



AC Motors

Frames 180 – 449

API 610 Style (P-Base)

Vertical Mount Solid Shaft

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Important:

Be sure to check www.baldor.com to download the latest version of this manual in Adobe Acrobat PDF format.

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Section 1

General Information

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. Baldor mining motors are sold to OEM (Original Equipment Manufacturers) companies who provide motors and equipment containing these motors as their product offerings. Be sure to consult the OEM documents for safety and regulatory information that is important to the application of these products.

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 OEM 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.
- The National Electrical Code
- Local codes and Practices

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 MSHA (Mine Safety and Health Administration), safety standards for selection, installation and use of electric motors and generators 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 disassembling 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.

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:

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.

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:

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:

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:

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:

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

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.

Safety Notice Continued

WARNING: Use only UL/CSA listed explosion proof motors in the presence of flammable or combustible vapors or dust.
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: 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.

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 over tension belts. Excess 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: Lift using Lift Eyes only. Lifting by power cords will cause motor damage. Use spreader bar to evenly distribute lift force. Angle of lift rope (no spreader bar) should not exceed 45° from vertical, excessive lift angle can damage motor.

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 Motor Insulation test (High Potential Insulation test) must be performed, disconnect the motor from any Speed Control or drive to avoid damage to connected equipment.

If you have any questions or are uncertain about any statement or procedure, or if you require additional information please contact your OEM.

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.

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.

Handling

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

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 hood.
2. 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. 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 closing many times without damage to the "shell".

Caution: If a Motor Insulation test (High Potential Insulation test) must be performed, disconnect the motor from any Speed Control or drive to avoid damage to connected equipment.

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. Motors equipped with roller bearings, or certain custom bearing configurations, will 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 transported. 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.
 - 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 OEM.
 - 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 OEM.
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.

Section 2

Installation & Operation

Installation

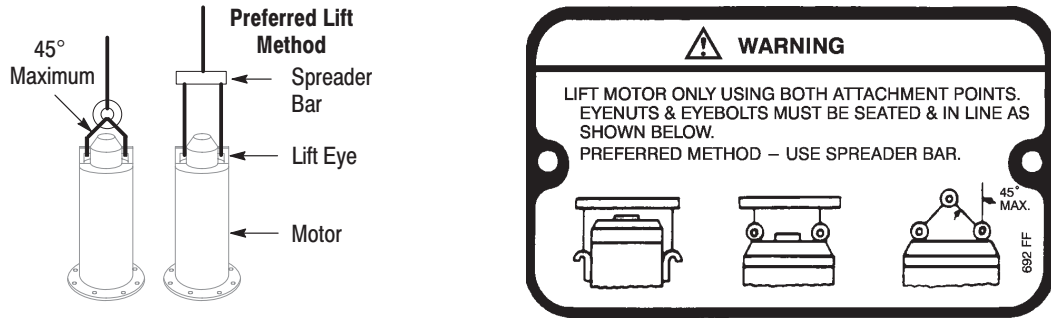
Caution:

Lift using Lift Eyes only. Lifting by power cords will cause motor damage. Use spreader bar to evenly distribute lift force. Angle of lift rope (no spreader bar) should not exceed 45° from vertical, excessive lift angle can damage motor.

Lifting

Lifting means are provided for handling the motor only and should not be used to lift the motor plus the driven equipment. In all cases, care should be taken to 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. Refer to Lifting Nameplate (Figure 2-1) to assure correct lifting procedure.

Figure 2-1 Lift Methods



When mounting motor it is essential that motor and drive unit be rigidly supported in correct alignment. Also, when mounting In-line NEMA LP motors.

