

**BALDOR • RELIANCE**

**RPM XE**  
**Integral Horsepower AC Motors**  
**Totally Enclosed**

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**Important:**

Be sure to check [www.baldor.com](http://www.baldor.com) to download the latest version of this manual in Adobe Acrobat PDF format.

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# Section 1

## General Information

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**Overview** 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. A Warning statement indicates a possible unsafe condition that can cause harm to personnel. A Caution statement indicates a condition that can cause damage to equipment.

**Important:** This instruction manual is not intended to include a comprehensive listing of all details for all procedures required for installation, operation and maintenance. This manual describes general guidelines that apply to most of the motor products shipped by Baldor. 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.

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

- NEMA Publication MG-2, Safety Standard for Construction and guide for Selection, Installation and Use of Electric Motors and Generators
- IEC 60034-1 Electrical and IEC60072-1 Mechanical specifications
- NFPA 70® National Electrical Code (NEC) and local codes and practices

### Limited Warranty

[www.baldor.com/support/warranty\\_standard.asp](http://www.baldor.com/support/warranty_standard.asp)

**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 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, protection should be provided by the user to protect against accidental contact with hot surfaces. Failure to observe this precaution could result in bodily injury.

**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 by-pass 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 restarting 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:** 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.

Continued on next page.

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**Safety Notice** Continued

- WARNING:** A voltage will be produced at the motor terminals any time the shaft is rotated, whether or not the motor is connected to a power source.
- 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-lubricate motor as this may cause premature bearing failure.
- 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 procedure in NEMA MG1 and MG2 standards to avoid equipment damage.
- Caution:** The space heaters are designed to operate at or below the maximum surface temperature stated on the nameplate. If the marked ambient and/or voltage are exceeded this maximum surface temperature can be exceeded and can damage the motor windings. If applied in a division 2 or zone 2 environment this excessive temperature may cause ignition of hazardous materials.

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. 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. 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.

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## 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, whichever 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 M  $\Omega$ ).

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 peak-to-peak 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.

Note: Remove motor from containers when heaters are energized, reprotect if necessary.

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 monthly by hand at least 10 to 15 revolutions 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.
6. All breather drains are to be fully 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. Vertical motors should be stored in a safe stable vertical position.
7. Coat all external machined surfaces with a rust preventing material. An acceptable product for this purpose is Exxon Rust Ban # 392.

## Non-Regreaseable Motors

Non-regreaseable 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.

## All Other Motor Types

Before storage, the following procedure must be performed.

1. Remove the grease drain plug, if supplied, (opposite the grease fitting) on the bottom of each bracket prior to lubricating the motor.
2. The motor with regreaseable bearing must be greased as instructed in Section 3 of this manual.
3. Replace the grease drain plug after greasing.
4. The motor shaft must be rotated a minimum of 15 times after greasing.
5. 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.
6. Bearings are to be greased at the time of removal from storage.

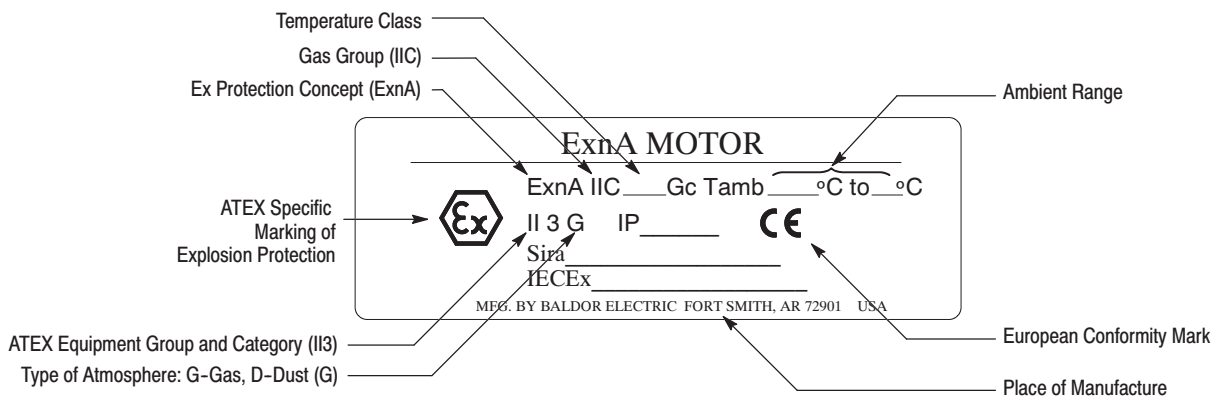
## Removal From Storage

1. Remove all packing material.
2. Measure and record the electrical resistance of the winding insulation resistance meter at the time of removal from storage. The insulation resistance must not be less than 50% from the initial reading recorded when the motor was placed into storage. A decrease in resistance indicates moisture in the windings and necessitates electrical or mechanical drying before the motor can be placed into service. If resistance is low, contact your Baldor District office.
3. Regrease the bearings as instructed in Section 3 of this manual.
4. Reinstall the original shipping brace if motor is to be moved. This will hold the shaft firmly against the bearing and prevent damage during movement.

## Equipment Marking for IEC Certified Product

IEC certified products have special markings that identify the protection concept and environment requirements. An example is shown in Figure 1-1.

