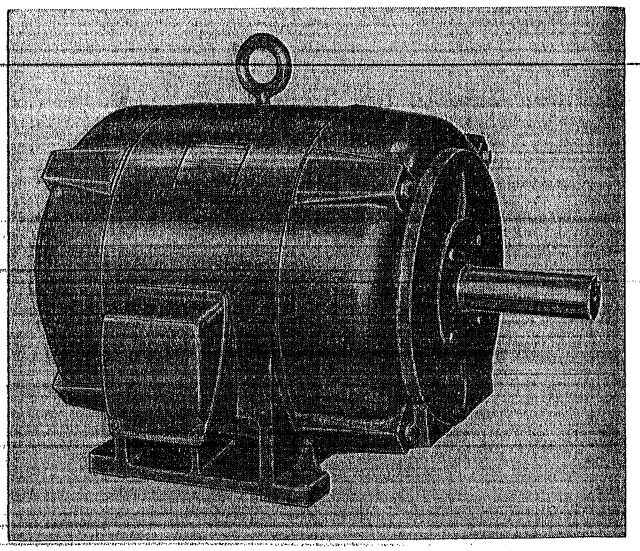
INSTALLATION • OPERATION • MAINTENANCE

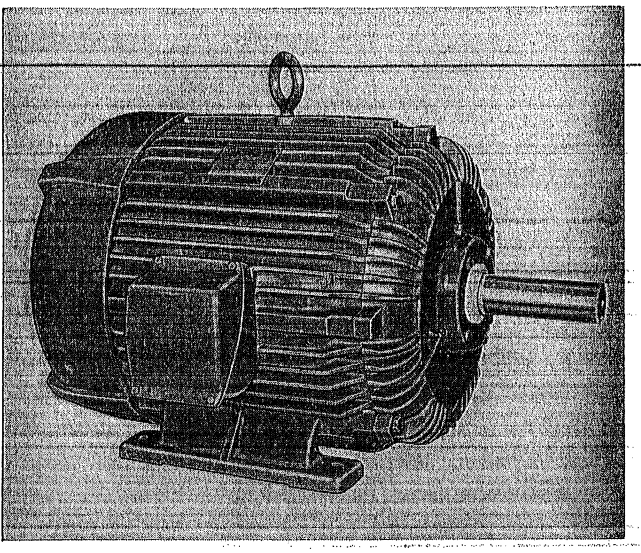
INSTRUCTIONS

TYPE A SQUIRREL-CAGE Life-Line® MOTORS

(Frame 364-U through 509-U)



Drip-Proof



Totally Enclosed Fan-Cooled

LIFE-LINE Type A Squirrel-Cage Induction Motors in NEMA frames 364-U through 509-U are designed for a wide variety of constant-speed applications. Sturdy cast iron construction is employed throughout, with brackets registering directly in rabbet fits machined in the frame.

Drip-proof motors are double-end ventilated, the cooling air being drawn in each end bracket and expelled through openings in the frame. Ventilation openings are of liberal size to provide ample cooling, yet their location and shape are such to afford a high degree of protection to the interior of the motor.

In totally enclosed fan-cooled motors, the ventilating air is blown over the externally ribbed surface, thereby keeping the frame clean and promoting effective cooling. For extremely dirty installations this external surface is directly accessible for cleaning. A rugged, two-piece, cast iron hood shrouds the fan and directs the cooling air axially over the frame. The most active standard motors have a chemically inert, glass-reinforced Moldarta fan. Other standard motors have bronze fans for extra corrosion resistance in chemical atmospheres. Unidirectional fans are used in frames 364 to 445 for speeds exceeding 2,000 Rpm and in frames 504 to 509 above 1400 Rpm. Direction of rotation must agree with rotational nameplate. The design of these unidirectional fans is such that the direction of rotation of the motor may be changed if necessary. To change rotation, remove grill from hood; remove fan from shaft; turn fan 180°; remount on shaft; replace grill and change rotational plate.

Totally enclosed non-ventilated motors use either the fan-cooled construction without fan and hood, or the drip-proof construction with solid covers over bracket and frame ventilation openings.

In all totally enclosed motors, none of the internal parts is exposed to the external air.

