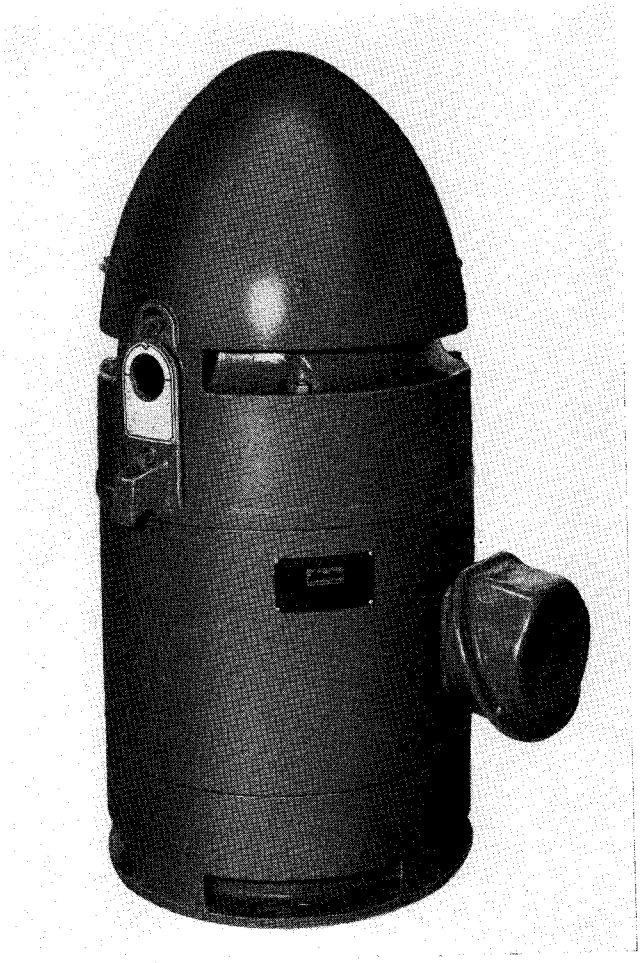
INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

SQUIRREL-CAGE *Life-Line*® MOTORS

HIGH THRUST VERTICAL HOLLOW AND SOLID SHAFT

Type CSP Frames 504, 505, and 507



VERTICAL CSP HIGH THRUST MOTORS in NEMA frame sizes 504 through 507 are squirrel cage induction motors designed for use on deep well turbine pumps. The stator core is completely encased in a steel frame. The lower bracket is of cast iron and provides a housing for the pre-lubricated guide bearing as well as a fit and mounting holes to mate with the pump head. The upper bracket is of cast iron and provides a sealed, tight housing for the oil lubricated thrust bearing. The light weight plastic hood protects the upper parts from the elements.

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.

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.

On solid shaft motors, the 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 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 rigid foundation using bolts or screws of the largest size permitted by the drilling in the flange mounting.

Accurate alignment between motor and pump is of extreme importance. Misalignment will result in bearing trouble.

METHODS OF DRIVE

A. Hollow Shaft. The motor may be equipped with either ratchet or clutch type couplings (as specified by purchaser) as follows:

1. **Ratchet Type.** These motors are equipped with non-reverse ratchet that permits rotation in the CCW direction only. The ratchet consists of a stationary member with teeth or steps cast into it and a rotating member with pins operating in vertical holes. When the motor starts in the forward or CCW direction, the inclined faces of the ratchet teeth throw the pins upward where they are held by centrifugal force and friction. When the motor stops, the pins drop and prevent CW or reverse rotation by striking the vertical faces of the teeth. Refer to Figure 1.

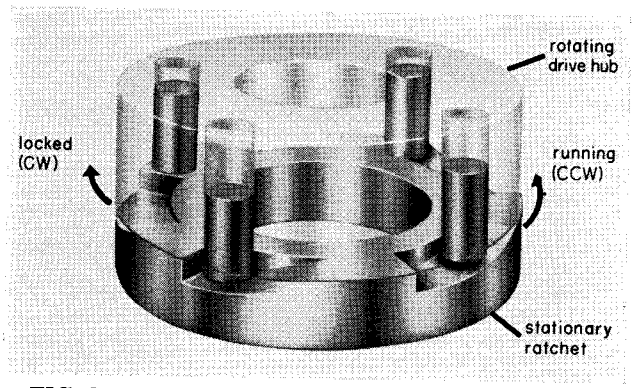


FIG. 1. Non-Reverse Ratchet (Coupling Not Shown)

2. **Clutch Type.** These motors are equipped with a disengaging clutch that consists of a coupling and a drive hub. The drive hub is keyed to the motor shaft, and the coupling is keyed to the pump shaft and attached through a screw to the adjusting nut. The coupling centers on the drive hub by means of a machined fit. The coupling is driven by two pins attached to the coupling and engaging corresponding holes in the drive hub. Disengagement of the clutch is caused by a lifting of the pump shaft which separates the pins in the coupling from the holes in the drive hub. Refer to Figure 2.

