

Instructions for Squirrel Cage Motors Vertical Hollow Shaft & Vertical Solid Shaft High Thrust Frames 324T Through 449T (Oil Lubricated)



I.L. 3030-12TA

Life Line T vertical hollow and solid shaft motors are designed for use on deep well or high thrust pump applications. Sturdy cast iron construction is employed throughout with the stator core encased in a cast iron frame. The brackets register directly in accurately machined fits in the frame. The lower bracket provides a housing for the greasable guide bearing as well as a register fit and mounting holes to mate with the pump head. The upper bracket provides a housing for the *OIL* lubricated thrust bearing.

Explosion proof assemblies are so identified by an Underwriters' label installed on the motor. Underwriters' labels can be mounted only at point of manufacture.

The presence of the Underwriters' label on the motor is certification that it has been built to rigidly controlled standards to assure utmost safety of operation in hazardous locations.

RECEIVING AND STORAGE

The motor should be stored in a dry area with factory packaging intact, unless appearance of package indicates possibility of motor damage during shipment. Motor rating and identification data are furnished on label for checking purposes.

Just prior to actual use, unpack motor and rotate shaft by hand to see that it turns freely. Remove rust preventative paper or slushing compound from shaft extension. For dripproof motor, coupling and ratchet pins are packed separately in the crate. See mounting instructions and appropriate figure No. 4 or 5 for assembly.

INSTALLATION

Mounting

Locate the motor in a place that is clean and well ventilated. The motor enclosure is such that dripping, wind blown and spashing water will not damage the motor. Under conditions of extreme weather and moisture, additional protection, such as a pump house is recommended; however, the free flow of air around the motor must not be obstructed. The ambient air temperature should not exceed 40°C or 104°F, unless the motor has been specially designed or otherwise cleared for use in a higher ambient temperature.

Bolt the motor to the pump head or rigid foundation using bolts of the largest size permitted by the holes in the motor bracket.

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

VERTICAL HOLLOW SHAFT MOTORS (VHS)

When mounting VHS motors, remove the hood and coupling. Lower the motor onto the pump head with the pump shaft extending through the hollow shaft. The motor bracket should bolt home square with the pump head and at right angles with the pump head shaft. The pump head shaft should be centered within the motor hollow shaft. Fit the coupling onto the motor and key it to the pump shaft using a gib head key. Put on the adjusting nut supplied with the pump and draw up on the impellers. Lock the adjusting nut in place with a screw through the nut into a tapped hole in the coupling.

THRUST

The axial thrust load imposed upon the motor by the pump shaft and impellers plus the hydraulic load should not exceed the value for which the motor was ordered.

METHOD OF DRIVE

VHS motors may be equipped with either ratchet or clutch drives (to be specified by the purchaser).

1. RATCHET TYPE VHS MOTORS

These motors are equipped with a non-reverse ratchet that permits rotation in the CCW direction (looking downward at the motor) only. The ratchet consists of a stationary plate with teeth cast into it, and a rotating drive hub or runner with pins operating in slots. When the motor starts in the forward or CCW direction, the inclined faces of the ratchet track lift the pins where they are held by centrifugal force. When the motor stops, the pins move down and prevent CW or reverse rotation by locking against the vertical faces of the teeth.

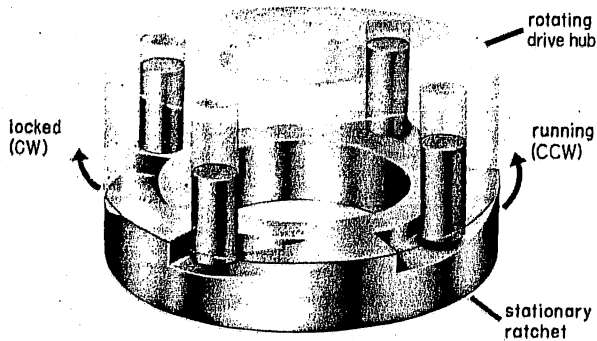


Fig. 1 - Ratchet Assembly

2. CLUTCH TYPE VHS MOTORS

These motors are equipped with a disengaging clutch that consists of a coupling and drive hub or runner. The drive hub is keyed to the motor shaft, and the coupling is keyed to the pump shaft and attached with a screw to the pump shaft 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 in turn lifts the coupling and drive pins out of the drive hub. This feature applies to dripproof motors only.

