

AC Induction Motors

Installation and operating instructions

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This **instruction manual** has been prepared for personnel authorized to install, operate and maintain Armstrong three-phase induction motors **safely** and **properly**.

RECEIVING INSPECTION AND HANDLING

- 1 Immediately check the motor for external damage that may have occurred during shipment and if any is found, inform the nearest Armstrong representative without delay.
- 2 Check the nameplate data, specially the voltage and winding connection.
- 3 Turn the shaft by hand to check it turns freely.
- 4 **WARNING!** The motor should be lifted by the lifting eyebolts or the lugs. Those are provided for lifting the motor only and must not be used for lifting other equipment that may be attached to the motor. All eyebolts must be fully tightened. When lifting the motor be careful not to damage other parts such as shaft extension, fan cover, fan, windings etc. See Pump I&O if appropriate for lifting of complete pumping unit.



WARNING

The following safety precautions must be observed.

- 1 Rotating parts of motor and high voltage connections can cause serious, even fatal injury if improperly installed, operated or maintained. Responsible personnel should be familiar with NEMA MG2 (Safety Standards for Construction and Guide Selection, Installation and Use of Electric Motors and Generators), the National Electrical Code (NEC) and all local safety regulations.
- 2 When servicing, all power sources to the motor and accessory devices must be de-energized and disconnected and all rotating parts should be inactive.
- 3 Lifting devices, when supplied are intended for lifting the motor only. When another device is supplied with the motor, a dual straps, not chains, please. See Pump I&O if appropriate for lifting of complete pumping unit.
- 4 Suitable protection must be used when working near machinery with high noise levels.
- 5 Safety means and protection must not be by-passed or rendered inoperative.
- 6 The electric motor frame must be grounded in accordance with National Electrical Code and the local applicable regulations.

- 7 A suitable enclosure should be provided to prevent access to the motor by other than authorized personnel. Extra caution should be observed around motors that are automatically controlled or have automatic reset relays; the motor could restart unexpectedly and cause serious injuries.
- 8 Shaft must be free to turn before motor is started.

INSTALLATION / MOUNTING

The motor foundation must be sufficiently rigid as to minimize vibration and maintain alignment between the motor and the driven equipment. Motors are dynamically balanced at the factory to NEMA Standards on Vibration Limit. However, vibration at the motor and the driven equipment can occur if the base motor is mounted on is not rigid enough. To minimize vibration, a strong and rigid base must be provided for the motor and driven equipment.

Only trained personnel should perform installation of the motor.

Direct Drive application: Direct connected motors may be coupled to the load through flexible or rigid couplings. Coupling halves should not be installed by force, unless the opposite end of shaft can be backed up to prevent damages to the bearings. Accurate mechanical alignment is essential for successful operation. Align shafts accurately. If reverse rotation can cause damage to the driven equipment, **check rotation** before connecting the motor to the load. See **START UP**.


Condensation drain holes: On Armstrong cast iron TEFC motors, condensation drain holes are located at each end of the stator housing where the feet are located, and on the face of face mounted motors (TC, JM, JP). The drain-hole plugs inserted at the factory must be removed to prevent condensation water build up. On horizontal foot mounted F1 or F2 installations, remove plugs located at each end of stator. In vertical output shaft down flange mounted installations, remove plugs located on face of motor C-face.

Foot mounted motor : Motor should be installed on a rigid foundation to prevent excessive vibration and should be fasten securely to a base with maximum size bolts.

Face mounted motor : All fits are accurately machined to match with the driven equipment. Matching surfaces should be free from dirt or burrs and solidly engaged. The complete assembly should turn freely without stressing shaft and bearings from misalignment and thrust.

LOCATION


- 1 Drip-proof motors are intended for use where atmosphere is relatively clean, dry and non-corrosive. Keep windings clean with a soft brush, cloth or vacuum.
- 2 Totally-enclosed motors may be installed where dirt, moisture and corrosion are present. **NOTE** : in all cases, **no** surrounding structure should obstruct normal flow of ventilating air through or over motor.