Both types of couplings above are bolted to drive hub at factory for shipping purposes.

B. Solid Shaft. These motors are equipped with a shaft extension suitable for coupled service, and are either straight or tapered as selected by the purchaser.

Note: *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, 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 couplings.*

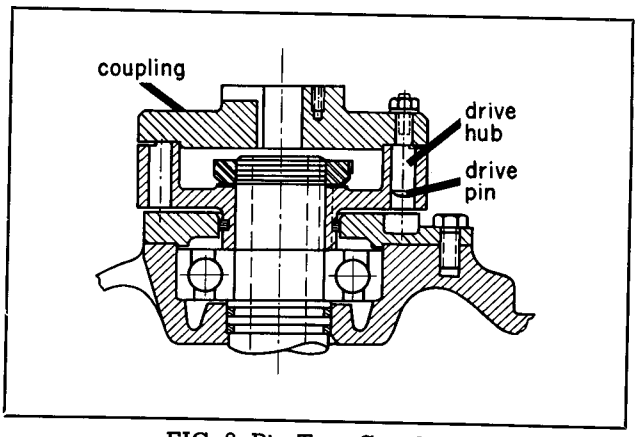


FIG. 2. Pin Type Coupling

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. The conduit box may be rotated 90 or 180 degrees for use with horizontal conduit or conduit from above.

OPERATION

Run the motor without load to check the connections and direction of rotation.

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.

DESCRIPTION OF BEARINGS

Top Bearings. In the top assembly, the angular contact bearings are mounted singularly, tandem or face to face. The bearing is oil lubricated and the oil pot is cooled by means of the motor cooling air passing over the outside of the pot. Bearings for motors above 2000 RPM have special clearances to give zero preload, and if necessary to replace, should be obtained from the motor manufacturer.

The axial thrust load imposed upon the motor by the pump shaft and impellers plus the hydraulic load should not exceed the recommendation by Westinghouse.

Caution: *Do not run motor until bearing housings have been filled to proper level with oil. (See lubrication).*

Lower Bearing. The lower bearing is a standard radial type ball bearing, presealed grease lubricated.

LUBRICATION

Oil. Use a good grade of SAE-10 in the top bearing assembly. See lubrication nameplate on motor.

To fill the upper oil reservoir remove the filler-metering plug (Piece 21 of Figure 5) beside the flush type oil gage, and fill to the mark on the lubrication plate. When the motor is operating the oil level will rise beyond the filler mark. See Figure 4 for lubrication. Nameplate supplied on motor.

Every six months the oil reservoir should be drained. To drain oil, remove both the patented filler-metering plug and the drain plug below the gage.

The filler-metering plug assembly shown in detail in Figure 3 regulates the oil flow to the bearings so that only the correct amount is supplied, and when removed allows rapid filling into or draining of the oil from the bearings and oil reservoir. In addition, a magnet on the end of this plug protects the bearings against the entrance of foreign magnetic particles should they be present in the lubrication system. See Figure 3.