Figure 1-1 IEC Certified Product Markings



### 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 certificate in conjunction with this instruction manual.

### Operation On Frequency Converters:

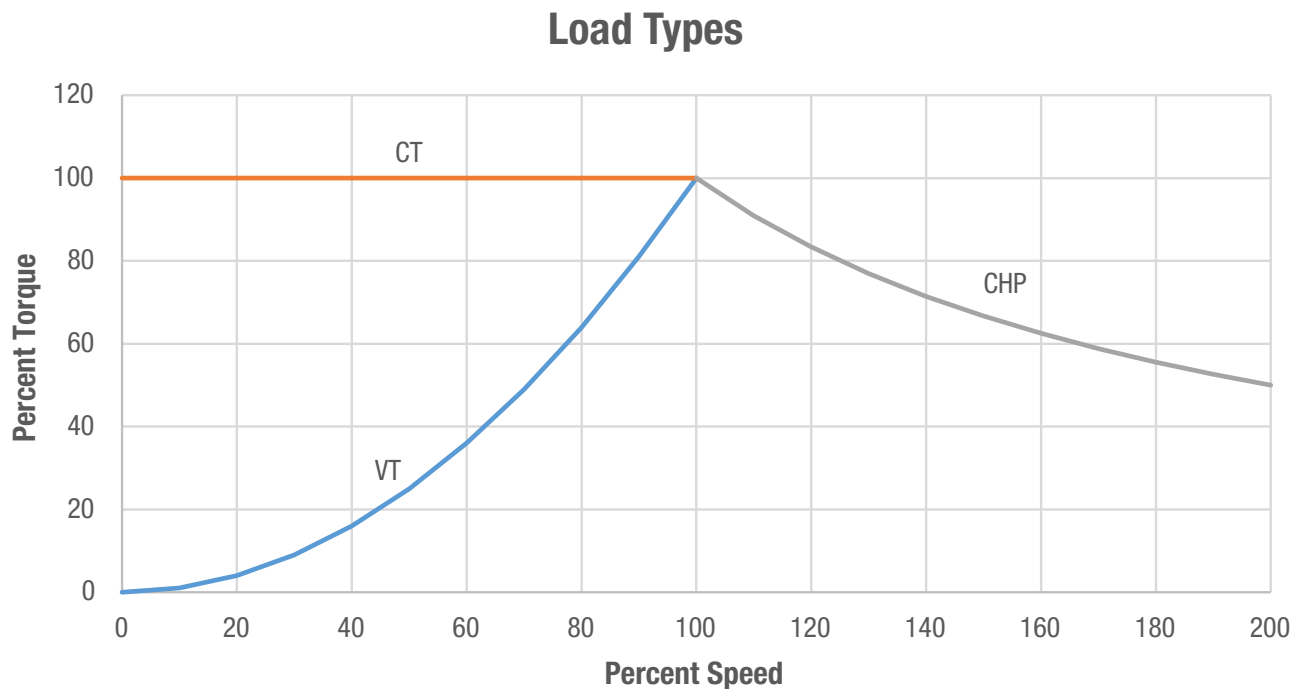
If the motor is evaluated for operation with an adjustable speed drive, the type of converter (for example PWM for Pulse Width Modulated) and safe speed ranges (for example 0 - 120 Hz) will be specified in the certification documents or on motor nameplates. It is necessary to consult the adjustable speed drive manual for proper set up. IECEx Certificates are available online at [www.iecex.com](http://www.iecex.com)



Unit Conversions	
Inches to Millimeters	Inches x 25.4 = mm
Millimeters to Inches	mm x .03937 = Inches
Horsepower to Kilowatts	Hp x .746 = Kw
Kilowatts to Horsepower	Kw x 1.341 = Hp
Pounds to Kilograms	Lbs x .454 = Kg
Kilograms to Pounds	Kg x 2.205 = Lbs

Typical Speed versus Torque Curves are shown in Figure 1-2. For values relative to your specific motor, consult the motor nameplate marking.

Figure 1-2 Typical Speed versus Torque Curves



#### EMC Compliance Statement for European Union

The motors described in this instruction manual are designed to comply 2004/108/EC and 2014/30/EU. These motors are commercial in design and not intended for residential use. When used with converters, please consult converter manufacturers literature regarding recommendations on cable types, cable shielding, cable shielding termination, connection recommendations and any filters which may be recommended for EMC compliance. For additional information, consult Baldor MN1383.



# Section 2

## Installation & Operation

**Overview** Installation should conform to the National Electrical Code as well as local codes and practices. When other devices are coupled to the motor shaft, be sure to install protective devices to prevent future accidents. Some protective devices include, coupling, belt guard, chain guard, shaft covers etc. These protect against accidental contact with moving parts. Machinery that is accessible to personnel should provide further protection in the form of guard rails, screening, warning signs etc.

**Location** It is important that motors be installed in locations that are compatible with motor enclosure and ambient conditions. Improper selection of the motor enclosure and ambient conditions can lead to reduced operating life of the motor.

For Group I Mining Motors where breather drains are used specified, Breather drain shall be mounted or protected in installation such that it is guarded from direct impact.”

Proper ventilation for the motor must be provided. Obstructed airflow can lead to reduction of motor life.

- **Totally Enclosed** motors may be installed where dirt, moisture or dust are present and in outdoor locations.

**Severe Duty**, enclosed motors are designed for installations with high corrosion or excessive moisture conditions. These motors should not be placed into an environment where there is the presence of flammable or combustible vapors, dust or any combustible material, unless specifically designed for this type of service.

**Hazardous Locations** are those where there is a risk of ignition or 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 should be installed in a location compatible with the motor enclosure and specific ambient. To allow adequate air flow, the following clearances must be maintained between the motor and any obstruction:

**Table 2-1 Enclosure Clearance**

TEFC / TENV ( IC0141 ) Enclosures All Frames	
Fan Cover Air Intake	2” (51mm)
Exhaust	Envelope equal to the P Dimension on the motor dimension sheet

The motor must be securely installed to a rigid foundation or mounting surface to minimize vibration and maintain alignment between the motor and shaft 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 accurate alignment of the motor and load is accomplished, the base should be grouted to the foundation to maintain this alignment.