- 3  **WARNING**
DO NOT INSTALL General Purpose motors where hazardous, inflammable or combustible vapors or dust are present, due to the possibility of explosions or fire and damage to property or injury to personnel.

ELECTRICAL CONNECTIONS

- 1 Connect motor to correct power supply according to nameplate.
- 2 Motor and control wiring, overload protection and grounding should be in accordance with the National Electric Code and local regulations.
- 3 Identify motor auxiliary device such as space heater or temperature sensors. These should have their own isolated circuits insulated separate from the motor power cables.

START UP

- 1  **WARNING**
The insulation resistance of the motor winding should be checked before energizing the motor.
- 2 It is recommended that the motor be initially started uncoupled from load. Check direction of rotation. If rotation must be changed, **allow the motor to come to a complete stop**, and interchange any two leads on a three phase motor.
- 3 Connect load. The motor should start quickly and run smoothly, if not, shut off the power at once. Recheck the assembly including all connections before restarting.
- 4 If excessive vibration is noted, check for loose mounting bolts, a motor supports structure that is too flexible, or transmitted vibration from adjacent machinery. Periodic vibration checks should be made as foundations settle.
- 5 Operate under load condition for a short period of time. Check operating current against nameplate.

LUBRICATION OF BALL OR ROLLER BEARINGS

Grease lubricated bearings as supplied, are adequate for a long period of operation without re-lubrication. A good maintenance schedule for re-greasing will vary depending on motor size, speed, duty and environment.

FREQUENCY FOR RE-LUBRICATION

The following table suggests re-lubrication intervals for motor on normal, steady running, light duty indoor load in relatively clean atmosphere at 40°C (104°F) ambient temperature or less.

ENCLOSURE	INSULATION	FRAMES 143-215T	FRAMES 254T +
TEFC	F	NOT GREASABLE	6 MONTHS

Frame sizes 143 through 215T, inclusive have permanently lubricated sealed bearings.

NOTE:

- Frequency shown above should be reduced by:
- 50% - For motors above 1800 RPM
 - 50% - For Heavy-Duty, Dusty locations.
 - 33% - For Severe-Duty, High vibration & shock

TYPE OF GREASE

Use Polyrex EM Polyurea grease or equivalent unless a specific grease is specified on the nameplate.

PROCEDURE FOR RE-LUBRICATION

When re-greasing, stop motor, remove outlet plug and add amount of grease per reference table below, with hand level gun only. Discontinue at once if grease appears at outlet plug. This may occur before specified amount is used.

Run for about ten minutes before replacing outlet plug.

Volume reference table:

SHAFT DIAMETER (AT FACE OF BEARING) in inch	GREASE AMOUNT g (ounce)
0.8 to 1.2	1.5 to 2.8 (0.05 to 0.1)
1.4 to 1.8	3.1 to 5.7 (0.11 to 0.2)
2.0 to 2.2	12.3 to 17 (0.43 to 0.6)
2.4 to 3.3	32.8 to 45 (1.16 to 1.6)

CAUTION



Over-greasing is a major cause of bearing and motor failure. Make sure that dirt and contaminants are not introduced when adding grease.

STORAGE

If the motor is not packaged for long-term storage and is not to be put into service immediately, certain precautions should be taken to protect it. If at all possible, place the motor under cover in a clean and dry location.

During storage, the winding should be protected from excessive moisture absorption by some safe and reliable method of heating. Space heaters, if supplied, may be used for this purpose. The temperature of the winding should be always maintained a few degrees above the temperature of the surrounding air.

TORONTO

+1 416 755 2291

BUFFALO

+1 716 693 8813

BIRMINGHAM

+44 (0) 8444 145 145

MANCHESTER

+44 (0) 8444 145 145

BANGALORE

+91 (0) 80 4906 3555

SHANGHAI

+86 21 3756 6696