th>Severity of Service</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>1.0</td>
</tr>
<tr>
<td>Severe</td>
<td>0.5</td>
</tr>
<tr>
<td>Extreme</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Table 3-5 Motor Design

Some motor designs use different bearings on each motor end. In this case, the larger bearing is insulated on the motor Drive endplate. This is normally indicated on the motor nameplate.

Relubrication intervals are based on average use.

Table 3-6 Maintenance & Troubleshooting MN408
### Table 3-5  Bearings Sizes and Types

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>NEMA (IEC)</th>
<th>Bearing Description</th>
<th>Weight of Grease to add *</th>
<th>Volume of grease to be added</th>
<th>Bearing Description (These are the “Large” Bearings (Shaft End) in each Frame Size)</th>
<th>NEAM (IEC)</th>
<th>Frame Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 frame</td>
<td>56 to 140 (90)</td>
<td>6203</td>
<td>0.08 (2.4)</td>
<td>0.15</td>
<td>AC Induction Servo: 76 Frame 180 (112) 6207 0.19 (5.0) 0.3 1.0</td>
<td>56 to 140 (90)</td>
<td></td>
</tr>
<tr>
<td>77 frame</td>
<td>140 (90)</td>
<td>6205</td>
<td>0.15 (3.9)</td>
<td>0.2</td>
<td>AC Induction Servo: 77 Frame 210 (132) 6210 0.32 (9.0) 0.64 2.1</td>
<td>140 (90)</td>
<td></td>
</tr>
<tr>
<td>76 frame</td>
<td>180 (100)</td>
<td>6206</td>
<td>0.19 (5.0)</td>
<td>0.3</td>
<td>AC Induction Servo: 80 Frame 250 (160) 6213 0.22 (6.1) 0.44 1.4</td>
<td>180 (100)</td>
<td></td>
</tr>
<tr>
<td>5000 to 5800 (315−450)</td>
<td>6207</td>
<td>0.22 (6.1)</td>
<td>0.44</td>
<td>1.4</td>
<td>AC Induction Servo: 5000 to 5800 (315−450) NU328 4.70 (130) 9.2 30.0</td>
<td>5000 to 5800 (315−450)</td>
<td>NU328</td>
</tr>
</tbody>
</table>

* Weight in grams = .005 DB of grease to be added.

Note: Not all bearing sizes are listed. For intermediate bearing sizes, use the grease volume for the next larger size bearing.
Caution: To avoid damage to motor bearings, grease must be kept free of dirt. For an extremely dirty environment, contact your Baldor distributor or an authorized Baldor Service Center for additional information.

Relubrication Procedure

Be sure that the grease you are adding to the motor is compatible with the grease already used. Table 3-5 shows that 1.5 to 3.9 teaspoons of grease is to be added.

1. Table 3-2 lists 9500 hours for standard conditions. Assume - NEMA 286T (IEC 180), 1750 RPM motor driving an exhaust fan in an ambient temperature of 43°C and the atmosphere is moderately corrosive.

Caution: To avoid damage to motor bearings, grease must be kept free of dirt.

Relubrication Determination

Assume - NEMA 286T (IEC 180), 1750 RPM motor driving an exhaust fan in an ambient temperature of 43°C.

2. Table 3-3 classifies severity of service as "Severe".

3. Table 3-5 shows that 1.2 in 3 or 3.9 teaspoon of grease is to be added.

Note: Smaller bearings in size category may require reduced amounts of grease.

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Table 3-6  Troubleshooting Chart