The standard motor base is designed for horizontal or vertical mounting. Adjustable or sliding rails are designed for horizontal mounting only. Consult your Baldor distributor or authorized Baldor Service Center for further information.

**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.**

In the case of assemblies on a common base, any lifting means provided on the motor should not be used to lift the assembly and base but, rather, the assembly should be lifted by a sling around the base or by other lifting means provided on the base. Assure lifting in the direction intended in the design of the lifting means. Likewise, precautions should be taken to prevent hazardous overloads due to deceleration, acceleration or shock forces.

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## Coupling Selection

Due to the nature of the starting torque of an RPM-XE motor operating on sine wave power, the coupling selection is critical for properly applying this motor design. Please consult Application Guide #AG-0102 for the recommended Dodge couplings.

## Maximum Inertia

To ensure successful synchronization, the load inertia should not exceed the values in Table 2-2 below. For load inertias exceeding these values, contact your Baldor District Office. Failure of the RPM-XE motor to synchronize will lead to extended current draw which is several times the rated full-load value. This current will cause the motor to overheat and lead to motor failure if unmitigated.

**Table 2-2 Load Inertia**

Rating (HP @ 60 Hz)	Inertia Capability (lb-ft <sup>2</sup> )
10	5
15	7
20	8
25	18
30	20
40	32
50	38
60	55
75	67
100	88
125	93

## Alignment

Accurate alignment of the motor with the driven equipment is extremely important. The pulley, sprocket, or gear used in the drive should be located on the shaft as close to the shaft shoulder as possible. It is recommended to heat the pulley, sprocket, or gear before installing on the motor shaft. Forcibly driving a unit on the motor shaft will damage the bearings.

- i. **Direct Coupling**  
For direct drive, use flexible couplings if possible. Consult the drive or equipment manufacturer for more information. Mechanical vibration and roughness during operation may indicate poor alignment. Use dial indicators to check alignment. The space between coupling hubs should be maintained as recommended by the coupling manufacturer.
- ii. **End-Play Adjustment**  
The axial position of the motor frame with respect to its load is also extremely important. The standard motor bearings are not designed for excessive external axial thrust loads. Improper adjustment will cause failure.
- iii. **Belt Drive**  
The RPM XE motor is designed for coupled duty only. If the motor is belted, an adjustable speed drive is recommended.

## Doweling & Bolting

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•Reliance motors are designed for doweling.)

- i. Drill dowel holes in diagonally opposite motor feet in the locations provided.
- ii. Drill corresponding holes in the foundation.
- iii. Ream all holes.
- iv. Install proper fitting dowels.
- v. 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.

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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.

**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, key ways or set screws. Some satisfactory methods of guarding are:

- i. Covering the machine and associated rotating parts with structural or decorative parts of the driven equipment.
- ii. Providing covers for the rotating parts. Covers should be sufficiently rigid to maintain adequate 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. Fully insulated and lugged terminations must be bolted and provided with lock washer to prevent rotation. 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 making ground connections. When motors with bonded cushion rings are used in multimotor installations employing group fusing or group protection, the bonding of the cushion ring should be checked to determine that it is adequate for the rating of the branch circuit over current protective device being used.

There are applications where grounding the exterior parts of a motor or generator may result in greater hazard by increasing the possibility of a person in the area simultaneously contacting ground and some other nearby live electrical parts of other ungrounded electrical equipment. In portable equipment it is difficult to be sure that a positive ground connection is maintained as the equipment is moved, and providing a grounding conductor may lead to a false sense of security.

Select a motor starter and over current protection suitable for this motor and its application. Consult motor starter application data as well as the National Electric Code and/or other applicable local codes.

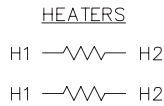
For motors installed in compliance with IEC requirements, the following minimum cross sectional area of the protective conductors should be used:

Crosssectional area of phase conductors, S	Minimum crosssectional area of the corresponding protective conductor, S <sub>p</sub>
mm2	mm2
6	6
10	10
16	16
25	25
35	25
50	25
70	35
95	50
120	70
150	70

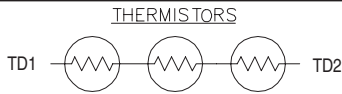
Equipotential bonding connection shall made using a conductor with a cross-sectional area of at least 4 mm<sup>2</sup>.

**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, RTD's etc.

**Figure 2-1 Accessory Connections (when specified)**



Leads for each heater are labeled H1 & H2.  
(Like numbers should be tied together).  
Heaters should be connected such that they are not energized when motor is operating.



When specified, three thermistors are installed in windings and tied in series. Leads are labeled TD1 & TD2.



When specified, winding RTDs are installed in windings (2) per phase. Each set of leads is labeled 1TD1, 1TD2, 1TD3, 2TD1, 2TD2, 2TD3 etc.



\* When specified, one bearing RTD is installed in Drive endplate (PUEP), leads are labeled RTDDE.  
\* One bearing RTD is installed in Opposite Drive endplate (FREPP), leads are labeled RTDODE.  
\* Note RTD may have 2-Red/1-White leads; or 2-White/1-Red Lead.