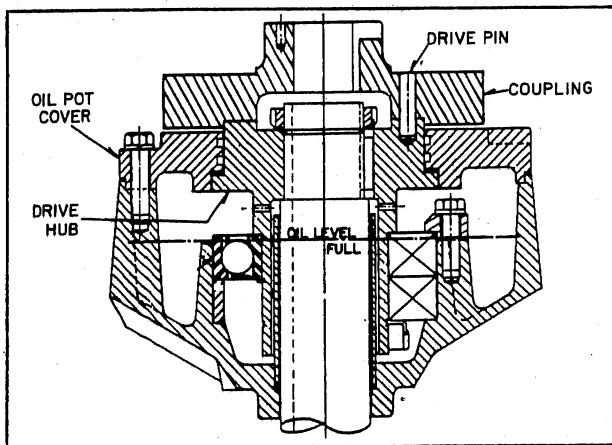


Fig. 2 - Clutch Assembly

3. SOLID SHAFT VERTICAL MOTORS

These motors are provided 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 coupling in 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 bearings. Use a pinion puller for removing tight couplings.

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.

Install all wiring, fusing and grounding in accordance with National Electrical Code and local requirements.

Carefully identify motor auxiliary devices before connecting. These might be space heaters, winding thermostats, thermocouples, thermistors, or other temperature sensors. Be sure they are connected only in circuits for which they are designed and that their connections are carefully insulated from the motor power cables.

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

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

To change direction of rotation on a two phase motor, interchange the leads of either phase.

Conduit Box

The conduit box may be rotated 360 degrees in 90 degree steps.

Operation

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

The motor will operate satisfactorily with a 10 per cent variation in voltage; a 5 per cent variation in frequency; or a combined voltage and frequency variation of 10 per cent, but not necessarily in accordance with the standard of performance established for operation at normal ratings.

MAINTENANCE

Inspection

Although Life Line T motors require a minimum of attention in service, they should be inspected at regular intervals to check for (1) dirt, (2) moisture, (3) friction, and (4) vibration, which account for 90 per cent 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 the air hose; use goggles to avoid eye 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. When a material is difficult to remove, carbon tetrachloride is more effective than petroleum solvents. Wear neoprene gloves to prevent skin irritation when using either petroleum solvents or carbon tetrachloride.

Petroleum solvents are flammable, but comparatively nontoxic.

Carbon tetrachloride is non-flammable, but is highly toxic. Suitable ventilation should be provided to avoid breathing vapors. When ventilation is not sufficient to prevent a distinct odor of carbon tetrachloride, a chemical cartridge respirator or gas mask must be used.

2. GUARD AGAINST MOISTURE

The motor should not be subject to extreme moisture conditions such as high humidity during shut down periods, exposure to water under pressure such as hosing down, or severe weather conditions.

During prolonged periods of idleness, the motor should be run at least once a week, or should be provided with heaters to guard against moisture condensation.

The insulation resistance of motors not in regular use should be checked with a megger, and, if necessary, their windings should be dried by appropriate means before energizing.

Before blowing motor windings out with air, make sure the air line is free of condensation.

3. GUARD AGAINST FRICTION AND VIBRATION

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 thrust.
- d. Overgreasing.
- e. Wrong oil and/or oil viscosity.

To avoid failures due to vibration, a few simple checks should be made regularly:

- a. Check for misalignment such as may be caused by foundation settling.
- b. Check to see if any pump vibration is being transmitted to the motor.
- c. Check the motor mounting bolts and bracket bolts to be sure they are tight.
- d. Check transmission from adjacent machinery or too flexible motor support structure, as well as by motor unbalance itself.

NOTE

If vibration of 5 MILS or more is experienced under running conditions after above checks have been made, then it is certain that there is some resonance in the system.

Coils

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

Guide Bearing

The guide bearings are vacuum degassed single row width conrad type greasable ball bearings.

Thrust Bearing

The thrust bearings are angular contact ball bearings, or spherical roller bearings.

CAUTION

The thrust capacity of these bearings vary with supplier and care should be taken to insure that replacement bearings are equivalent to the original.