Inspection

After the motor is unpacked, examine the nameplate data to see that it agrees with the power circuit to which it is to be connected. The motor is guaranteed to operate successfully with frequency not more than 5% and voltage not more than 10% above or below the nameplate data, or combined variation of voltage and frequency of not more than 10% above or below nameplate data. Efficiency, power factor and current may vary from nameplate data. The rotor should rotate freely when the shaft is turned by hand. The motor should run smoothly with little noise. If the motor is TEFC (totally enclosed, fan cooled) and equipped with condensate drain plugs they must be removed to permit escape of moisture. The drain plug is located on the flange bracket. Certain motors are furnished with hex-head "T-Drains", which should be left in place. Some explosion proof motors are equipped with explosion proof drains which must remain in place.

As shipped the motor is ready for immediate service. If the motor has been in storage for an extended period or has been subjected to adverse moisture conditions, it is best to check the insulation resistance of the stator winding with a megger or an insulation resistance meter before initial starting.

Shaft Growth

When mounting motor it is essential that motor and drive unit be rigidly supported in correct alignment. Also, when mounting in-line NEMA LP motors, allowances should be made for shaft growth due to thermal expansion to avoid potential problems with seals and/or bearings. All motors with the thrust bearings located in the top will have some degree of shaft growth. Table 2-1 lists the expected amount of growth for LP motors.

Table 2-1 Shaft Growth

Frame Size	Growth (Inches)	Frame Size	Growth (Inches)	Frame Size	Growth (Inches)
180	0.002	280	0.012	400	0.018
210	0.005	320	0.015	444/445	0.020
250	0.010	360	0.017	447/449	0.022

Electrical Connections

All motors and generators should be installed and protected in accordance with the National Electrical Code.

Grounding

Motors should be grounded to limit their potential to ground in the event of accidental connection or contact between live electrical parts and the metal exteriors. See the National Electrical Code, Article 430 for information on grounding of motors, Article 445 for grounding of generators, and Article 250 for general information on grounding. In compliance with NEC the terminal housing has grounding provisions which have been approved by the Underwriters Laboratory, UL, and Canadian Standards Association, CSA. In making the ground connection, the installer should make certain there is a solid and permanent metallic connection between the ground point and the motor or generator terminal housing. External grounds should not be used on motors located in hazardous environments.

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 part or 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. When careful consideration of the hazards involved in a particular application indicate the machine frames should not be grounded or when unusual operating conditions dictate that a grounded frame cannot be used, the installer should make sure the machine is permanently and effectively insulated from ground. In those installations where the

machine frame is insulated from ground, it is recommended that appropriate warning labels or signs be placed on or in the area of the equipment by the installer.

Thermal Protection

Thermostat leads marked P1 & P2 must be connected in series with the stop button of the 3-wire pilot circuit of the magnetic motor controller, so that the thermostat will open the circuit before dangerous temperatures are reached. Thermostats are automatic reset for use in a normally closed circuit where the thermostat is connected in series with the holding coil of the magnetic starter. Thermostats provide "Over Temperature" Protection in accordance with NEMA MG 1-12.53. Thermostats do not provide winding over temperature protection (locked rotor). It is suggested that over current protection be used in the motor starter to ensure locked rotor protection.

Installation Procedure

To prevent damage to the motor, do not use force to drive pump on (drive impeller onto motor shaft) or to remove pump from motor shaft.

1. The user must 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 local codes.
2. Turn off and lockout all power and verify the voltage at the motor starter connectors are zero.
3. Connect the motor power leads to the connectors in the motor starter.
4. Thermal Protectors must be connected. Leads marked P1 and P2.
5. Verify your power source is within nameplate tolerances.
6. Motor will operate properly with frequency not more than $\pm 5\%$ and voltage not more than $\pm 10\%$ above or below nameplate rating.
7. Performance within this range will not necessarily be the same as the established performance at exact rated voltage and frequency.

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 at the starter. 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. Not all single phase motors are reversible.

Adjustable Frequency 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.

First Time Start Up

Be sure that all power to motor and accessories is off.

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.

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 through 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 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 District Office or Baldor Service Center.