**AC Power** When RPM-XE motors are applied across the line, they are only suitable for 60 Hz (1800 RPM) and 50 Hz (1500 RPM) operation. Motors with flying lead construction must be properly terminated and connected with bolt, lockwasher and nut wrapped with two full layers of electrical grade tape or heat shrink tubing.

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  $\pm 10\%$  of rated voltage with rated frequency. (See motor name plate for ratings).

**OR**

2. AC power is within  $\pm 5\%$  of rated frequency with rated voltage.

**OR**

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

Performance within these voltage and frequency variations are shown in Figure 2-3.

**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.

Adjustable Frequency Power Inverters used to supply adjustable frequency power to 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.

Note: Main power leads for CE Marked Motors may be marked U,V,W – for standard configurations, please consult connection diagrams.

**Caution:** The space heaters are designed to operate at or below the maximum surface temperature stated on the nameplate. If the marked ambient and/or voltage are exceeded this maximum surface temperature can be exceeded and can damage the motor windings. If applied in a Division 2 or Zone 2 environment this excessive temperature may cause ignition of hazardous materials. Space heaters should be connected such that they are not energized when motor is operating.

## AC Motor Connection Diagram

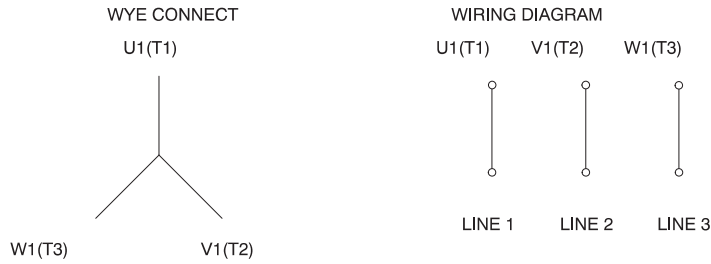
### THREE PHASE

FOR SINGLE WINDING 3 PHASE MOTORS, LEAD MARKINGS CAN BE DIRECTLY TRANSLATED BETWEEN IEC AND NEMA DESIGNATIONS. FOR THESE MOTORS, THE LEAD MARKINGS ARE EQUIVALENT AS FOLLOWS:

U1=T1	U2=T4	U5=T7	U6=T10
V1=T2	V2=T5	V5=T8	V6=T11
W1=T3	W2=T6	W5=T9	W6=T12

EXAMPLES OF COMMON CONNECTIONS ARE GIVEN BELOW.

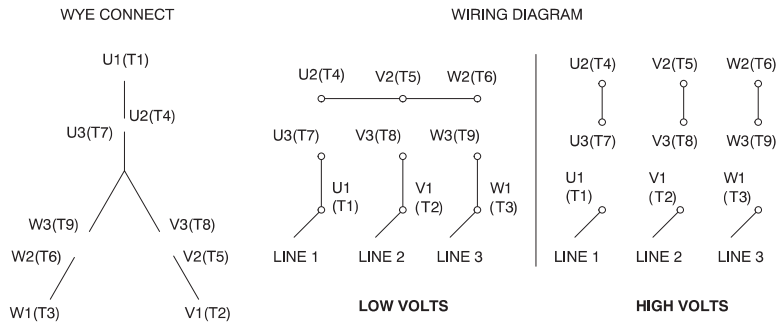
### THREE LEADS



## AC Motor Connection Diagram

### NINE LEADS

DUAL VOLTAGE-HIGH TO LOW VOLTAGE RATIO 2:1



MOTOR WINDING THERMOSTATS		
CONTACTS _____ @ _____ °C		
FIGURE NUMBER _____		
CONTACT RATING		
VOLTS	CONTINUOUS AMPERES	INRUSH AMPERES
110 - 120	3.0	30
220 - 240	1.5	15
440 - 480	0.75	7.5
550 - 600	0.60	6.0