LUBRICATION

Guide Bearing

Grease lubricated bearings as furnished are adequate for a long period of operation without relubrication. A good maintenance schedule for regreasing will vary widely depending on motor size, speed, duty, and environment.

Frequency of Regreasing

The following table suggests relubrication intervals for motors on normal, steady running, in relatively clean atmosphere at 40°C ambient (104°F) temperature or less.

Enclosure	Ins.	Frame 320	Frame 360-440
Open-Dp	B	18 Months	1 Year
Enclosed-Fan Cooled	B	1 Year	9 Months
Open-DP	F		
Enclosed-Fan Cooled	F	9 Months	6 Months
Open-DP	H		
Enclosed-Fan Cooled	H	6 Months	3 Months

NOTE

For motors over 1800 RPM - use 1/2 of tabled period. For heavy duty - dusty locations - use 1/2 of tabled period.

Type of Grease

For maximum bearing service life, use only the grease shown on the lubrication decal on the motor. For most applications, this will be Westinghouse #53701RW grease. Some of the equivalent greases are:

FOR CLASS B INSULATED MOTORS

Chevron BRB-2	-	Standard Oil of Calif.
AeroShell #5	-	Shell Oil Company
Hi Temp	-	Texaco, Inc.
Andok 260	-	Humble Oil
Rykon #2	-	American Oil

FOR CLASS B, F, OR H INSULATED MOTORS

Chevron BRB-2	-	Standard Oil of Calif.
AeroShell #5	-	Shell Oil Company
Hi Temp	-	Texaco, Inc.

NOTE

If the grease or number on motor decal differs from #53701RW, *DO NOT* use any substitute grease.

Procedure for Re-Greasing

When regreasing, stop motor, remove inlet and outlet plugs, and add grease with hand lever operated gun only. Discontinue at once if grease appears at outlet plug. Run motor for about ten minutes before replacing outlet plug.

Reference Table for Guide and Thrust Bearings

Shaft Diameter (At face of bracket)	Amount of Grease to Add
3/4 to 1-1/4	1/8 cu. in. or 0.1 oz.
1-1/4 to 1-7/8 (Guide)	1/4 cu. in. or 0.2 oz.
1-7/8 to 2-3/8 (Brgs.)	3/4 cu. in. or 0.6 oz.
2-3/8 to 3-3/8	2 cu. in. or 1.6 oz.
1 oz. = 1.8 cu. in by weight	

CAUTION

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

Thrust Bearing

The thrust bearings are either angular contact ball bearings, or spherical roller thrust bearings depending on the motor's thrust rating. The angular contact bearings are mounted singularly, tandem or back to back. The bearing is oil lubricated and the oil reservoir is cooled by means of the motor cooling air passing over the outside of the reservoir.

CAUTION

Do not run motor until bearing housings have been filled to proper level with oil as indicated on oil lubrication plate (see lubrication) and allowed to stand 1 hour to meter oil into the bearings.

Lubrication

With motor at standstill, fill top bearing reservoir with a good grade of lubricating oil having a viscosity equivalent to S.A.E. #10W; 200SSU @ 100°F for ball bearings and S.A.E. #40W; 600SSU @ 100°F for roller bearings. This is done by pouring the oil in through the filler plug until no more can be added. Before starting motor, replace filler plug. Refer to lubrication nameplate on motor.

The drain-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 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.

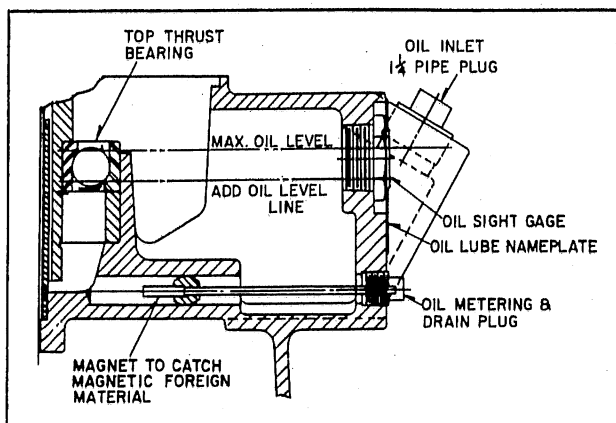


Fig. 3 - Oil Metering Assembly

Every six months, the oil reservoir should be drained. To drain oil, remove the drain metering plug located below the site gage.

