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Supersedes I.L. 3030-11TA
dated February, 1971

Grease Lubricated, Lifeline T and Type G
Models

Hollow Shaft, Frames 210TP thru 449TP
Solid Shaft, Frames 210VP thru 449VP

Medium Ac Motors Vertical, High Thrust, P-Base

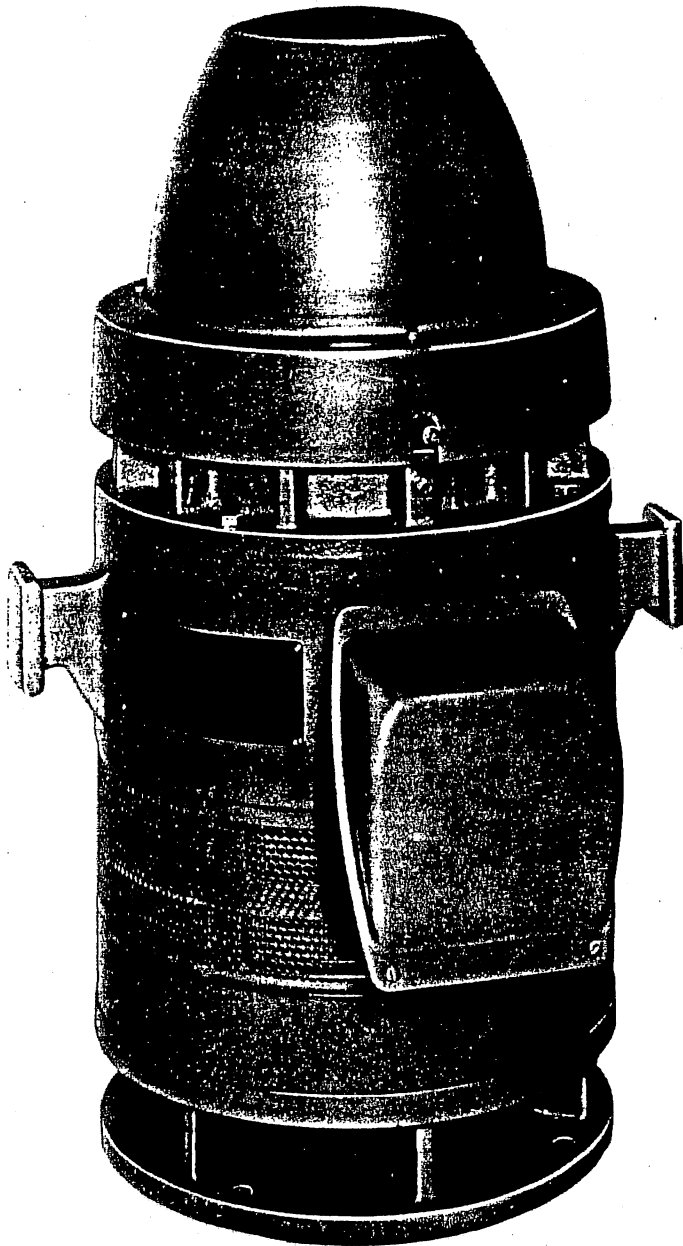


Fig. 1 Typical High Thrust - WPI (Open Dripproof) Vertical Motor Frames 210T-449T

