



**IEC Three Phase AC Motors
(Aluminum Frame)**

Installation & Operating Manual

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Important:

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

Section 1 General Information

Overview This manual contains general procedures that apply to Baldor•Reliance 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. 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. 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.

Limited Warranty

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. IEC and Local codes must be carefully followed.

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: 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: 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: 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: 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: 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.

Safety Notice Continued

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: 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: **MEDICAL DEVICE/PACEMAKER DANGER-** Magnetic and electromagnetic fields in the vicinity of current carrying conductors and industrial motors can result in a serious health hazard to persons with cardiac pacemakers, internal cardiac defibrillators, neurostimulators, metal implants, cochlear implants, hearing aids, and other medical devices. To avoid risk, stay away from the area surrounding a motor and its current carrying conductors.

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 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: 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.

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.

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.

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

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 weather proof motor.

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

1. 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.
2. Storage temperatures of 10°C (50°F) to 40°C (104°F) must be maintained.
3. Relative humidity must not exceed 50%.
4. Altitude must not exceed 1000m above sea level (3280ft.)

Section 2 Installation & Operation

Use as replacement motors for equipment made in Europe requiring IEC metric frame mounting. Available features IP55 weather proof enclosure, aluminum frame construction.

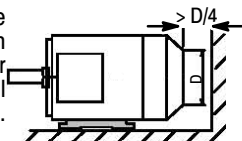
Mounting

Motor must be securely installed to a rigid foundation or mounting surface to minimize vibration and maintain alignment between the motor and shaft load. Improper mounting may cause vibration, misalignment and bearing damage. The standard motor base is designed for horizontal or vertical mounting.

Ventilation See Figure 2-1. Air intake and exhaust must be kept clean at all times.

Figure 2-1

For vertical shaft-up designs, suitable protection must be provided at the mounting end so that no foreign objects can enter the motor air intake. Such protection must not interfere with motor cooling and must not allow exhaust air to re-enter the air intake. The distance between the motor air intake and wall or other machinery must be at least 1/4 the diameter of the air intake opening.



Drain Holes

Condensation drain holes must be at the lowest point of the motor. Drain holes must be kept clean. Plug the drain holes after maintenance (draining).

Rotor Balance

Rotors are dynamically balanced with half key per DIN ISO 8821. Balance is stated on nameplate: **H** or **blank** means balanced with half key. **F** means balanced with full key. **N** means no key. The coupling balance must match the type of balance for the rotor (H, F or N).

Mounting of Load

1. Before attaching load to shaft, remove anti-corrosion paint from shaft using suitable solvent.
2. Grease the shaft extension.
3. Figure 2-2 illustrates mounting and removal practices that should be used. Do not forcibly drive the load onto the motor shaft as this will damage the bearings. If coupling is a tight fit, heat the coupling to 80 to 100°C before assembly onto greased motor shaft.

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.

1. **Direct Coupling** For direct drive, use flexible couplings only. 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.
2. **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 radial and axial thrust loads. Improper loading will cause failure.
3. **Pulley Ratio** The best practice is to not exceed an 8:1 pulley ratio.

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

4. **Belt Drive** Align sheaves carefully to minimize belt wear and axial bearing loads (see End-Play Adjustment). Belt tension should be sufficient to prevent belt slippage at rated speed and load. However, belt slippage may occur during starting.

Motor and load must be properly aligned to prevent vibration and bearing failure. Radial and axial alignment must be achieved and dial indicators are used to measure misalignment.

Figure 2-3 illustrates the use of dial indicators to achieve proper alignment of motor and load.

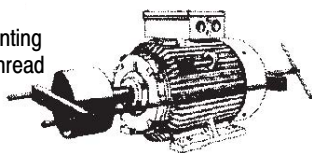
Shims motor for proper alignment. Maximum angular misalignment is 0.03 mm referred to a diameter of 200mm. Maximum parallel misalignment is 0.03 mm. Axial clearance "E" in Figure 2-3 must exceed coupling manufacturers specification. Recheck alignment after machine has reached operating temperature.

Vibration Vibration levels should be less than 3.5mm/s (at <15kW) or 4.5mm/s (at >15kW).

Conduit Box Conduit box can be rotated 90° or 180°. Be sure that conduit box is clean and dry after all connections are made. Be sure the box is sealed so it is dust and water tight.

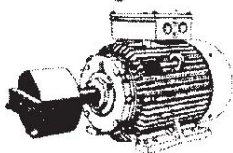
Figure 2-2

Example of mounting without female thread



Remove Fan Cover

Example of mounting with female thread



Example of removal (puller)

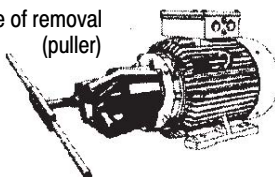
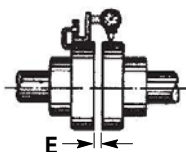
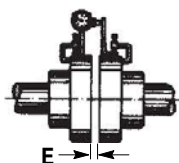


Figure 2-3

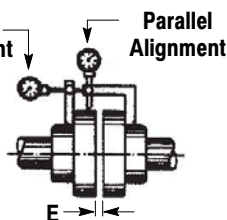
Parallel Alignment (center offset)



Angular Alignment



Angular Alignment

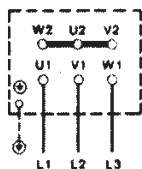


AC Power Motors with flying lead construction must be properly terminated and insulated. Connect the motor leads as shown on the connection diagram located on the name plate or inside the cover on the conduit box. Be sure AC power is within $\pm 5\%$ of rated voltage and $\pm 2\%$ rated frequency. Connection of L1, L2 and L3 to motor terminals U1, V1 and W1 determine rotation direction.

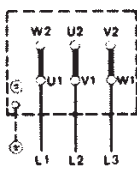
Connection of L1, L2, L3 to	Rotation Direction (viewed from Drive End)
U1, V1, W1	clockwise, CW
W1, V1, U1	counter-clockwise, CCW

Adjustable Frequency Power Inverters. Consult the drive instructions for maximum acceptable motor lead lengths, and proper grounding.

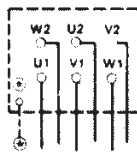
Three Phase Cage Motor Connection



Star



Delta



Star-Delta Starter Connection

Three Phase Pole Changing Motors

For pole changing motors, please observe the wiring diagram in the motor's terminal box.

Dahlander connection

The highest number of poles = high speed is shown first (AM 160 ... 4/8)

With 2 Separate Windings

The low number of poles = high speed is shown first (AM 160 ... 4/8)

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.

WARNING: Guards must be installed for rotating parts such as couplings, pulleys, external fans, belts, chains 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.

Surface temperature of motor enclosure 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 user to protect against accidental contact with hot surface.

Some satisfactory methods of guarding are:

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

First Time Start Up

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.

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.

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.

Permanent Lubrication

Ball bearing with permanent lubrication can be operated about 20,000 hours (up to a maximum of 48 months) without replacement.



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