RECEIVING

Unpack the motor and make certain that it was not damaged during shipment. Turn the shaft by hand to see that it turns freely.

Check to see that the nameplate data agrees with the voltage and frequency of the power supply provided for the motor.

*Trade-Mark

Shaft extension is coated with a slushing compound to prevent rusting during shipment and storage. This slushing compound may be removed by wiping with turpentine or any petroleum solvent such as benzine, gasoline, Stoddard solvent, etc. See precautions under "Maintenance" for use of these solvents.

INSTALLATION

Mounting. Locate the motor in a place that is well-ventilated. If protecting shields or guards are used, they must not obstruct the free flow of air around the motor. The external air temperature should not exceed 40°C or 104°F, unless the motor has been specially designed or otherwise cleared for use in higher ambient.

Fasten to a rigid foundation using bolts or screws of the largest size permitted by the drilling in the mounting feet. The motor must rest evenly on all four-foot pads.

For wall or ceiling horizontal mounting, the end brackets of sleeve bearing motors must be rotated 90° or 180° to prevent loss of oil supply. For all drip-proof motors, end brackets should be similarly rotated to maintain their drip-proof protection. All brackets have sturdy projecting lugs to permit ready disassembly.

Grease lubricated ball bearing motors may be mounted at any desired odd angle, providing decreased drip-proof protection is not detrimental.

Method of Drive. Any of the following drive methods may be used depending on the particular motor application:

1. **Belt Drive.** Mount the motor on slide rails or base, which allows for adjusting the belt tension.

Mount the motor sheave or pulley as close to the bearing housing as possible, allowing sufficient clearance for rotor end play.

The smallest sheave or pulley should not be less in diameter than that recommended by the belt manufacturer for the belt used.

Sheaves or pulleys should be carefully aligned. Belt tension should be just sufficient to carry normal load without slippage; for first trial, tension should be only enough to eliminate excessive sag in the slack side of the belt. V-belts do not require as much tension as flat belts.

2. **Chain Drive.** Mount the motor on slide rails or base to permit adjustment in center distance between shafts.

Mount the motor sprocket close to the bearing housing, allowing sufficient clearance for rotor end play, and align the sprockets accurately.

3. **Gear Drive.** Mount the motor and driven unit so as to maintain accurate alignment. The gears must mesh accurately to prevent vibration.

Mount the motor pinion close to the bearing housing to minimize the overhang, allowing sufficient clearance for rotor end play.

Dowel the motor to the base.

4. **Direct Drive.** The motor shaft and driven shaft must be carefully aligned.

Dowel the motor to the base.

NOTE: Pulleys, pinions or coupling halves should have a close sliding fit on the shaft extension and must be securely locked to avoid hammering out in operation. If it is necessary to drive the part into position, it is important, on ball bearing motors, that the end of the shaft opposite the extension be backed up so that the force of the blow is not taken in the bearing. Use a pinion puller for removing tight pulleys.

Electrical Connections. Be sure the motor is connected as shown on the nameplate diagram, and that the power supply (Voltage, Frequency and Number of Phases) corresponds with the nameplate data.

Connect to the power supply through a suitable switch and overload protection.

Install all wiring and fusing in accordance with the National Electric Code and local requirements.

To change the direction of rotation on three-phase motors, interchange any two-line leads.

To change the direction of rotation on two-phase motors, interchange the line leads of either phase.

Conduit Box. If the conduit box is desired on the opposite side of the motor, remove the brackets and rotor, reverse the frame, and reassemble.

The conduit box is mounted near the horizontal centerline, and may be rotated in steps of 90° to receive conduit from any of four directions.

Drip-proof motors use a sheet steel box with knock-out for conduit entrance. When conduit entry is from above, the recommended method of connecting conduit is as shown in Fig. 1. Where conditions warrant it, the same method may be applied to conduit entry from the sides.

Enclosed motors have a cast iron box tapped for receiving rigid conduit. Pipe-size conforms to accepted standards for the particular motor frame size, and a reducer should be used when connecting to smaller conduit.

When the motor is mounted on a bedplate or on slide rails for belt adjustment, flexible metallic conduit should be used to protect the incoming cable. In making this connection a squeeze connector should be used for attaching the flexible conduit to the motor box. Squeeze connectors may be straight, 45° or 90°.