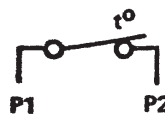

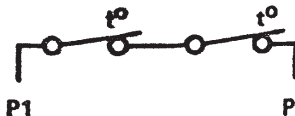
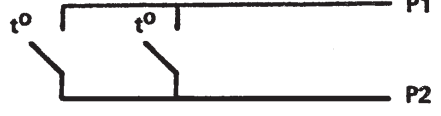
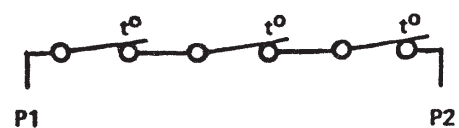
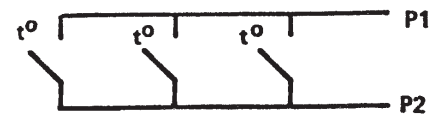
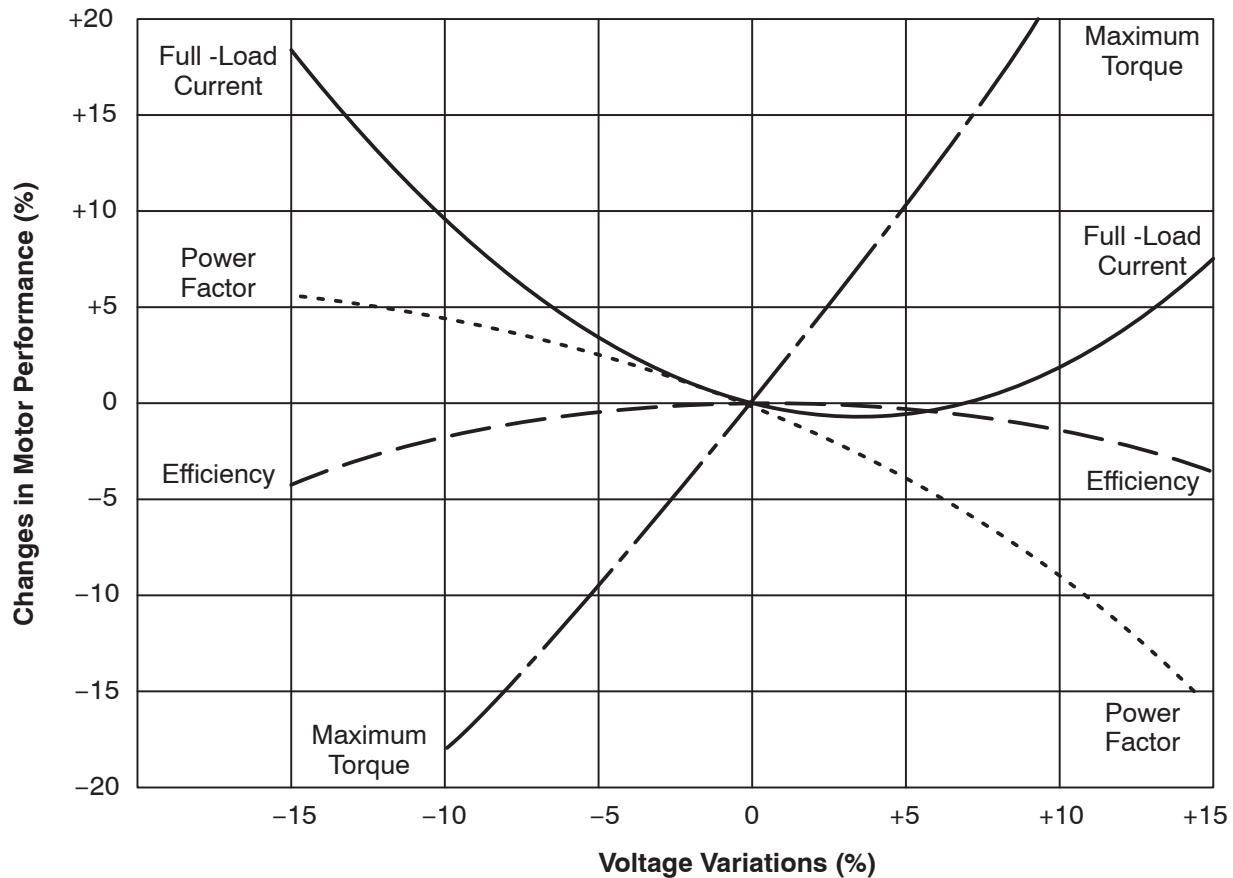
THERMOSTATS	
NORMALLY CLOSED	NORMALLY OPEN
<p>FIGURE 1</p> 	<p>FIGURE 4</p> 
<p>FIGURE 2</p> 	<p>FIGURE 5</p> 
<p>FIGURE 3</p> 	<p>FIGURE 6</p> 



Figure 2-2 Typical Motor Performance Versus Voltage Variations



### Initial Lubrication

Baldor•Reliance motors are shipped 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 (regreasable type) prior to starting. When motors are equipped for oil mist lubrication refer to the instruction manual for installation, operation, and maintenance of oil mist lubrication systems.

### 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. If motor has been in storage or idle for some time, check winding insulation integrity.
3. Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical continuity.
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. Verify rotation direction before you continue.
9. Start the motor and ensure operation is smooth without excessive vibration or noise. If so, run the motor for 1 hour with no load connected.
10. After 1 hour of operation, disconnect power and connect the load to the motor shaft. Verify all coupling guards and protective devices are installed. Ensure motor is properly ventilated.
11. If motor is totally enclosed fan-cooled or non-ventilated it is recommended that condensation drain plugs, if present, be removed. These are located in the lower portion of the end-shields. Totally enclosed fan-cooled "XT" motors are normally equipped with automatic drains which may be left in place as received.

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## Coupled Start Up

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

- i. Check the coupling and ensure that all guards and protective devices are installed.
  - ii. Check that the coupling is properly aligned and not binding.
  - iii. 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 through the coupling or the foundation. Vibration should be at an acceptable level.
  - iv. 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 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 with your local Baldor distributor or Baldor Service Center.

**Heating** - Duty rating and maximum ambient temperature are stated on the motor name plate. Do not exceed these values. If there is any question regarding safe operation, contact your local Baldor distributor or Baldor Service Center.

## Hazardous Locations

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

### Selection

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. In international hazardous location areas, guidance for gas / vapor / mist classification is given in IEC60079-14. This classification process lets the installer know what equipment is suitable for installation in that environment, and identifies what the maximum safe temperature or temperature class is required. It is the customer or users responsibility to determine the area classification and select proper equipment.

Areas are classified with respect to risk and exposure to the hazard. In the US market, areas are typically classified as follows Class, Division, Group and Temperature Class. In some newer installations in the US and in most international markets, areas are classified in Zones.

### **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 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 relies heavily on the housekeeping practices within the installation.

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### **Sine Wave Power Operation for Division 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 T-Code) 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.

- i. Motor load exceeding service factor nameplate value
- ii. Ambient temperatures above nameplate value
- iii. Voltages above or below nameplate value
- iv. Unbalanced voltages
- v. Loss of proper ventilation
- vi. Altitude above 3300 feet / 1000 meters
- vii. Severe duty cycles of repeated starts
- viii. Motor stall
- ix. Motor reversing
- x. Single phase operation of polyphase equipment
- xi. Variable frequency operation

### **Variable Frequency Power Operation for Division 1 or 2 and Zone 1 or 2 and Zone 21 or 22**

Hazardous Location (motors with maximum surface temperature listed on the nameplate).