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Causes</th>
<th>Possible Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor will not start</td>
<td>Usually caused by line trouble, such as, single phasing at the starter.</td>
<td>Check source of power. Check overloads, fuses, controls, etc.</td>
</tr>
<tr>
<td>Excessive humming</td>
<td>High Voltage. Eccentric air gap.</td>
<td>Check input line connections. Have motor serviced at local Baldor service center.</td>
</tr>
<tr>
<td>Motor Over Heating</td>
<td>Overload. Compare actual amps (measured) with nameplate rating.</td>
<td>Locate and remove source of excessive friction in motor or load. Reduce load or replace with motor of greater capacity.</td>
</tr>
<tr>
<td>Single Phasing.</td>
<td>Overdamped. Incorrect air gap. Incorrect rotation.</td>
<td>Check current at all phases (should be approximately) equal.</td>
</tr>
<tr>
<td>Improper ventilation.</td>
<td>Overdamped. Incorrect air gap. Incorrect rotation.</td>
<td>Check external cooling fan to be sure air is moving properly across cooling fins.</td>
</tr>
<tr>
<td>Unbalanced voltage.</td>
<td>Overdamped. Incorrect air gap. Incorrect rotation.</td>
<td>Check voltage at all phases (should be approximately) equal to isolate and correct the problem.</td>
</tr>
<tr>
<td>Over voltage or under voltage.</td>
<td>Overdamped. Incorrect air gap. Incorrect rotation.</td>
<td>Check input voltage at each phase to motor.</td>
</tr>
<tr>
<td>Improper connections.</td>
<td>Overdamped. Incorrect air gap. Incorrect rotation.</td>
<td>Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical continuity. Refer to motor lead connection diagram.</td>
</tr>
<tr>
<td>Bearing Over Heating</td>
<td>Misalignment.</td>
<td>Check and align motor and driven equipment.</td>
</tr>
<tr>
<td>Excessive belt tension.</td>
<td>Misalignment.</td>
<td>Reduce belt tension to proper point for load.</td>
</tr>
<tr>
<td>Excessive end thrust.</td>
<td>Misalignment.</td>
<td>Reduce the end thrust from driven machine.</td>
</tr>
<tr>
<td>Excessive grease in bearing.</td>
<td>Misalignment.</td>
<td>Remove grease until cavity is approximately 3/4 filled.</td>
</tr>
<tr>
<td>Insufficient grease in bearing.</td>
<td>Misalignment.</td>
<td>Add grease until cavity is approximately 3/4 filled.</td>
</tr>
<tr>
<td>Inadequate grease in bearing.</td>
<td>Misalignment.</td>
<td>Replace grease until cavity is approximately 3/4 filled.</td>
</tr>
<tr>
<td>Uneven lubrication.</td>
<td>Misalignment.</td>
<td>Check and align motor and driven equipment.</td>
</tr>
<tr>
<td>Incorrect bearing selection.</td>
<td>Misalignment.</td>
<td>Check and align motor and driven equipment.</td>
</tr>
<tr>
<td>Open slot winding.</td>
<td>Misalignment.</td>
<td>Check slot insulation and keep brushes free for proper end winding connections.</td>
</tr>
<tr>
<td>Over voltage at under voltage.</td>
<td>Misalignment.</td>
<td>Check voltage at all phases (should be approximately) equal.</td>
</tr>
<tr>
<td>Hofer nibbling on stator.</td>
<td>Misalignment.</td>
<td>Check bearing for clearances (should be approximately) equal.</td>
</tr>
<tr>
<td>Unbalanced voltage.</td>
<td>Misalignment.</td>
<td>Check voltage at all phases (should be approximately) equal.</td>
</tr>
<tr>
<td>Excessive air gap.</td>
<td>Misalignment.</td>
<td>Check and align motor and driven equipment.</td>
</tr>
<tr>
<td>Motor Over Heating</td>
<td>Motor Over Heating.</td>
<td>Check motor and driven equipment for proper alignment.</td>
</tr>
<tr>
<td>Overdamped. Incorrect air gap. Incorrect rotation.</td>
<td>Motor Over Heating.</td>
<td>Check terminal at all phases (should be approximately) equal.</td>
</tr>
<tr>
<td>Improper ventilation.</td>
<td>Motor Over Heating.</td>
<td>Check external cooling fan to be sure air is moving properly across cooling fins.</td>
</tr>
<tr>
<td>Motor will not start</td>
<td>Motor Over Heating.</td>
<td>Check motor and driven equipment for proper alignment.</td>
</tr>
<tr>
<td>Uneven braking at the stator.</td>
<td>Motor Over Heating.</td>
<td>Check voltage at all phases (should be approximately) equal.</td>
</tr>
<tr>
<td>Excessive humming</td>
<td>Motor Over Heating.</td>
<td>Check motor and driven equipment for proper alignment.</td>
</tr>
<tr>
<td>High Voltage.</td>
<td>Motor Over Heating.</td>
<td>Check bearing for clearances (should be approximately) equal.</td>
</tr>
<tr>
<td>Growling or whining</td>
<td>Motor Over Heating.</td>
<td>Check terminal at all phases (should be approximately) equal.</td>
</tr>
</tbody>
</table>
Suggested bearing and winding RTD setting guidelines for Non-Hazardous Locations ONLY

Most large frame AC Baldor motors with a 1.15 service factor are designed to operate below a Class B (80°C) temperature rise at rated load and are built with a Class H winding insulation system. Based on this low temperature rise, RTD (Resistance Temperature Detectors) settings for Class B rise should be used as a starting point. Some motors with 1.0 service factor have Class F temperature rise.