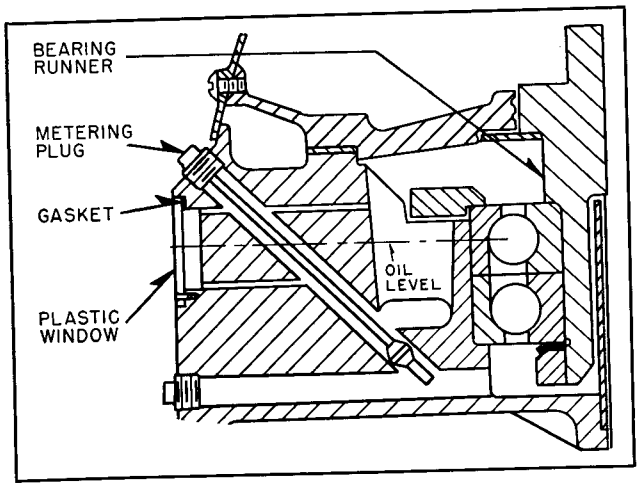


FIG. 3. Oil Metering Assembly

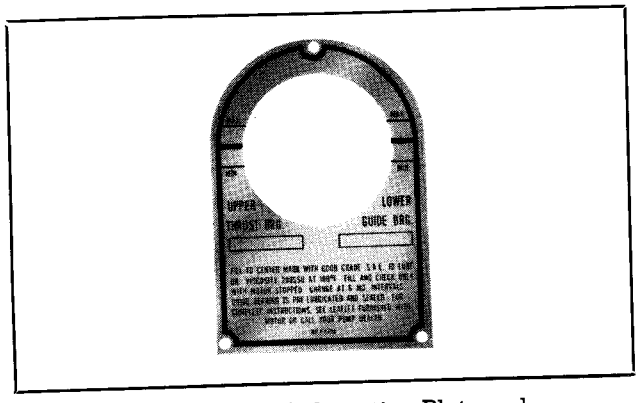


FIG. 4. Motor Lubrication Plate and Bearing Identification

DISMANTLING AND RE-ASSEMBLY OF MOTOR—(see Fig. 5)

1. Remove hood, coupling and cover plates so that upper bearing assembly is exposed.

2. Remove nut and lockwasher from top of shaft and assemble 3/4 inch eye bolts in two tapped holes in top of runner.

3. Pull runner and bearings from shaft. Runner fit on shaft is a light tapping to a sliding fit .0005 to .0022 inches loose.

4. Remove bolts between upper bracket and frame and key in top of shaft.

5. Lift top bracket from frame.

6. Remove bolts from lower bearing assembly and lift rotor with shaft.

7. Separate frame and lower bracket.

To reassemble, reverse the above procedure and use .010" shims in bottom bearing assembly to limit end play to .015 to .025 inches. (On models supplied with rotating bearing flinger, shimming is omitted.)

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% of all motor failures.

1. **Guard Against Dirt.** Prevent excessive build up of dirt on the motor exterior by blowing it off or brushing it clean.

Do not inspect the motor interior unless the motor is dismantled for other reasons. If necessary to dismantle a motor in the field for servicing, upon reassembly, it is imperative that the factory assembly be duplicated in all respects.

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.** 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 standby motors, at least once a week should protect the windings from moisture absorption or condensation.

a. Poor alignment causing excessive vibration or binding.

b. Bent shaft.

c. Excessive end or side thrust due to gearing, flexible couplings, etc.

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 pump is being transmitted to the motor.

Check the motor mounting bolts and bracket bolts to be sure they are tight.

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

RENEWAL PARTS

Renewal Parts information may be obtained from the nearest Westinghouse Sales Office. Be sure to name the part or parts required (see Figure 5) and give the complete nameplate reading on the motor for positive identification.

