

**BALDOR • RELIANCE**



**Oil Mist Lubrication  
of AC Motors**

**Installation & Operating Manual**

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**Important:**

Be sure to check [www.baldor.com](http://www.baldor.com) for 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 34-1 Electrical and IEC72-1 Mechanical specifications
- ANSI C51.5, the 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.**

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**Safety Notice** Continued

- WARNING:** Use proper care and procedures that are safe during handling, lifting, installing, operating and maintaining operations. Improper methods may cause muscle strain or other harm.
- WARNING:** Pacemaker danger – Magnetic and electromagnetic fields in the vicinity of current carrying 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:** Do not use non UL/CSA listed explosion proof motors in the presence of flammable or combustible vapors or dust. These motors are not designed for atmospheric conditions that require explosion proof operation.
- WARNING:** Motors that are to be used in flammable and/or explosive atmospheres must display the UL label on the nameplate along with CSA listed logo. Specific service conditions for these motors are defined in NFPA 70 (NEC) Article 500.
- WARNING:** Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions, should be permanently guarded to prevent accidental contact by personnel. Accidental contact with body parts or clothing can cause serious or fatal injury.
- Caution:** To prevent premature equipment failure or damage, only qualified maintenance personnel should perform maintenance.
- Caution:** Do not over tension belts. Excess tension may damage the motor or driven equipment.
- 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.
- 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. When lifting a WPII (Weather Proof Type 2) motor, do not lift the motor by inserting lifting lugs into holes on top of the cooling hood. These lugs are to be used for hood removal only. A spreader bar should be used to lift the motor by the cast lifting lugs located on the motor frame.

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

## **Storage**

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

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

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

Minimum resistance of motor winding insulation is 5 Meg ohms or the calculated minimum, whichever is greater. Minimum resistance is calculated as follows:  $R_m = kV + 1$

where: (Rm is minimum resistance to ground in Meg-Ohms and  
kV is rated nameplate voltage defined as Kilo-Volts.)

Example: For a 480VAC rated motor  $R_m = 1.48$  meg-ohms (use 5 MΩ).  
For a 4160VAC rated motor  $R_m = 5.16$  meg-ohms.

## **Preparation for Storage**

1. Some motors have a shipping brace attached to the shaft to prevent damage during transportation. The shipping brace, if provided, must be removed and stored for future use. The brace must be reinstalled to hold the shaft firmly in place against the bearing before the motor is moved.
2. Store in a clean, dry, protected warehouse where control is maintained as follows:
  - a. Shock or vibration must not exceed 2 mils maximum at 60 hertz, to prevent the bearings from brinelling. If shock or vibration exceeds this limit vibration isolation pads must be used.
  - b. Storage temperatures of 10°C (50°F) to 49°C (120°F) must be maintained.
  - c. Relative humidity must not exceed 60%.
  - d. Motor space heaters (when present) are to be connected and energized whenever there is a possibility that the storage ambient conditions will reach the dew point. Space heaters are optional.  
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.

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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. This grease must be removed when the oil mist system is connected.
  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.
  8. Carbon brushes should be lifted and held in place in the holders, above the commutator, by the brush holder fingers. The commutator should be wrapped with a suitable material such as cardboard paper as a mechanical protection against damage.

#### **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.



## Section 2 Installation & Maintenance

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### Oil Mist Installation

1. Remove all grease from bearings. This step is necessary on motors that are labeled "Provisions for oil mist lubrication" or motors built for "oil mist lubrication" but filled with grease by user. This step is not required on motors built "For oil mist lubrication" as supplied by factory.
2. Remove inlet and outlet pipe plugs from bearing brackets (or extension tubes) on each end of motor.
3. Install appropriate reclassifier, Tables II, III and IV, in top opening. Connect oil recovery trap to bottom opening or leave open to act as relief.

### **Oil Supply**

The lubricating oil should be rust and oxidation inhibited, stray-mist suppressed, and manufactured in accordance with good commercial practice. The viscosity should be ISO VG 100 (approx. 470 sus @ 100°F), per ASTM D 2422, latest revision. The flash point should not be less than 350°F (17 C), nor the pour point more than -15°F (-26°C). Oil and misting unit must be compatible. For recommended oils see Table 1.

**TABLE 1  
RECOMMENDED OILS**

<b>MANUFACTURER</b>	<b>OIL NAME</b>
EXXON COMPANY	*TERESSTIC* SYNESSTIC ENMIST
CHEVRON OIL COMPANY	VISTAC
SHELL OIL COMPANY	OMALA
TEXACO, INC.	TEXAMIST

\*This is the only oil recommended **above 1000 volts**.

## Oil Mist Lubrication

The following tables should be used to select the appropriate reclassifier based on the motor frame size and speed. Foot Mounted C & D-Flange Motors as well as Vertical HP Motors use Table II. Vertical LP Motors refer to Table III.

**TABLE II – OIL MIST REQUIREMENTS**

FRAME SIZE	RATED RPM	BEARING SIZE		RRECLASSIFIER SYMBOL*		CONSUMPTION @20" H <sub>2</sub> O	
		FE	BE	FE	BE	OIL** fl oz/hr	AIR*** SCFM
180	ALL	205	206	A	A	.024	.11
210	ALL	206	207	A	A	.028	.13
250	ALL	309	309	B	B	.035	.17
280	ALL	310	310	B	B	.039	.19
320	ALL	311	311	B	B	.043	.21
360	ALL	313	313	B	B	.051	.24
400	≤1800	316	316	C	C	.063	.30
	3600	313	313	B	B	.051	.24
440	≤1800	318	318	C	C	.071	.34
	3600	313	313	B	B	.051	.24
5000	≤1800	222	222	C	C	.087	.42
	3600	313	313	B	B	.051	.24
5800	≤1800	224	224	C	C	.094	.45
	3600	313	313	B	B	.051	.24
9500	≤1800	226	226	C	C	.102	.49
	3600	220	220	C	C	.079	.38

**TABLE III – VERTICAL LP-BASE**

FRAME SIZE	RATED RPM	BEARING SIZE		RRECLASSIFIER SYMBOL*		CONSUMPTION @20" H <sub>2</sub> O	
		FE	BE	FE	BE	OIL** fl oz/hr	AIR*** SCFM
250	ALL	7308	309	B	B	.035	.17
280	ALL	7309	212	B	B	.039	.19
320	ALL	7309	213	B	B	.039	.19
360	ALL	7310	313	B	B	.051	.24
400	≤1800	7314	313	C	C	.063	.30
	3600	7310	313	B	B	.051	.24
440	≤1800	7314	313	C	C	.063	.30
	3600	7310	313	B	B	.051	.24

**TABLE IV**

RECLASSIFIER SYMBOL	ALEMITE PART NUMBER
A	380791-4
B	380791-6
C	381303-10

\* For identification see Table IV – The fittings listed provide consumptions shown in Tables 2 & 3.

\*\* Minimum Oil consumption =

$$\frac{(XX) (5) (0.02)}{25.4} = 0.00394 (XX)$$

\*\*\* Minimum Air consumption = 0.00394 x 4.8 (XX) = .0189(XX)

(XX) Denotes the last 2 digits in bearing identification number on 300 series bearings.

## Baldor District Offices

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