Section 3

Maintenance & Troubleshooting

- WARNING:** High Voltage may be present even when the machine is not rotating. Ensure that power has been disconnected before touching the motor or any of its components. Electrical shock can cause serious or fatal injury.
- WARNING:** Solvents can be toxic and/or flammable. Follow manufacturer's safety procedures and directions. Failure to observe this precaution could result in bodily injury.
- Caution:** Do not use solvents containing trichloroethane to clean interior or exterior of motor. Damage may occur to paint and insulation systems.

The fundamental principle of electrical maintenance is keep the motor clean and dry. This requires periodic cleaning and inspection of the motor. It is also important to:

- Provide adequate ventilation.
- Keep air and exhaust openings clean and free of obstructions.
- Avoid sharp blows and excessive axial thrust loads on the output shaft.
- Maintain proper lubricant level (check weekly on oil lubricated units).

AC Motors when properly applied, are very easy to maintain. Since clearances and fits are precisely machined, there are no periodic mechanical adjustments to make. Like any precision machine, periodic inspection and simple routine maintenance will prolong your motor's life and help locate potentially damaging conditions before they become problems. The minimal time spent performing these simple procedures cannot begin to compare with the cost of lost productivity and time consuming major repairs incurred through neglect of routine inspection and maintenance.

TEFC motors require very little attention, be sure that the external air chamber of this motor does not become clogged with foreign material which will restrict the passage of air. Squirrel Cage rotors are rugged and very reliable.

Periodic Inspection

Inspections are important to the proper operation and maintenance of a motor, should occur every 3 months (or 500 operating hours whichever comes first).

1. Listen for any abnormal noises and check cause immediately.
2. Check for any vibration and check cause immediately if excessive vibration is found.
3. Check voltage and frequency variations. Unbalanced voltage or single phase operation of poly phase motors will cause excessive heating and ultimately failure. Only a slight unbalance of voltage applied to a poly phase motor will cause large unbalance currents and result in overheating.
4. Check power supply total harmonic distortion to avoid overheating.
5. Periodic checks of phase, voltage, frequency, and power consumption of an operating motor are recommended. These checks can also provide an excellent indication of the load from the driven equipment. Comparisons of this data with previous no load and full load power demands will give an indication of the performance of the driven machine.
6. Check to see that air filters, when used, are in place and clean.
7. Check all air passages and ensure that they are not blocked or clogged.
8. Check for proper lubrication. For sleeve bearing motors check oil level. The oil level must be at the midpoint of sight gauge when the motor is at rest and in operation.
9. When provided, check that constant level oilers have oil in them. Check that cap on oiler is screwed on tightly. Make sure the oil is clean.
10. Check bearing temperature rise.
11. Disconnect and lockout the power source. Ensure no power is applied to the motor.
12. Check all electrical connectors to be sure that they are tight and corrosion free.
13. Check for frayed interconnecting wires, especially at points where it contacts the motor frame.
14. Verify that all covers and guards are in place and fasteners are properly torqued.

These checks can also provide an excellent indication of the load from the driven equipment.

Comparisons of this data with previous no load and full load power demands will give an indication of the performance of the driven machine.

Semi-Annual Maintenance

1. Inspect and clean rotor ends, windings and fan blades.
2. Check electrical connections for tightness and absence of corrosion.

Anti-Friction Bearing

This motor has been properly lubricated at the time of manufacture and it is not necessary to lubricate at time of installation. When the motor has been in storage for a period of six months or more, lubricate before starting. Lubrication of anti-friction bearings should be done as a part of a planned maintenance schedule.

The Recommended Relubrication Interval should be used as a guide to establish this schedule.

Cleanliness is important in lubrication. Any grease used to lubricate anti-friction bearings should be fresh and free from contamination. Similarly, care should be taken to properly clean the grease wet area of the motor to prevent grease contamination.

The relubrication periods shown in Table 3-3 are offered as a guide for different speeds, bearing types, operating time and service conditions (Table 3-2).

Recommended Lubricant

Refer to motor nameplate. Use only clean, fresh grease from clean containers.