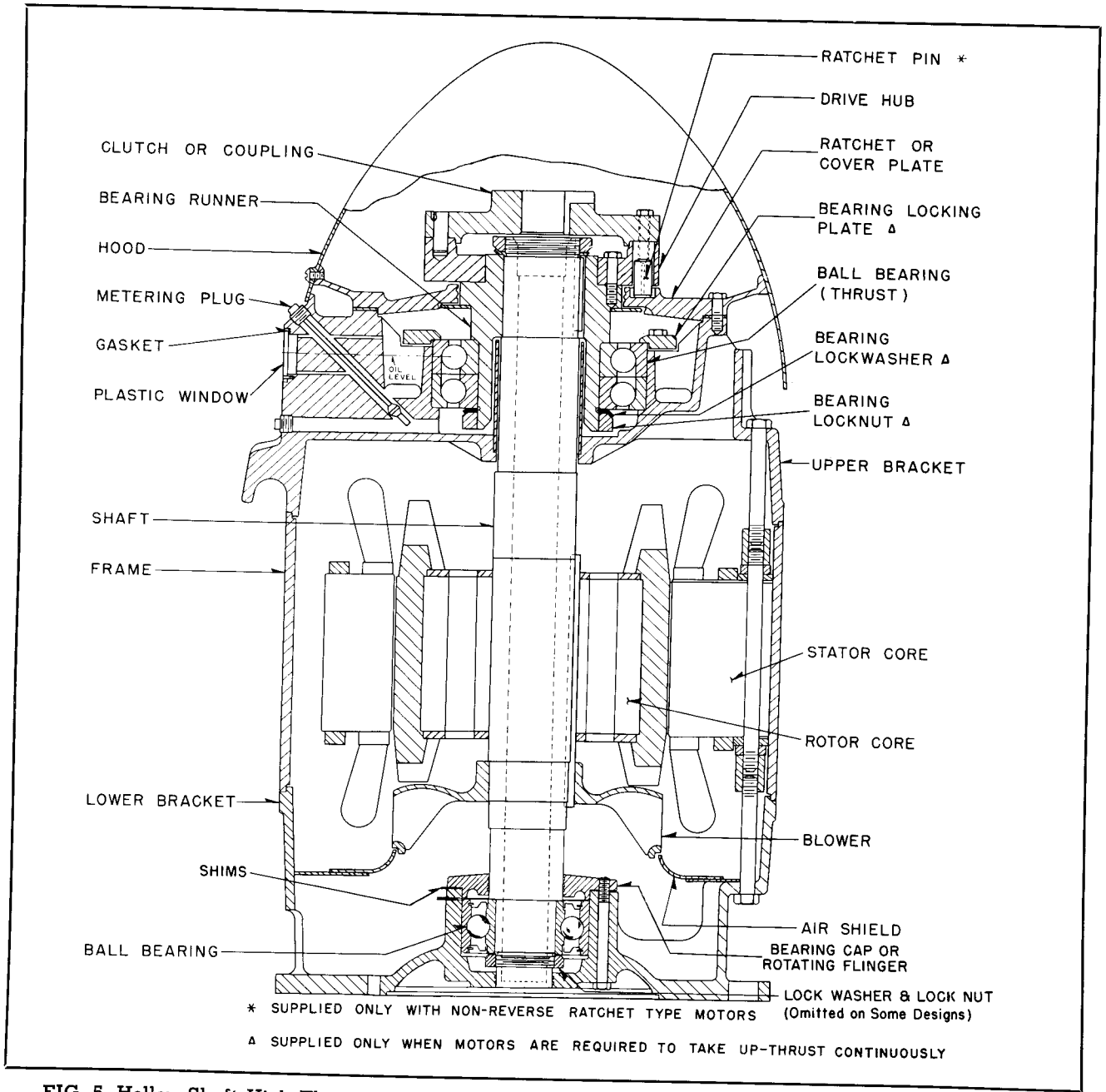


FIG. 5. Hollow Shaft High Thrust. (Solid Shaft Motors Use Same Construction Except Coupling Omitted).

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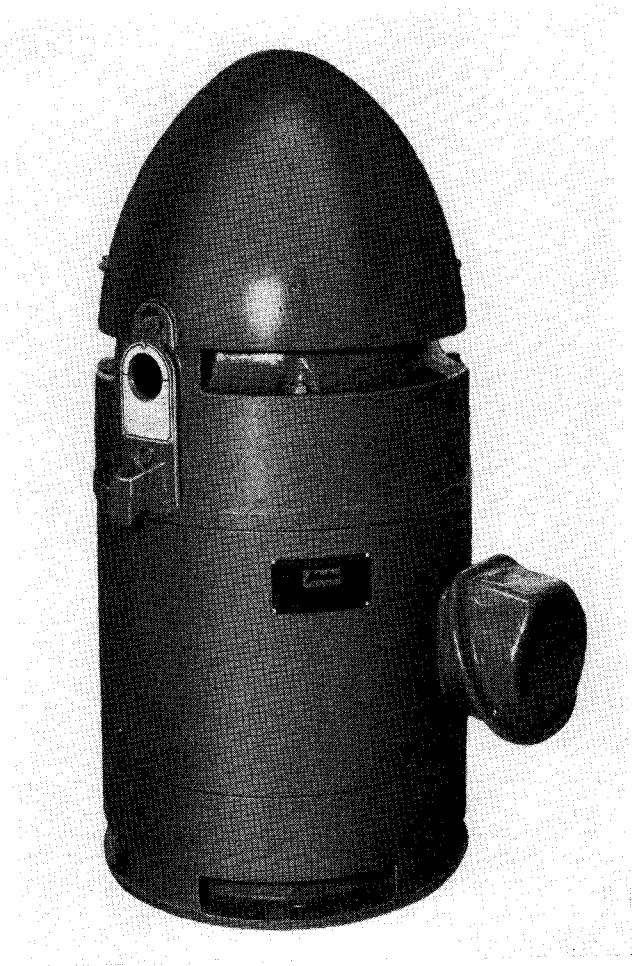
HIGH THRUST VERTICAL HOLLOW AND SOLID SHAFT

Type CSP Frames 504, 505, and 507



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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.