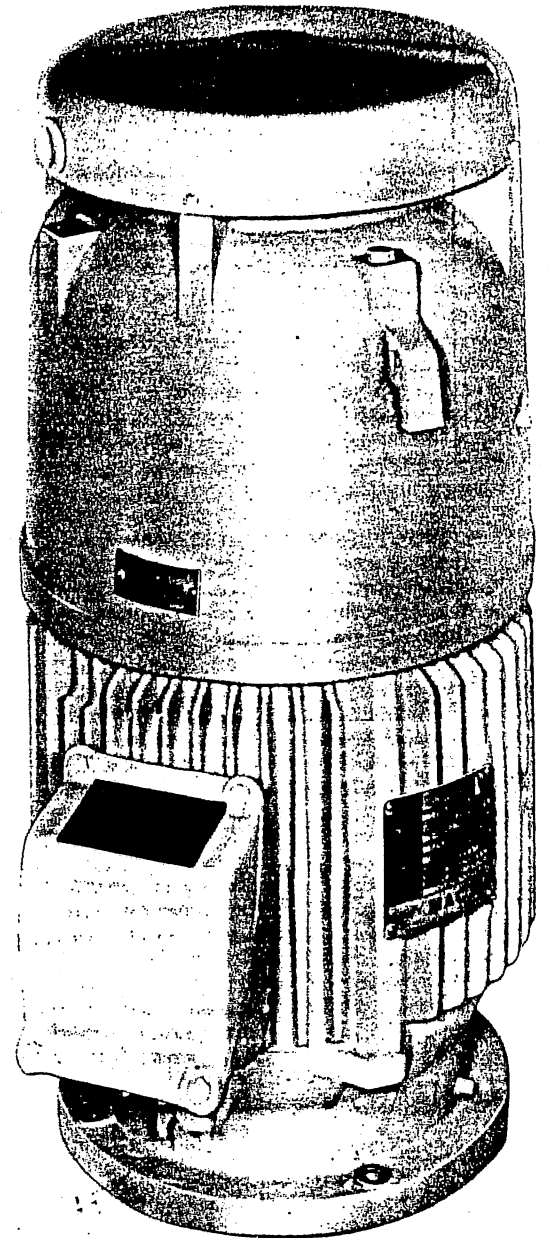


Fig. 2 Typical High Thrust (Fan Cooled) Vertical Motor Frames 210T-280T

Note: These instructions do not cover all details or modifications in equipment nor provide for all contingencies of installation, operation, or maintenance. Should additional information be required, contact Westinghouse.

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 grease lubricated thrust bearings.

Explosionproof 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.

Warning:

The use of electric motors is potentially hazardous. Installation and service of the motor are to be performed only by trained personnel and in accordance with the national electrical code, all local codes, NEMA Safety Standard MG2 and after reading the nameplate and instructions for that motor.

To prevent possible accidents, locate the motor in an enclosure to keep out children and other unauthorized personnel. This is essential for motors on automatic controls which may restart unexpectedly.

Receiving and Storage

Carefully inspect the motor upon arrival, record and report any damage promptly to the carrier and to the nearest office of the Westinghouse Electric Corporation.

Motor rating and identification data are furnished on the nameplate for checking purposes. The motor should be stored in a dry area with factory packaging intact, unless appearance of package indicates possibility of motor damage during shipment. During long-term storage protect the motor's windings from absorption of moisture. Use space heaters, if present. Periodically inspect, rotate the shaft, megger the winding and record conditions. Investigate any significant changes. (If desired, request detailed long-term storage procedure for Medium Ac Motors from Westinghouse.)

Just prior to actual use, unpack motor - remove shipping braces and packing material from the coupling. Rotate shaft by hand to see that it turns freely. Remove rust preventative paper or slushing compound from shaft extension.

Handling

You should handle the motor in a vertical position. It has lifting lugs on opposite sides for placing the motor on a pump base.

Caution:

To make a proper lift, use a spreader bar; chains vertical. Don't squeeze the top hood; lift gently, slowly. With care, and if necessary, the motor's lifting lugs can safely handle additionally, up to 2 times the motor's weight. This might include a pump base of the approximate weight as the bottom part of the motor.

Installation

Mounting

Locate the motor in a place that is clean and well ventilated. The motor enclosure is such that dripping, wind-blown and splashing 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 external 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. The fits are accurately machined. The mating surfaces must be free of dirt or burrs and solidly engaged. The assembly should turn freely without stress to the shaft and bearings from misalignment. 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 before installing the pump head shaft 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 top drive coupling over the threaded end of the pump head shaft and key it to the pump 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. Basically the vertical high thrust motor is designed to withstand momentary up-thrust of 30% of the standard down-thrust rating. For an application having continuous up-thrust or momentary up-thrust in excess of 30%, check that the motor was so ordered.

Method of Drive

Open Dripproof Vertical Hollow Shaft motors (Fig. 1) may be equipped with either a non-reverse coupling or a self-release coupling, as specified by the purchaser.

Non-Reverse Coupling

Prevents motor and pump from rotating to possibly damaging speeds in the reverse direction when the motor is switched off.

These motors are equipped with a non-reverse ratchet that permits CCW rotation (looking downward at the motor) only. The ratchet assembly (Fig. 3) 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. The pins and pin holes must be clean and free of oil or grease. Oiling or greasing pins will attract dirt which can cause pins to stick and result in ratchet failure.