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 T-Code) 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.

- i. Motor load exceeding service factor nameplate value
- ii. Ambient temperature above nameplate value
- iii. Voltage (at each operating frequency) above or below rated nameplate value
- iv. Unbalanced voltages
- v. Loss of proper ventilation
- vi. Operation outside of the nameplate speed / frequency range
- vii. Altitudes above 3300 feet / 1000 meters
- viii. Single phase operation of polyphase equipment
- ix. Unstable current wave forms
- x. Lower than name plate minimum carrier frequency

### **Thermal Limiting**

Thermal limiting devices are temperature sensing control components installed inside the motor to limit the internal temperature of the motor frame by interrupting the circuit of the holding coil of the magnetic switch or contactor. They are required for most Division 1 and Zone 1 applications. For Division 2 or Zone 2 applications, motors should be selected that preclude running temperatures from exceeding the ignition temperatures for the designated hazardous material. In Division 2 or Zone 2 classified locations, thermal limiting devices should only be used for winding protection and not considered for limiting all internal motor temperatures to specific ignition temperatures.

### **Specific “Conditions of Use” for Ex Equipment or “Schedule of Limitations” for Ex Components**

- i. Cooling airflow on Totally Enclosed Air Over Motors shall have a minimum airflow of \_\_\_\_ Feet Per Min. (FPM) shown on the N/P.
- ii. The installer shall ensure that cable entries are fitted with suitably certified and dimensioned cable entry devices to maintain minimum IP54 for the motor connection box
- iii. The anti condensation heater, when provided must be de-energized before the motor is energized.
- iv. If motor RTDs are utilized and connected to a control circuit, the voltage applied to the RTDs shall not exceed 4.0 V
- v. Converter fed motors shall only be used with PWM variable speed converters, instruction manual contains voltage and current operating instructions.
- vi. The user shall ensure that the ingress protection of IP54 is maintained when installing suitably certified glands and modifying the gland plate.

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**Specific Information Relative to voltage:****RPM-XE Polyphase Synchronous Motors**

The RPM-XE series polyphase synchronous motors are design for operation directly across the line or in conjunction with a converter. The motors are optimized for the nameplate rating. The optimum Volts and Current are provided on the nameplate for the optimum rating. When optimum voltage and current is not supplied to the motor optimum rating may not be obtained. The allowable voltage variation for these motors when operated across the line on Sine Wave Power is +/- 10%.

When sizing the motor for use with a converter the voltage drop of all components such as filters, long cables, etc. have to be taken into account. The motor nameplate identifies the optimum voltage into the motor. The allowable voltage variation for these motors when operated from a converter is +/- 5%.

The RPM-AC series polyphase synchronous motors are designed operation at switching / carrier frequencies of 1.5 kHz or greater for optimum rating.

**Repair of Motors used in Hazardous Locations**

Repair of hazardous certified motors requires additional information, skill, and care. It is the customer's responsibility to select service shops with proper qualifications to repair hazardous location motors. Contact the manufacture for additional repair details. Use only original manufacturer's parts.

**Repair of Dust Ignition Proof Motors – Class II Division 2, Zone 21 and 22.**

For Dust Ignition Proof, proper sealing is required. Do not modify the motor construction to add any additional opening, and ensure that proper sealing is maintained in the connection box and at the shaft seal. Since this protection method also relies on temperature being maintained, make sure that any rewinding uses the original electrical designs, including any thermal protection that may be present

**Repair of Class I Division 2 and Zone 2 motors**

For Division 2 and Zone 2, the internal and external temperatures are of concern. Since this protection method also relies on temperature being maintained, make sure that any rewinding uses the original electrical designs, including any thermal protection that may be present. Use only Baldor replacement thermostats, if provided.

# Section 3

## Maintenance & Troubleshooting

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- WARNING:** UL and EX Listed motors must only be serviced by UL or EX Approved Authorized Baldor Service Centers if these motors are to be returned to a hazardous and/or explosive atmosphere.
- 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:** 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:** The Adjustable Speed Controller, when used, may apply hazardous voltages to the motor leads after power to the controller has been turned off. Verify that the controller is incapable of delivering hazardous voltages and that the voltage at the motor leads is zero before proceeding. Failure to observe this precaution may result in severe bodily injury or death.
- 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, protection should be provided by the user to protect against accidental contact with hot surfaces. Failure to observe this precaution could result in bodily injury.
- 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.

### General Inspection

Inspect the motor at regular intervals, approximately every 500 hours of operation or every 3 months, whichever occurs first. Keep the motor clean and the ventilation openings clear. The following steps should be performed at each inspection:

- 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.
  1. Check that the motor is clean. Check that the interior and exterior of the motor is free of dirt, oil, grease, water, etc. Oily vapor, paper pulp, textile lint, etc. can accumulate and block motor ventilation. If the motor is not properly ventilated, overheating can occur and cause early motor failure.
  2. Perform a dielectric with stand test periodically to ensure that the integrity of the winding insulation has been maintained. Record the readings. Immediately investigate any significant decrease in insulation resistance.
  3. Check all electrical connectors to be sure that they are tight.

### Relubrication & Bearings

Bearing grease will lose its lubricating ability over time, not suddenly. The lubricating ability of a grease (over time) depends primarily on the type of grease, the size of the bearing, the speed at which the bearing operates and the severity of the operating conditions. Good results can be obtained if the following recommendations are used in your maintenance program.