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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.

On solid shaft motors, the 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 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 rigid foundation using bolts or screws of the largest size permitted by the drilling in the flange mounting.

Accurate alignment between motor and pump is of extreme importance. Misalignment will result in bearing trouble.

METHODS OF DRIVE

A. Hollow Shaft. The motor may be equipped with either ratchet or clutch type couplings (as specified by purchaser) as follows:

1. **Ratchet Type.** These motors are equipped with non-reverse ratchet that permits rotation in the CCW direction only. The ratchet consists of a stationary member with teeth or steps cast into it and a rotating member with pins operating in vertical holes. When the motor starts in the forward or CCW direction, the inclined faces of the ratchet teeth throw the pins upward where they are held by centrifugal force and friction. When the motor stops, the pins drop and prevent CW or reverse rotation by striking the vertical faces of the teeth. Refer to Figure 1.

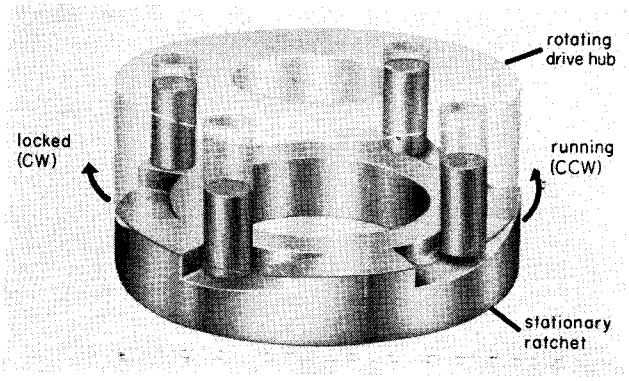

FIG. 1. Non-Reverse Ratchet (Coupling Not Shown)

2. **Clutch Type.** These motors are equipped with a disengaging clutch that consists of a coupling and a drive hub. The drive hub is keyed to the motor shaft, and the coupling is keyed to the pump shaft and attached through a screw to the adjusting nut. The coupling centers on the drive hub by means of a machined fit. The coupling is driven by two pins attached to the coupling and engaging corresponding holes in the drive hub. Disengagement of the clutch is caused by a lifting of the pump shaft which separates the pins in the coupling from the holes in the drive hub. Refer to Figure 2.

Both types of couplings above are bolted to drive hub at factory for shipping purposes.

B. Solid Shaft. These motors are equipped with a shaft extension suitable for coupled service, and are either straight or tapered as selected by the purchaser.

Note: *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, 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 couplings.*

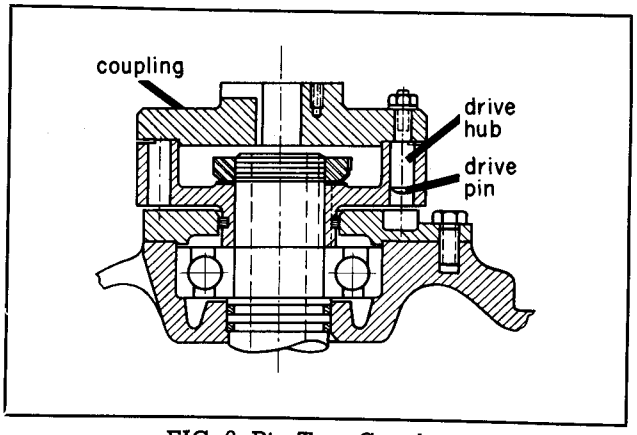

FIG. 2. Pin Type Coupling

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. The conduit box may be rotated 90 or 180 degrees for use with horizontal conduit or conduit from above.

OPERATION

Run the motor without load to check the connections and direction of rotation.

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.