Too heavy an oil could cause the following:

1. Increased fluid friction losses resulting in higher operating temperatures; higher temperatures will cause the oil to oxidize or breakdown at an accelerated rate.
2. A heavy oil tends to churn or foam more than a lighter weight oil.
3. Bearings may run warmer because of reduced oil circulation through and around bearings. Too light an oil may allow the oil film to wipe or break down.

For standard applications, the oil viscosity called for on the lube nameplate should be used. Do not use E.P. oil. Turbine or dynamo oils are suggested rather than automotive oils. Some automotive oil additives tend to churn excessively. For severe application, contact the nearest Westinghouse Sales Office and give them the following information: ambient temperature (average), thrust loads, type and brand name of lubricating oil to be used; **MOTOR SERIAL NUMBER.**

To Disassemble Motor

To service or inspect the thrust bearing, the parts should be removed in the following order (see Figures 4 and 5): Hood, drive nut from pump shaft*, coupling*, ratchet pins*, locknut and washer, ratchet plate, bearing runner and bearing.

When the thrust bearing is removed, the upper bracket can be lifted off the frame after removing bracket bolts.

If required, the rotor and shaft can be lifted out with the upper bracket by removing the lower bearing cap bolts and leaving the thrust bearing and runner on the shaft.

EXTRA HI-THRUST DOWN MOTORS

(440 frames only) with spherical roller thrust bearings will follow a similar procedure for assembly and disassembly. The only difference will be the spring plate and springs under the outer race of the thrust bearing. When reassembling, be sure spring plate and springs are seated.

ADJUST SHAFT END PLAY

On the standard vertical hi-thrust motors, the lower guide bearing is restrained to take momentary up thrust. On spherical bearing motors, the restrained lower bearing also maintains spring tension on the thrust bearing during any periods the motor is running without external load.

When reassembling the motor, it is important a pre-load stress is not left on the guide and thrust bearing. The following assembly procedure should be used:†

1. Leave the locknut holding the runner on shaft loose.
2. Tighten lower bearing cap bolts.
3. Tighten down on shaft locknut until bearings are just starting to preload. When slight preloading is experienced, there is no end play and the rotor will not turn as freely by hand.
4. After slightly preloading the bearings, back off the locknut approximately 1/4 turn for angular contact bearing motors and 1/2 turn for spherical roller bearing motors.

*Solid shaft motors will not have a pump shaft nut, coupling or ratchet pins.

†This does not apply for special units with DB thrust bearings for continuous up or down thrust.