Do not mix greases unless compatibility has been checked and verified.

Contact your Baldor District Office if you have compatibility questions.

For motors operating in ambient temperatures shown below, use the following lubricant or its equal:

Operating TEMP. -25°C (-15°F) to 50°C (120°F)

Chevron Oil SRI NO. 2 (Factory lubricant)

Exxon Mobil POLYREX EM

Shell Oil Co. DOLIUM R

Texaco Inc. PREMIUM RB

Minimum Starting Temperature -76°C (-100°F)

Shell Oil Co. AEROSHELL #7

Lubrication Procedure

1. Select service conditions from Table 3-1.
2. Select lubrication interval (Table 3-2).
3. Select recommended volume (Table 3-3).

Table 3-1 Service Conditions

Severity of Service	"Hours per day of Operation"	"Ambient Temperature Maximum"	"Atmospheric Contamination"
Standard	8	40 °C	Clean, Little Corrosion
Severe	16 Plus	50 °C	Moderate dirt, Corrosion
Extreme	16 Plus	">50 °C or Class H Insulation"	"Severe dirt, Abrasive dust, Corrosion, Heavy Shock or Vibration"
Low Temperature		<-29 °C	

Table 3-2 Relubrication Intervals

Anti-Friction Ball Bearings			
Speed (RPM)	Standard Conditions	Severe Conditions	Extreme Conditions
1 thru 7-1/2 1800 RPM or less	1 Year	6 months	1 month
10 thru 75 1800 RPM and slower	1 Year	3 months	1 month
100 and greater 1800 RPM and slower	1 Year	3 months	1 month
All over 1800 RPM	6 months	2 months	1 month

Table 3-3 Relubrication Volume (cubic inches; Motor Maximum speed – RPM)

Frame Size	1800 RPM & Slower	3600 RPM
182 to 215	0.5 in ³	0.5 in ³
254 to 286	1.0 in ³	1.0 in ³
324 to 365	1.5 in ³	1.5 in ³
404 to 449	2.5 in ³	1.0 in ³

Roller Bearings For Roller Bearings divide the above times by 2 (maintenance required more frequently).

Lubrication Procedure

Anti-friction bearings may be lubricated with the motor running or stationary. (Stationary with the motor warm is recommended.)

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. Locate the grease inlet, clean the area and replace the pipe plug with a grease fitting, if the motor is not equipped with grease fittings.
3. Remove relief plug. If grease is caked around the plug, clean with a wooden stick or suitable tool, if severe caking appears at the plug, run the motor until the bearing housing is warm, permitting a free flow of grease through the housing.
4. Locate the motor nameplate. Find the lubricant recommended type and volume.
(Table 3-3 is for reference only, Nameplate values should always be used).
5. Add the recommended volume of the recommended lubricant using a hand operated grease gun.
6. Run the motor for 2 hours with relief plug removed.
7. Replace the pipe plugs and wipe off excess grease.