OPERATION

Grease lubricated ball bearing motors are ship-

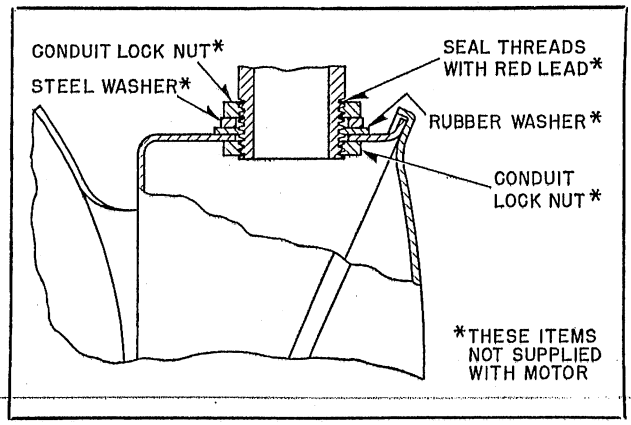


FIG. 1. Method of Connecting Conduit to keep out Liquids When Leads Enter Top of Conduit Box

ped from the factory with sufficient grease to operate for a long period. (See greasing instructions under "Ball Bearings" on page 5.) Run the motor without load to check the connections and direction of rotation.

Before starting sleeve bearing motors, see instructions under "Sleeve Bearings" on page 5.

The motor will operate satisfactorily with a 10 percent variation in voltage, a 5 percent variation in frequency, or a combined voltage and frequency variation of 10 percent, but not necessarily in accordance with the standards of performance established for operation at normal rating.

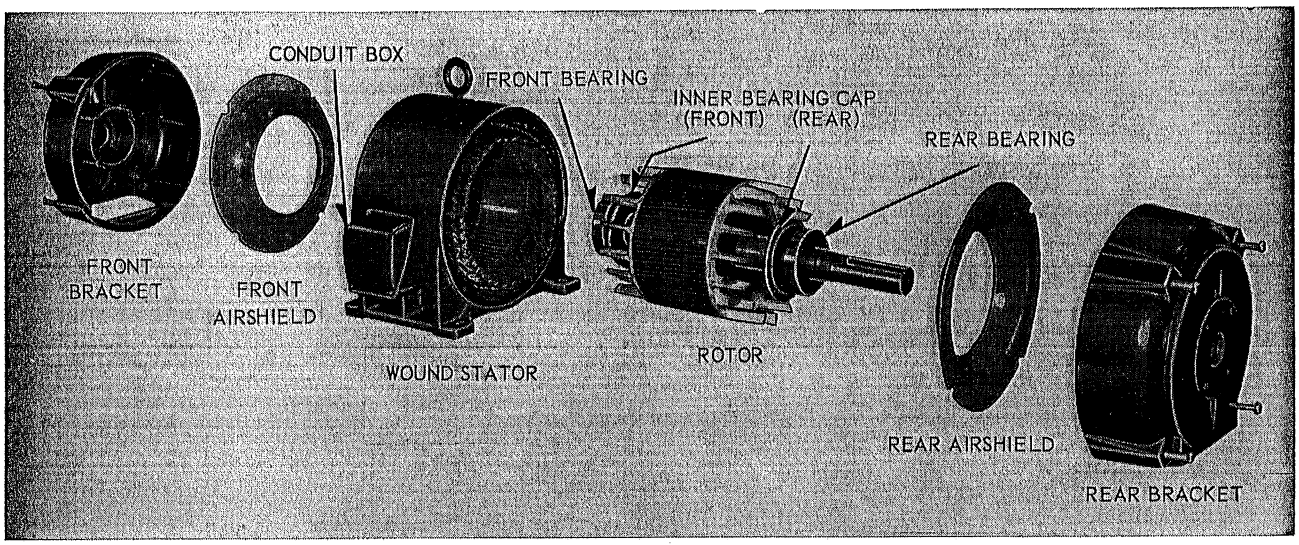


FIG. 2. Arrangement of Parts* — Drip-Proof Motors

**Note: Totally enclosed non-ventilated motors use same parts as drip-proof except conduit box is cast iron, air-shields are not used, and solid covers are mounted over ventilation openings in brackets and frame.*