The following tables show the suggested alarm and trip settings for RTDs. Proper bearing and winding RTD alarm and trip settings should be selected based on these tables unless otherwise specified for specific applications.

The alarm and trip settings should be changed as needed. The alarm and trip settings are based on the RTD alarm setting for the sleeve bearing shell or roller bearings or direct contact with the sleeve bearing shell. Winding RTDs should be included on the motor nameplate as the required temperature limits. The alarm and trip settings should be selected based on these tables unless otherwise specified for specific applications.

<table>
<thead>
<tr>
<th>Motor Load to 1.15 S.F.</th>
<th>Alarm</th>
<th>Trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class B Temp Rise 80°C</td>
<td>130</td>
<td>140</td>
</tr>
<tr>
<td>Class F Temp Rise 105°C</td>
<td>140</td>
<td>150</td>
</tr>
<tr>
<td>Class H Temp Rise 125°C</td>
<td>155</td>
<td>165</td>
</tr>
</tbody>
</table>

Note: * Bearing temperature limits are for standard design motors operating at Class B temperature rise. The alarm and trip settings should be increased for Class H temperature rise. ** High temperature lubricants include some special synthetic oils and greases. Greases that may be substituted for replacement grease or oil recommendation. See the motor nameplate for replacement grease or oil recommendation. Contact Baldor application engineering for special lubricants or further clarifications.

<table>
<thead>
<tr>
<th>Bearing Type</th>
<th>Standard</th>
<th>High Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil or Grease</td>
<td>95</td>
<td>110</td>
</tr>
<tr>
<td>Anti-Friction</td>
<td>100</td>
<td>120</td>
</tr>
</tbody>
</table>

Note: ** Bearing temperatures apply to bearings operating at Class B temperature rise. The alarm and trip settings should be increased for Class H temperature rise. When Class H temperatures are used, consider bearing temperatures and relubrication requirements. Greases that may be substituted for replacement grease or oil recommendation. See the motor nameplate for replacement grease or oil recommendation. Contact Baldor application engineering for special lubricants or further clarifications.

Greases that may be substituted for replacement grease or oil recommendation. See the motor nameplate for replacement grease or oil recommendation. Contact Baldor application engineering for special lubricants or further clarifications.

<table>
<thead>
<tr>
<th>Motor Load</th>
<th>Alarm</th>
<th>Trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Load</td>
<td>130</td>
<td>140</td>
</tr>
<tr>
<td>Rated Load to 1.15 S.F.</td>
<td>140</td>
<td>150</td>
</tr>
</tbody>
</table>

Note: * Bearing temperature limits are for standard design motors operating at Class B temperature rise. The alarm and trip settings should be increased for Class H temperature rise. ** High temperature lubricants include some special synthetic oils and greases. Greases that may be substituted for replacement grease or oil recommendation. See the motor nameplate for replacement grease or oil recommendation. Contact Baldor application engineering for special lubricants or further clarifications.

Greases that may be substituted for replacement grease or oil recommendation. See the motor nameplate for replacement grease or oil recommendation. Contact Baldor application engineering for special lubricants or further clarifications.
Product Information Packet: ECP844206T-4 - 200HP, 1190RPM, 3PH, 60HZ, 449T, TEFC, FOOT,
TEFC, molten metal in the event of insulation failure. Vibration: The motor is protected by NEMA MG-1, Part 7 standards. ODG, dry locations with adequate supply of cooling air. These motors should not be used in the presence of flammable or combustible materials. Open motors can emit flame and/or smoke. EXPLOSION PROTECTED

http://www.baldor.com/support/literature_load.asp

The user must select a motor starter and overcurrent protection suitable for this motor and its application. Consult motor starter application data as well as the National Electric Code and/or applicable local codes. Special motors for use with motor starter application data as well as the National Electric Code and/or applicable local codes. Special motors for use with motor starter application data as well as the National Electric Code and/or applicable local codes.

INSTALLATION

WARNING: Do not connect electrical equipment before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury.