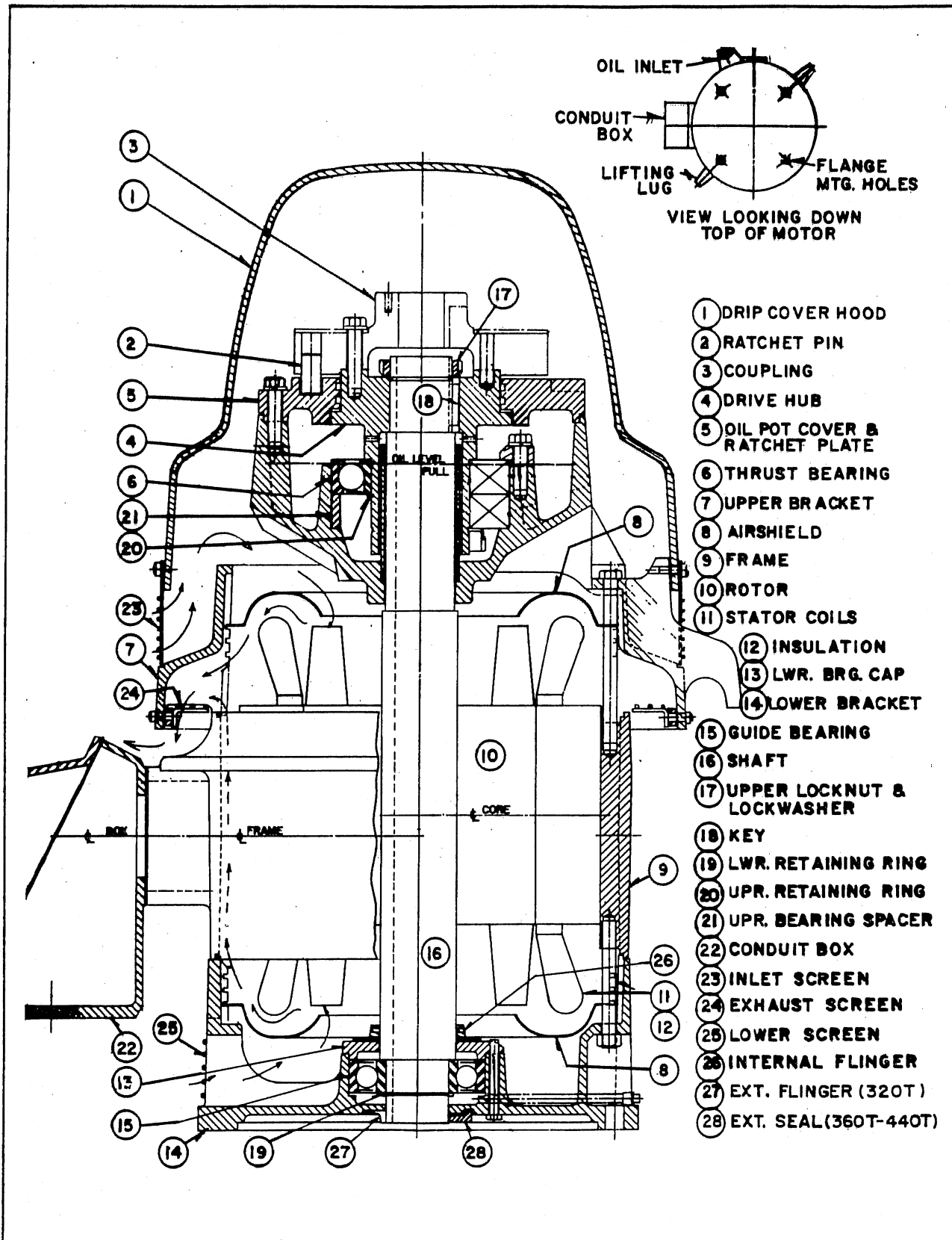


Fig. 4 - Arrangement of Parts, Vertical Hollow Shaft Dripproof Type T Life-Line Motor, Frames 324T thru 445T (Solid Shaft Motors Use Same Construction Except Top Coupling and Ratchet Pins are Omitted)