DESCRIPTION OF BEARINGS

Top Bearings. In the top assembly, the angular contact bearings are mounted singularly, tandem or face to face. The bearing is oil lubricated and the oil pot is cooled by means of the motor cooling air passing over the outside of the pot. Bearings for motors above 2000 RPM have special clearances to give zero preload, and if necessary to replace, should be obtained from the motor manufacturer.

The axial thrust load imposed upon the motor by the pump shaft and impellers plus the hydraulic load should not exceed the recommendation by Westinghouse.

Caution: *Do not run motor until bearing housings have been filled to proper level with oil. (See lubrication).*

Lower Bearing. The lower bearing is a standard radial type ball bearing, presealed grease lubricated.

LUBRICATION

Oil. Use a good grade of SAE-10 in the top bearing assembly. See lubrication nameplate on motor.

To fill the upper oil reservoir remove the filler-metering plug (Piece 21 of Figure 5) beside the flush type oil gage, and fill to the mark on the lubrication plate. When the motor is operating the oil level will rise beyond the filler mark. See Figure 4 for lubrication. Nameplate supplied on motor.

Every six months the oil reservoir should be drained. To drain oil, remove both the patented filler-metering plug and the drain plug below the gage.

The filler-metering plug assembly shown in detail in Figure 3 regulates the oil flow to the bearings so that only the correct amount is supplied, and when removed allows rapid filling into or draining of the oil from the bearings and oil reservoir. In addition, a magnet on the end of this plug protects the bearings against the entrance of foreign magnetic particles should they be present in the lubrication system. See Figure 3.

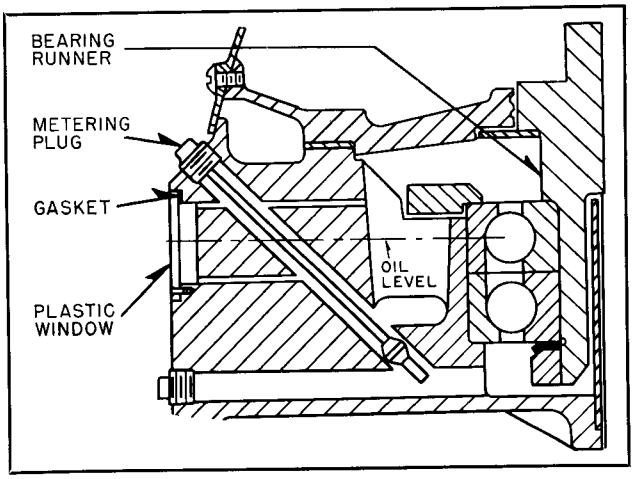

FIG. 3. Oil Metering Assembly

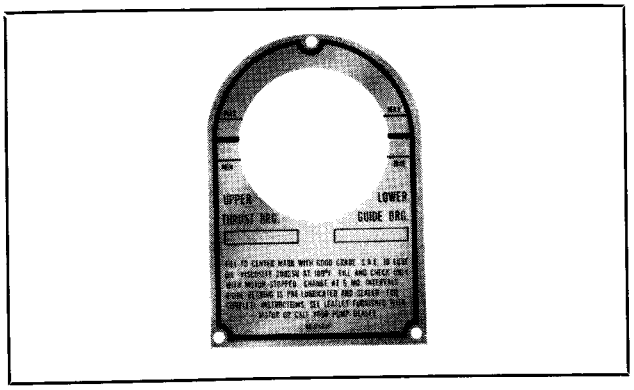

FIG. 4. Motor Lubrication Plate and Bearing Identification

DISMANTLING AND RE-ASSEMBLY OF MOTOR—(see Fig. 5)

1. Remove hood, coupling and cover plates so that upper bearing assembly is exposed.

2. Remove nut and lockwasher from top of shaft and assemble 3/4 inch eye bolts in two tapped holes in top of runner.

3. Pull runner and bearings from shaft. Runner fit on shaft is a light tapping to a sliding fit .0005 to .0022 inches loose.

4. Remove bolts between upper bracket and frame and key in top of shaft.

5. Lift top bracket from frame.

6. Lift rotor and lower bearing assembly.

7. Separate frame and lower bracket.

To reassemble reverse the above procedure.

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% of all motor failures.

1. **Guard Against Dirt.** Prevent excessive build up of dirt on the motor exterior by blowing it off or brushing it clean.

Do not inspect the motor interior unless the motor is dismantled for other reasons. If necessary to dismantle a motor in the field for servicing, upon reassembly, it is imperative that the factory assembly be duplicated in all respects.