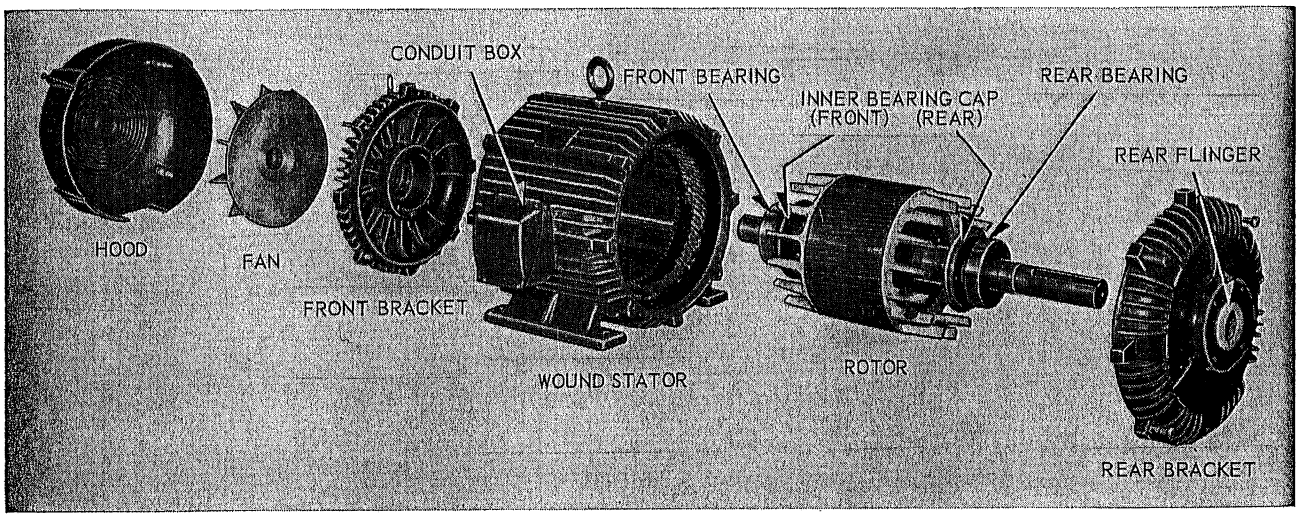


FIG. 3. Arrangement of Parts† — Totally Enclosed Fan-Cooled Motors

†Note: Fits between brackets and frame sealed with water repellent grease; some totally enclosed non-ventilated motors use same parts as totally enclosed fan-cooled except without fan and hood.

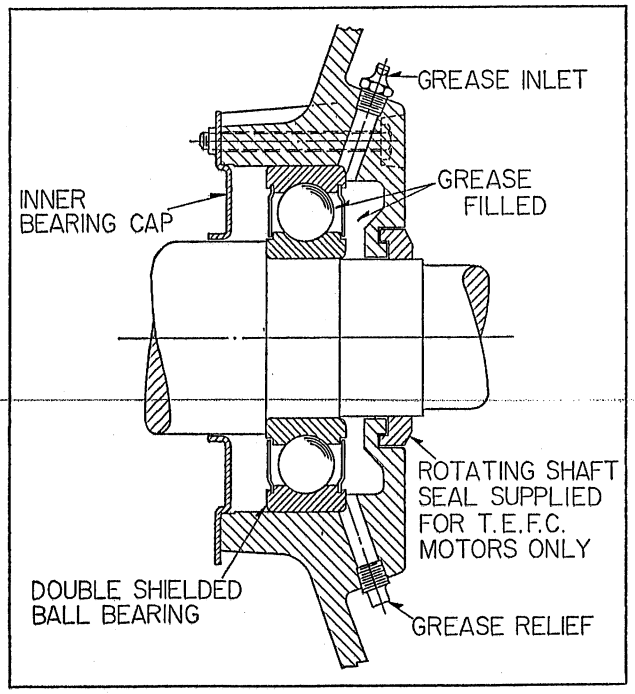


FIG. 4. Sectional View — Bearing Assembly

MAINTENANCE

Inspection. Although Life-Line motors require a minimum of attention in service, they should be inspected at regular intervals to check for excessive (1) dirt, (2) moisture, (3) friction and (4) vibration, which account for 90 percent of all motor failures.