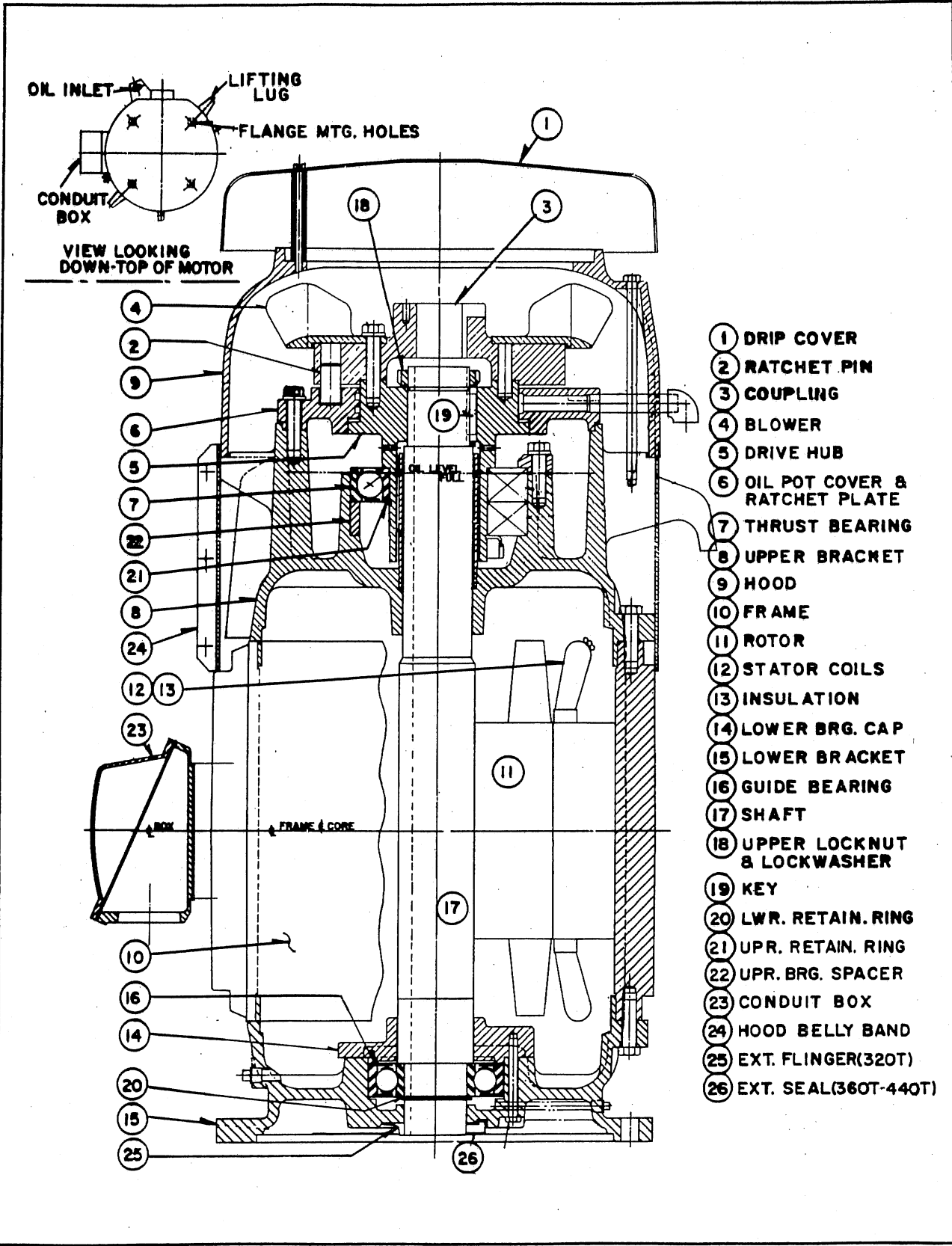


Fig. 5 - Arrangement of Parts, Vertical Hollow Shaft Fan-Cooled or Type T Life-Line Explosion Proof Motor, Frames 324T Thru 445T (Solid Shaft Motors Use Same Construction Except Ratchet Pins are Omitted)

5. Shaft end play for angular contact bearing motors should be .005 to .020 inches. End play for spherical roller bearings should be .008 to .010 inches.
6. If equipment is available, it is desirable that shaft end play be checked using a dial indicator to measure movement as rotor and shaft is raised and lowered.
7. To measure end play on spherical roller bearing motors, the shaft will have to be pressed down to be sure the bearing is bottoming on the spring plate. This can best be done by assembly first without springs and mark shaft accordingly. Then reassemble motor with springs to mark on shaft.

REPAIR AND RENEWAL PARTS

Repair and renewal parts information may be obtained from the nearest Westinghouse Sales Office. Be sure to describe the part or parts required, and give the complete nameplate reading on the motor for positive identification.

Repairs on explosion proof motors, that alter in any way the explosion resisting character of the motor, void the Underwriters' label.

NOTE

Bearings - style numbers on motor nameplate.

Grease - identity on motor decal.

To obtain Westinghouse #53701RW grease in small containers, order:

S# 773A773G01	1 lb. can
S# 773A773G05	5 lb. can
S# 773A773G35	35 lb. can

Returning Apparatus

Authorization and shipping instructions for the return of any apparatus must be obtained by the purchaser from Westinghouse Sales Office or distribution outlet before returning apparatus. In no event will Westinghouse be responsible for apparatus returned without proper authorization and identification.

Warranty

Contact nearest Westinghouse Apparatus Sales Office for details of warranty coverage. Generally, Westinghouse will correct by repair or replacement any defect in workmanship or material which develops in this motor, when properly used, for one year after installation or 18 months after shipment, whichever comes first.

Westinghouse Electric Corporation

Medium A.C. Motor and Gearing Division
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