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.** 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 standby motors, at least once a week should protect the windings from moisture absorption or condensation.

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

a. Poor alignment causing excessive vibration or binding.

b. Bent shaft.

c. Excessive end or side thrust due to gearing, flexible couplings, etc.

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 pump is being transmitted to the motor.

Check the motor mounting bolts and bracket bolts to be sure they are tight.

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

RENEWAL PARTS

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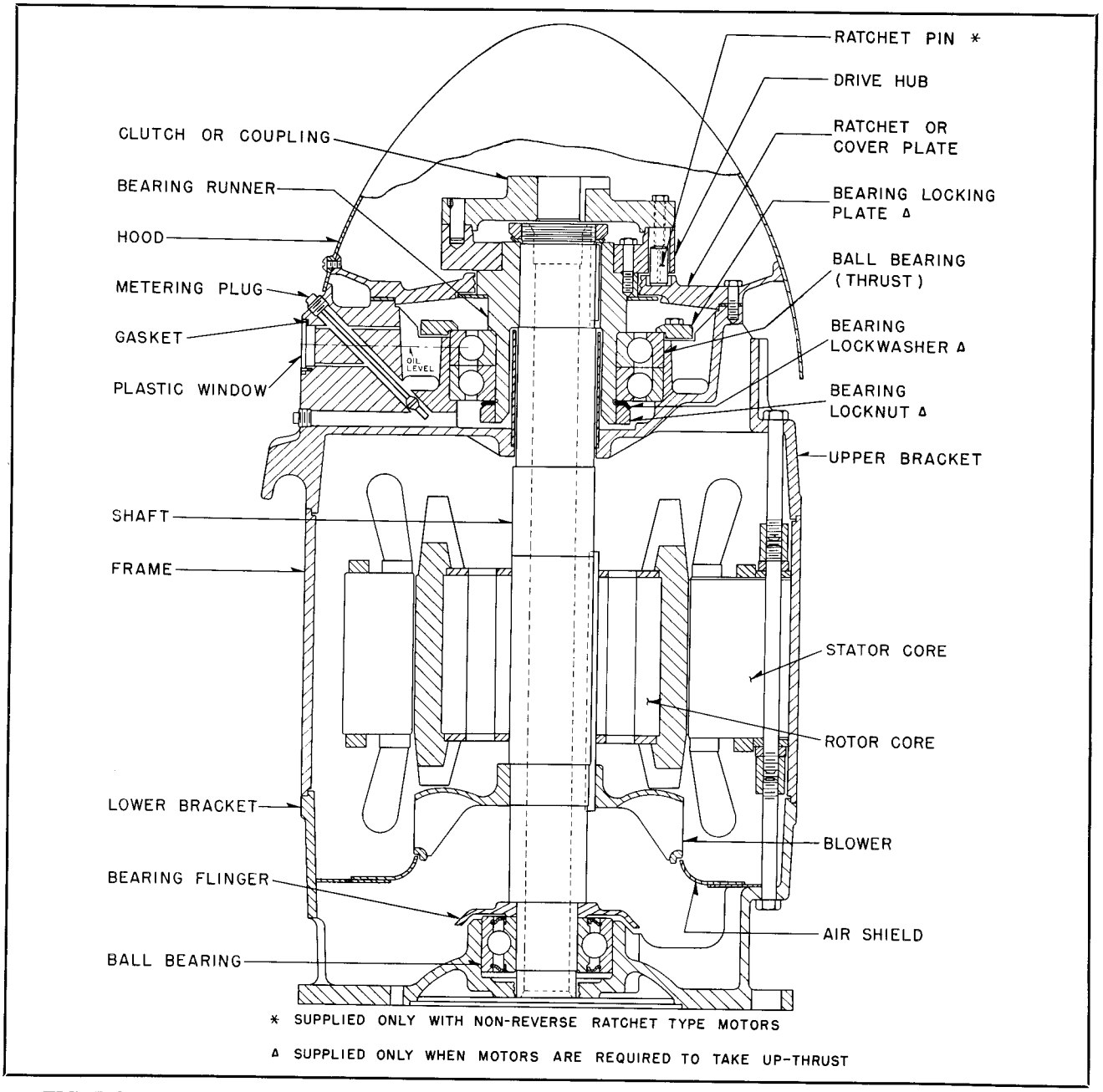

FIG. 5. Hollow Shaft High Thrust. (Solid Shaft Motors Use Same Construction Except Coupling Omitted).