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The motor must be installed as part of a motor control drive system, according to the manufacturer's diagrams. Refer to MN408 for additional information on grounding of motors and generators, and the motor or generator frame. In non-USA locations there is a solid and permanent metallic connection between the ground point, the motor or generator terminal housing, and the ground. Where this is not the case, a solid and permanent metallic connection must be provided. Where there is no solid and permanent metallic connection between the ground point, the motor or generator terminal housing, and the ground, the motor or generator must be grounded. Grounding must be in accordance with NEC and local codes. When the motor is connected to the load for the first time, it should start quickly in the proper direction of rotation and should run smoothly. If not, stop the motor immediately and determine the cause. Possible causes are: low voltage at the terminals; the load is too large; the motor or generator connections are not correct; or the load is not correct. The motor must be installed in accordance with the National Electrical Code and/or applicable local codes. The motor must be installed in accordance with the National Electrical Code and/or applicable local codes. The motor must be installed in accordance with the National Electrical Code and/or applicable local codes.

Ground the motor according to NEC and local codes. In the U.S.A. the electrical equipment grounding conductor is connected to the motor. Electric Code, NEMA MG-1, Part 7, requires that the motor and electrical equipment have an earth ground. Electric Code, NEMA MG-1, Part 7, requires that the motor and electrical equipment have an earth ground. Electric Code, NEMA MG-1, Part 7, requires that the motor and electrical equipment have an earth ground. Electric Code, NEMA MG-1, Part 7, requires that the motor and electrical equipment have an earth ground. Electric Code, NEMA MG-1, Part 7, requires that the motor and electrical equipment have an earth ground.
leads. For special applications consult your Baldor representative.

**SPECIAL APPLICATIONS**

1. Connect the motor to the power source.
2. Select the correct motor for the application.
3. Ensure proper mounting and alignment.
4. Select the correct lubricant.
5. Follow the manufacturer’s recommendations.

**INSPECTION**

1. Check for loose bolts or nuts.
2. Check for alignment.
3. Check for lubricant leaks.
4. Check for overheating.
5. Check for mechanical damage.

**LUBRICATION PROCEDURE**

1. Determine the lubrication frequency.
2. Select the correct lubricant.
3. Apply the lubricant to the bearings.
4. Ensure proper lubricant placement.
5. Check for lubricant contamination.

**MOUNTING**

1. Check for proper alignment.
2. Ensure proper mounting and alignment.
3. Check for loose bolts or nuts.
4. Ensure proper lubrication.
5. Check for overheating.

**GUARDING**

1. Ensure proper guarding.
2. Check for proper alignment.
3. Ensure proper lubrication.
4. Check for overheating.
5. Ensure proper electrical connections.

**LUBRICATION INFORMATION**

1. Select the correct lubricant.
2. Ensure proper lubrication placement.
3. Check for lubricant contamination.
4. Ensure proper lubrication frequency.
5. Check for overheating.

**STARTING**

1. Check for proper alignment.
2. Ensure proper mounting and alignment.
3. Check for loose bolts or nuts.
4. Ensure proper lubrication.
5. Check for overheating.

**WARNING**

- Do not touch any rotating parts or edges of the motor.
- Do not touch any unshielded electrical connections.
- Do not touch any exposed motor parts.
- Do not touch any unshielded electrical connections.
- Do not touch any unshielded electrical connections.

**INSTALLATION & MAINTENANCE**

1. Follow all safety precautions.
2. Ensure proper alignment.
3. Ensure proper lubrication.
4. Check for overheating.
5. Ensure proper electrical connections.

**PRODUCT INFORMATION PACKET**

1. Consult with a Baldor representative.
2. Follow all safety precautions.
3. Ensure proper alignment.
4. Ensure proper lubrication.
5. Check for overheating.

**WARNING**

- Do not touch any rotating parts or edges of the motor.
- Do not touch any unshielded electrical connections.
- Do not touch any exposed motor parts.
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**CONTACT INFORMATION**

1. Consult with a Baldor representative.
2. Follow all safety precautions.
3. Ensure proper alignment.
4. Ensure proper lubrication.
5. Check for overheating.
### Table 1 Service Conditions

<table>
<thead>
<tr>
<th>Severity of Service</th>
<th>Ambient Temperature</th>
<th>Atmospheric Contamination</th>
<th>Type of Bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>40°C (104°F)</td>
<td>Clean, Little Corrosion</td>
<td>Deep Groove Ball Bearing</td>
</tr>
<tr>
<td>Severe</td>
<td>50°C (122°F)</td>
<td>Moderate dirt, Corrosion</td>
<td>Ball Thrust, Roller Bearing</td>
</tr>
<tr>
<td>Extreme</td>
<td>&gt;50°C (122°F)</td>
<td>Severe dirt, Abrasive dust, Corrosion</td>
<td>All Bearings</td>
</tr>
</tbody>
</table>

* Special high temperature grease is recommended. ** Special low temperature grease is recommended.