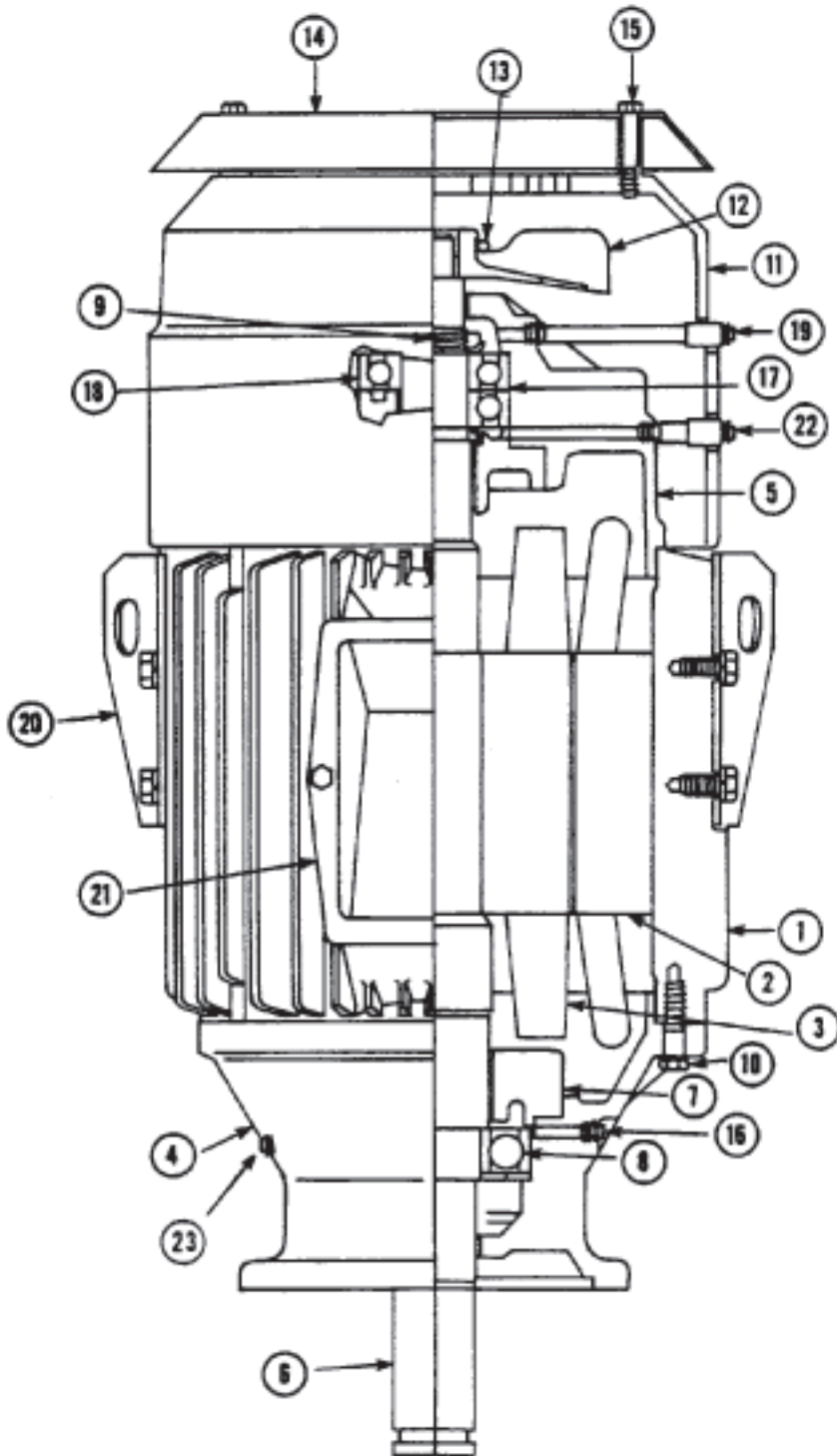
Disassembly

Consult your local Baldor District office. To retain UL listing, UL listed motors must be returned to a Baldor service facility for all repairs or maintenance which requires opening the motor enclosure. Opening the enclosure by anyone other than a Baldor Service Facility will void the motor warranty.

Table 3-4 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.	Check input line connections.
	Eccentric air gap.	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."

Parts Identification



Parts List

Ref.	Part Description
1	Frame
2	Stator
3	Rotor
4	Back End Bracket
5	Front End Bracket
6	Shaft
7	Back End Inner Cap
8	Back End Ball Bearing
G	Bearing Locknut & Lockwasher
10	Back End Bracket Bolts
11	Fan Cover
12	Outer Fan
13	Fan Clamp
14	Drip Cover
15	Drip Cover Bolts
16	Grease Entry Back End
17	Thrust Ball Bearing, Medium Thrust
18	Thrust Ball Bearing, Normal Thrust
19	Grease Inlet Front End
20	Lifting Plates
21	Conduit Box
22	Grease Drain
23	Grease Drain



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