**Type of Grease** A high grade ball or roller bearing grease should be used. Baldor motors are pregreased, normally with Polyrex EM (Exxon Mobil) or as stated on the nameplate. Do not mix greases unless compatibility has been checked and verified.

#### Ball Bearing Motors

Operating Temperature –25°C (–15°F) to 50°C (120°F)	
EXXON	POLYREX EM (Standard on Baldor motors)
EXXON	UNIREX N2
EXXON	BEACON 325
CHEVRON OIL	SRI NO. 2 ( Compatible with Polyrex EM )
CHEVRON OIL	BLACK PEARL
TEXACO, INC.	PREMIUM RB
TEXACO, INC.	POLYSTAR
AMOCO	RYKON # 2
PENNZOIL	PENNZLUBE EM–2
DARMEX	DARMEX 707
DARMEX	DARMEX 711
PETRO–CANADA	PEERLESS LLG
SHELL OIL	DOLIUM BRB
Minimum Starting Temperature –60°C (–76°F)	
SHELL OIL CO.	AEROSHELL 7 (Standard on Baldor motors)
MOBIL	MOBIL 28
MOBIL	MOBILITH SHC 100 (Low Temperature – Arctic Duty)

## Lubrication Procedure

**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.

1. Relubrication with the shaft stationary and a warm motor is recommended. If lubrication must be done with motor running, stay clear of rotating parts and electrical circuits.
2. Wipe all dirt from the outside of the grease fills and drains.
3. Locate the grease inlet at the top of the bearing hub, clean the area and replace the 1/8-inch pipe plug with a grease fitting if the motor is not equipped with grease fitting.
4. Remove grease drain plug located opposite the grease inlet.
5. Using a manual grease gun, pump in the recommended grease in the amount shown. This amount of grease will provide an ample supply of lubricant between lubrication periods for the service condition listed in Table 3-1, Table 3-2 and Table 3-3. Use only clean, fresh grease from clean containers and handle so as to keep it clean. In general, mixing of greases is not recommended. If an incompatible grease is used, the lube system must be completely cleaned then repacked with the new grease.
6. Wipe away any excess grease at the grease drain or relief and replace drain plugs.
7. Rubbing Seals need to be periodically greased.
8. Non-rubbing Seals or Labyrinth type seals have a clearance between stationary and rotating parts of not less than .05mm.

### Type of Grease

See the motor nameplate for replacement grease or oil recommendation. Use Mobil Polyrex EM or equivalent grease unless motor nameplate specifies special grease. Amount of grease to be added to RPM AC motors. See Table 3-3 for relubrication interval.

**Table 3-1 Relubrication Amount**

Frame Size	Volume in Cubic in3 (cm3)	Weight oz (gram)
All	1.0 (16)	0.5 (14)

**Table 3-2 Service Condition**

Service Condition	Ambient	Use/Day	Atmosphere	Bearing Load
Standard	-18°C to 40°C (0°F to 104°F)	8	Clean	Steady
Severe	-30°C to 50°C * (-22°F to 122°F)	8 to 24	Medium Dirt, Abrasives, Corrosion (less than .2 in/sec.	Medium Shock, Vibration
Extreme	-54°C to 65°C * (-65°F to 149°F)	8 to 24	Heavy Dirt, Abrasives, Corrosion	Heavy Shock, Vibration (more than .44 in/sec)

\* Motors must be specially designed for operation in ambient in this range. Special grease is required.

**Table 3-3 Relubrication Periods For RPM AC Motors**

Maximum Normal Operating Speed RPM *	Frame	Relubrication Interval in Months **		
		Standard Service	Severe Service	Extreme Service
3450 and higher	All	9	4	1
2400 thru 3449	All	9	3	1
1700 thru 2399	All	36	12	3
800 thru 1699	All	36	24	8
500 thru 799	All	48	36	12
499 and lower	All	48	36	12

---

## Relubrication Intervals

Recommended relubrication intervals are shown in Table 3-1. 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 3-2, 3-3 and 3-4.

- \* 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.
- \* Special high temperature grease is recommended (Dow Corning DC44). Note that Dow Corning DC44 grease does not mix with other grease types. Thoroughly clean bearing & cavity before adding grease.
- \*\* Special low temperature grease is recommended (Aeroshell 7).

Some motor designs use different bearings on each motor end. This is normally indicated on the motor nameplate. In this case, the larger bearing is installed on the motor Drive endplate. For best relubrication results, only use the appropriate amount of grease for each bearing size (not the same for both).

**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 in the motor. Consult your Baldor distributor or an authorized service center if a grease other than the recommended type is to be used.

**Caution:** **Do not over-lubricate motor as this may cause premature bearing failure.**

### With Grease Outlet Plug

1. With the motor stopped, clean all grease fittings with a clean cloth.
2. Remove grease outlet plug.

**Caution:** **Over-lubricating can cause excessive bearing temperatures, premature lubrication breakdown and bearing failure.**

3. Add the recommended amount of grease.
4. Operate the motor for 15 minutes with grease plug removed. This allows excess grease to purge.
5. Re-install grease outlet plug.

### Without Grease Provisions

Note: Only a Baldor authorized and UL or CSA certified service center can disassemble a UL/CSA listed explosion proof motor to maintain it's UL/CSA listing.

1. Disassemble the motor.
2. Add recommended amount of grease to bearing and bearing cavity. (Bearing should be about 1/3 full of grease and outboard bearing cavity should be about 1/2 full of grease.)
3. Assemble the motor.