### Table 2 Lubrication Frequency (Ball Bearings)

<table>
<thead>
<tr>
<th>NEMA / (IEC) Frame Size</th>
<th>Rated Speed - RPM</th>
<th>10000 Hrs</th>
<th>6000 Hrs</th>
<th>3600 Hrs</th>
<th>18000 Hrs</th>
<th>22000 Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 210 incl. (132)</td>
<td>2700 Hrs</td>
<td>5500 Hrs</td>
<td>12000 Hrs</td>
<td>18000 Hrs</td>
<td>22000 Hrs</td>
<td></td>
</tr>
<tr>
<td>Over 210 to 280 incl. (180)</td>
<td>3600 Hrs</td>
<td>9500 Hrs</td>
<td>15000 Hrs</td>
<td>18000 Hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 280 to 360 incl. (225)</td>
<td>* 2200 Hrs</td>
<td>7400 Hrs</td>
<td>12000 Hrs</td>
<td>15000 Hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 360 to 5000 incl. (300)</td>
<td>* 2200 Hrs</td>
<td>3500 Hrs</td>
<td>7400 Hrs</td>
<td>12000 Hrs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For motors operating at speeds greater than 3600 RPM, consult Baldor for lubrication recommendations.

### Table 4 Amount of Grease to Add

<table>
<thead>
<tr>
<th>Frame Size (NEMA / IEC)</th>
<th>Bearing Description (Largest bearing in each frame size)</th>
<th>OD mm</th>
<th>Width mm</th>
<th>Weight of grease to add (ounce/gram)</th>
<th>Volume of grease to add (inches³/teaspoon)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 210 incl. (132)</td>
<td>6307, 80, 21</td>
<td>0.30</td>
<td>0.42</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Over 210 to 280 incl. (180)</td>
<td>6311, 120, 29</td>
<td>0.61</td>
<td>0.90</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td>Over 280 to 360 incl. (225)</td>
<td>6313, 140, 33</td>
<td>0.81</td>
<td>1.24</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td>Over 360 to 5000 incl. (300)</td>
<td>NU322, 240, 50</td>
<td>2.12</td>
<td>6.10</td>
<td>4.10</td>
<td>13.40</td>
</tr>
</tbody>
</table>

Weight in grams = 0.005 DB
### Typical IEC vs NEMA Lead Marking

<table>
<thead>
<tr>
<th>IEC</th>
<th>NEMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Winding</td>
<td>U1(T1)</td>
</tr>
<tr>
<td>Aux Winding</td>
<td>Z1(T8)</td>
</tr>
<tr>
<td>Z2(T5)</td>
<td></td>
</tr>
</tbody>
</table>

#### Single Phase Non-Reversible

- Refer to the connection diagram provided on the Baldor motor.

#### Single Phase Reversible

- U1(T1) & U2(T4)
- Z1(T8) & Z2(T5)

#### Dual Voltage Reversible

- U1(T1) & U2(T2)
- U3(T3) & U4(T4)
- Z1(T8) & Z2(T5)

#### Three Phase

- U1(T1) & U2(T4) & U3(T7)
- V1(T2) & V2(T5) & V3(T8)
- W1(T3) & W2(T6) & W3(T9)

- Refer to the connection diagram provided on the Baldor motor.

#### DC Motors

- Lead markings can be translated between IEC and NEMA designations.
- For DC motors, the lead markings are:
  - Armature: A1, A2
  - Shunt Field: F1, F2
  - Series Field: S1, S2

- Refer to the connection diagram provided on the Baldor motor.

- Some examples are as follows:
  - WYE Connection: U(T1), W(T3), V(T2)
  - DELTA Connection: U(T1), V(T5), W(T3)

- DC Motors can be run at different voltages.

- High Volts/Run High Volts/Start
- Low Volts/Run Low Volts/Start