1. Guard Against Dirt. Keep the insulation and mechanical parts of the motor clean. Dust that is free from oil or grease may be removed by wiping with a clean, dry cloth, or preferably, by suction. Dust may be blown from inaccessible parts with clean, dry air, using not more than 30 to 50 pounds pressure. Use care to prevent personal injury from flying particles.

When grease or oil is present, wipe with a cloth moistened (but not dripping) with a petroleum solvent of a "safety type" such as Stoddard solvent or similar materials available under various trade names. Wear suitable gloves to prevent skin irritation when using these petroleum solvents.

Petroleum solvents are flammable but relatively non-toxic.

2. Guard Against Moisture. Care should be taken to protect drip-proof motors from accidental hosing.

The insulation resistance of stand-by motors should be checked with a "megger" at regular intervals to detect the presence of moisture in the windings. If the insulation resistance shows an appreciable decrease, the windings should be dried out by any suitable means before applying power to the motor. This is particularly important in installations where the ambient temperature is subject to frequent, sharp fluctuations, or where the atmosphere is unusually damp. For less severe locations, running stand-by motors at least once a week should protect the windings from moisture absorption or condensation.

Before motor windings are blown out with air, make sure that water has not condensed in the air line.

3. Guard Against Friction. Excessive friction or overheating of bearings is usually traced to one of the following causes:

(a) Overgreasing.

(b) Insufficient lubricant.

(c) Excessive belt tension.

(d) Poor alignment, such as to cause vibration or binding.

(e) Lack of end play.

(f) Excessive end or side thrust from gearing, couplings, etc.

If the overheating is not localized in the bearings, but prevails in the motor generally, check the following possible sources of trouble:

(a) Overload.

(b) Impaired ventilation, caused by heavy accumulation of dirt in ventilation passages or on dissipating surfaces, or by other obstructions to the normal cooling.

4. Guard Against Vibration. To avoid failures due to vibration, a few simple checks should be made regularly:

Check for misalignment such as may be caused by foundation settling or heavy floor loading. These may be causing vibration through misalignment.

Check to see if vibration from the driven machine is being transmitted to the motor.

Check for excessive belt or chain tension or the push-apart effect inherent in spur gears.

Check the motor mounting bolts, bracket bolts, and the pulley or coupling to make sure they are securely fastened.

Coils. Revarnishing the windings when motors are overhauled will lengthen their life. Suitable varnish may be obtained from the nearest Westinghouse Sales Office.

Ball Bearings. (See Fig. 4). When shipped from the factory, grease lubricated ball bearing motors have a sufficient quantity of the proper grade grease to last for a long period. This period will vary depending on the application. When regreasing, stop motor, remove drain plug, add Westinghouse grease (with hand operated gun only) until grease appears at drain hole. Run motor for approximately ten minutes before replacing drain plug. It is recommended for easy applications no lubricant be added, for average applications motor be lubricated every three to six years, and for severe applications, greasing be done on the basis of experience.

Sleeve Bearings. When ordered, specially designed motor brackets and bearings of tin-base babbitt are furnished, see Fig. 5. The brackets are equipped with transparent inspection windows for quick inspection of bearing and oil ring operation. Sight oil gauges provide instant visual checking of oil level. Three air-gap check holes in bracket and air shield permit insertion of ½" feeler gauges.

Before starting the motor, fill both reservoirs through the spring-lid filler plug in the bearing inspection window with best quality clean dynamo oil. The oil used should have a viscosity of from 180 to 220 SSU (equivalent to SAE #10).

If any oil is accidentally spilled on the bracket, it should be wiped off with a rag or waste. This prevents dirt from collecting on the surface of the motor.

Periodic "flushing out" is not normally required. At intervals of about two years in average service, or during general overhaul periods, remove the bracket and thoroughly wash out the bearing housings, using hot kerosene oil and compressed air if available.