---

## Connection Box Maintenance

For motors certified as Ex nA and Ex ec, in order to maintain the protection level, it is necessary to periodically inspect and tighten covers and gland plates. The torque values shown below can be used for guidance:

**Table 3-4 TORQUE VALUES**

INCH-THREADED			
BOLT SIZE	THREAD PITCH	STANDARD DRY TORQUE	
		FT. POUND FORCE TOLERANCE +/- 5%	NEWTON METER TOLERANCE +/- 5%
1/4	20	8.45	11.5
5/16	18	17.4	23.6
3/8	16	30.9	41.9
METRIC THREADED			
BOLT SIZE	THREAD PITCH	STANDARD DRY TORQUE	
		FT. POUND FORCE TOLERANCE +/- 5%	NEWTON METER TOLERANCE +/- 5%
6	1.00	9.972	13.52
8	1.25	24.19	32.80
10	1.50	47.90	64.94



**Table 3-5 Troubleshooting Chart**

Symptom	Possible Causes	Possible Solutions
Motor will not start	Usually caused by line trouble, such as, single phasing at the starter.	Check source of power. Check overloads, fuses, controls, etc.
Excessive humming	High Voltage. Eccentric air gap.	Check input line connections. Have motor serviced at local Baldor service center.
Motor Over Heating	Overload. Compare actual amps (measured) with nameplate rating.	Locate and remove source of excessive friction in motor or load. Reduce load or replace with motor of greater capacity.
	Single Phasing.	Check current at all phases (should be approximately equal) to isolate and correct the problem.
	Improper ventilation.	Check external cooling fan to be sure air is moving properly across cooling fins. Excessive dirt build-up on motor. Clean motor.
	Unbalanced voltage.	Check voltage at all phases (should be approximately equal) to isolate and correct the problem.
	Rotor rubbing on stator.	Check air gap clearance and bearings. Tighten "Thru Bolts".
	Over voltage or under voltage.	Check input voltage at each phase to motor.
	Open stator winding.	Check stator resistance at all three phases for balance.
	Grounded winding.	Perform dielectric test and repair as required.
	Improper connections.	Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical continuity. Refer to motor lead connection diagram.
Bearing Over Heating	Misalignment.	Check and align motor and driven equipment.
	Excessive belt tension.	Reduce belt tension to proper point for load.
	Excessive end thrust.	Reduce the end thrust from driven machine.
	Excessive grease in bearing.	Remove grease until cavity is approximately 3/4 filled.
	Insufficient grease in bearing.	Add grease until cavity is approximately 3/4 filled.
	Dirt in bearing.	Clean bearing cavity and bearing. Repack with correct grease until cavity is approximately 3/4 filled.
Vibration	Misalignment.	Check and align motor and driven equipment.
	Rubbing between rotating parts and stationary parts.	Isolate and eliminate cause of rubbing.
	Rotor out of balance.	Have rotor balance checked and repaired at your Baldor Service Center.
	Resonance.	Tune system or contact your Baldor Service Center for assistance.
Noise	Foreign material in air gap or ventilation openings.	Remove rotor and foreign material. Reinstall rotor. Check insulation integrity. Clean ventilation openings.
Growling or whining	Bad bearing.	Replace bearing. Clean all grease from cavity and new bearing. Repack with correct grease until cavity is approximately 3/4 filled.

## Suggested bearing and winding RTD setting guidelines for Non-Hazardous Locations ONLY

RPM XE 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. RPM XE motors applied to an adjustable speed drive may have a class F rise on adjustable speed power.

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.

If the driven load is found to operate well below the initial temperature settings under normal conditions, the alarm and trip settings may be reduced so that an abnormal machine load will be identified.

The temperature limits are based on the installation of the winding RTDs imbedded in the winding as specified by NEMA. Bearing RTDs should be installed so they are in contact with the outer race on ball or roller bearings or in direct contact with the sleeve bearing shell.

**Table 3-6 Winding RTDs – Temperature Limit In °C (40°C Maximum Ambient)**

Motor Load (Typical Design)	Class B Temp Rise ≤ 80°C		Class F Temp Rise ≤ 105°C	
	Alarm	Trip	Alarm	Trip
≤ Rated Load	130	140	155	165
Rated Load to 1.15 S.F.	140	150	160	165

Note: • Winding RTDs are factory production installed, not from Mod-Express.

When Class H temperatures are used, consider bearing temperatures and relubrication requirements.

**Table 3-7 Bearing RTDs – Temperature Limit In °C (40°C Maximum Ambient)**

Bearing Type Oil or Grease	Anti-Friction	
	Alarm	Trip
Standard*	95	100
High Temperature**	110	115

Notes: \* Bearing temperature limits are for standard design motors operating at Class B temperature rise.

\*\* High temperature lubricants include some special synthetic oils and greases.

Greases that may be substituted that are compatible with Polyrex EM (but considered as “standard” lubricants include the following:

- Texaco Polystar
- Rykon Premium #2
- Chevron SRI #2
- Mobilith SHC-100
- Pennzoil Pennzlube EM-2
- Chevron Black Pearl
- Darmex 707
- Darmex 711
- Petro-Canada Peerless LLG

See the motor nameplate for replacement grease or oil recommendation.

Contact Baldor application engineering for special lubricants or further clarifications.





\* M N 4 4 2 - 0 4 1 7 \*

**BALDOR**<sup>®</sup>  
A MEMBER OF THE ABB GROUP  
**Baldor Electric Company**

P.O. Box 2400, Fort Smith, AR 72902-2400 U.S.A., Ph: (1) 479.646.4711, Fax (1) 479.648.5792, International Fax (1) 479.648.5895  
[www.baldor.com](http://www.baldor.com)