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Mounting. Locate the motor in 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 rigid foundation using bolts or screws of the largest size permitted by the drilling in the flange mounting.

Accurate alignment between motor and pump is of extreme importance. Misalignment will result in bearing trouble.

a. Poor alignment causing excessive vibration or binding.

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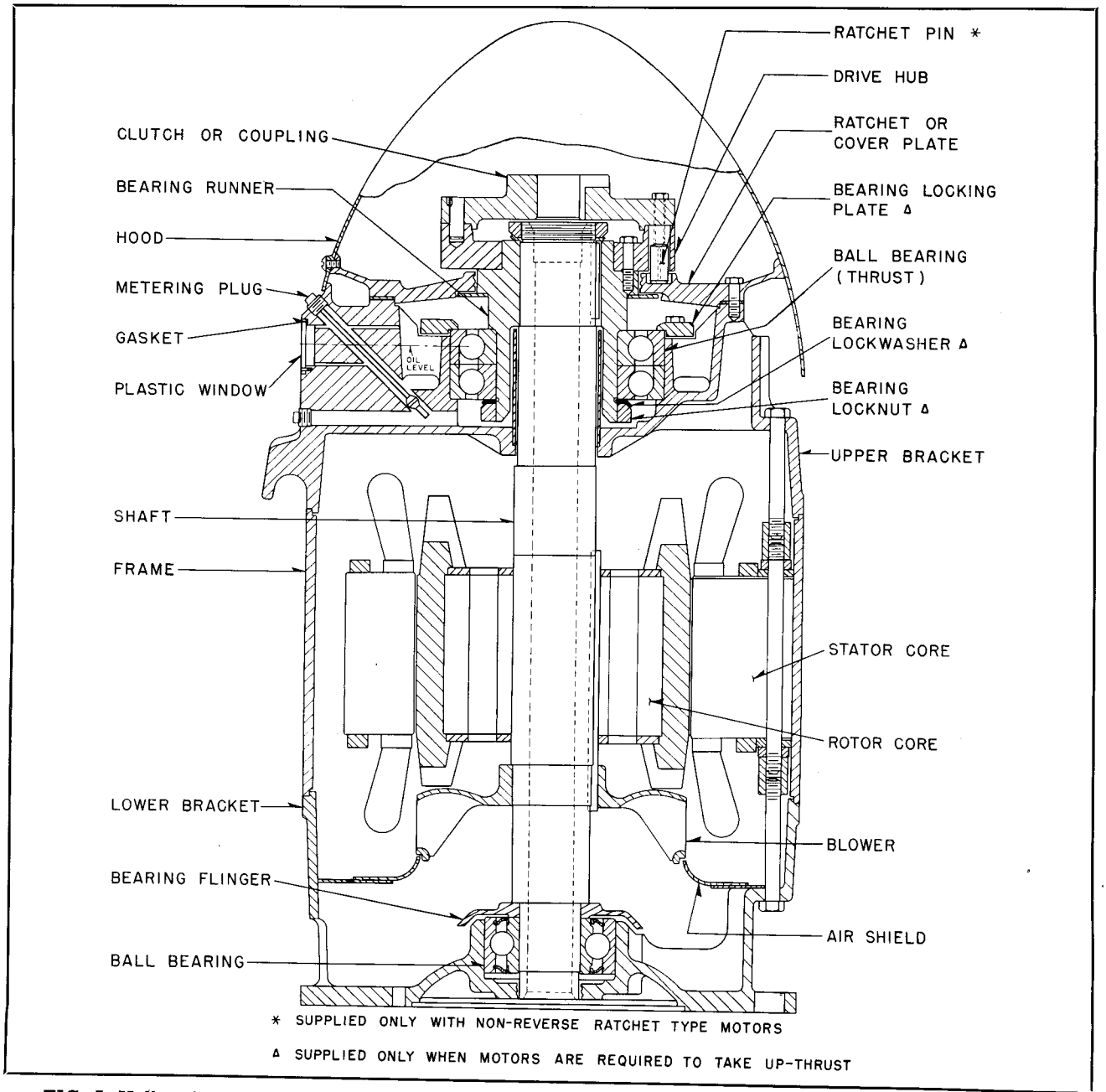

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