Replacing Sleeve Bearing. If it becomes necessary to remove sleeve bearings, remove the bearing inspection window and oil ring keeper. Free oil ring and tap bearing out toward inside of bracket using a driver against the bearing shoulder. Then the replacement bearing is pressed into place using a soft material between driver and thrust face. Assemble the bracket on the shaft upside down so that the oil ring will not be damaged. Then revolve it on the shaft to the correct position before bolting the bracket in place. After bolting in place and replacing the keeper, check to see that the oil ring revolves with the shaft.

Split Sleeve bearings. When split sleeve bearings are furnished in this series, the top half of the bracket serves mainly as a protective cover. By removing the bolts on the sides of the bracket this cover is readily removable without uncovering the bearing. The interior of the motor may be easily cleaned out if desired and the cover replaced without affecting mechanical line up or coupling in any way.

If it becomes necessary to remove split sleeve bearings, first remove the top half of the bracket, then remove the 4 bolts which hold down the upper bearing housing. Lift the upper bearing housing and the top half of the bearing. To remove lower half of bearing, rotate 180° around shaft by applying a series of light bumps on the outer edge of bearing shoulder with a soft material rod and light hammer. Reverse the above procedure to replace the bearing.

RENEWAL PARTS

Renewal Parts information may be obtained from the nearest Westinghouse Sales Office. Be sure to name the part or parts required (see Figs. 2 and 3) and give the complete nameplate reading on the motor for positive identification.

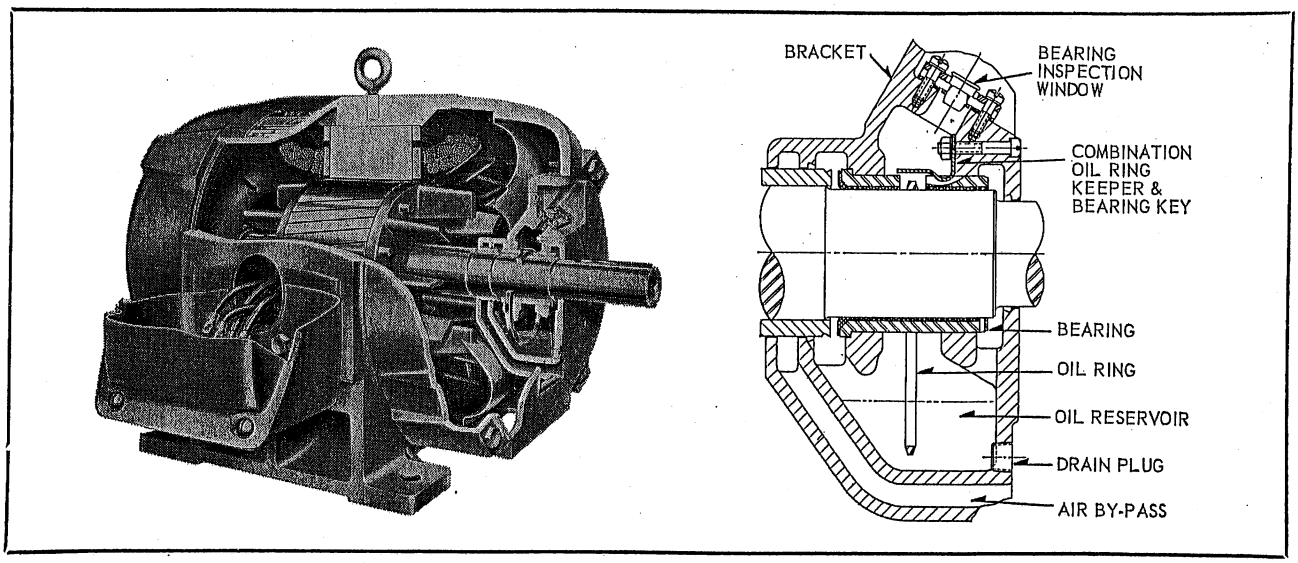


FIG. 5. Sleeve Bearing Motor with Sectional View of Bearing

Warranty. The Corporation in connection with apparatus sold agrees to correct any defect or defects in workmanship or material which may develop under proper or normal use during the period of one year from the date of shipment, by repair or by replacement f.o.b. factory of the defective part or parts, and such correction shall constitute a fulfillment of all the Corporation's liabilities in respect to said apparatus, unless otherwise stated in the quotation.

Any defects that may develop should be referred to the nearest Westinghouse Sales Office for complete servicing information.

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