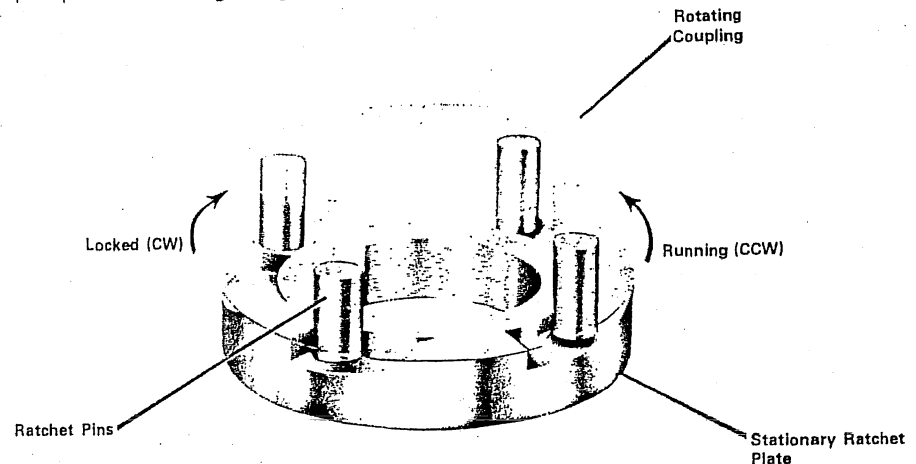


Fig. 3 Ratchet Assembly



A non-reverse ratchet protects against **accidental** reverse rotation due to phase reversals or from backspins at shutdown.

A non-reverse ratchet should not be used indiscriminately or unnecessarily. This type of ratchet is inherently subject to wear in **normal** usage and under certain conditions may fail with consequent damage to the pump/motor system. The non-reverse ratchet is not recommended for settings greater than 375 feet, since pump torque developed is greater than motor torque which results in destruction of ratchet, coupling drive hub, etc.

In addition, the non-reverse ratchet is not recommended for pressure systems where **frequent** starts and stops are common. Frequent being defined as 5 starts and stops per 24 hour period. This type of service would require a check valve or similar device. Although a non-reverse ratchet does protect against reverse rotation, it is **not intended** and **will not perform** like a check valve.

Self-Release Coupling

Prevents pump line-shaft joints from unscrewing if, occasionally, the motor accidentally runs in the reverse direction.

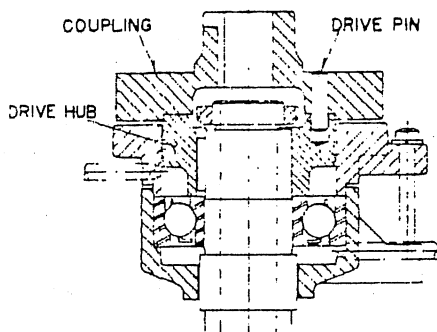


Fig. 4 Self-Release Coupling Assembly in Hollow-Shaft Motors - Open Drip-proof Only

These motors (Fig. 4) are equipped with a unique coupling and drive hub. 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 hub and engaging corresponding holes in the drive hub. Disengagement is caused by a lifting of the pump shaft which in turn lifts the coupling off the two drive pins. This feature applies to drip-proof motors only.

Bolted Coupling

The bolted down coupling allows the motor bearings to take momentary up-thrust from the pump and limits lifting of the pump head shaft to the amount of motor end play.

Totally Enclosed Fan Cooled and TEFC - Explosionproof Vertical Hollow Shaft motors are equipped only with a bolted-down coupling, which may have the non-reverse feature, if so ordered (Fig. 2).

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. Be sure to tighten coupling bolts per good mechanical practice. 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 your power supply (voltage, frequency, and number of phases) corresponds with the nameplate data.

Employ trained personnel to install all wiring, fusing and grounding in accordance with National Electrical Code, local requirements and NEMA Safety Standard MG-2.

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 starter and overload protection.

Conduit Box

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

Warning:

When servicing, all power sources to the motor and to accessory devices should be disconnected and de-energized; all rotating parts should be at standstill.

Operation

1. Disconnect load and start motor. Check direction of rotation. If rotation must be changed, **ALLOW THE MOTOR TO STOP COMPLETELY.** Interchange any two leads of a three phase motor. Reconnect a single phase motor per nameplate instructions; interchange the leads of either phase of a two phase motor. Fans on fan cooled motors that have directional rotation nameplates must be reversed on shaft if rotation is changed.

2. Connect load. The motor should start quickly and run smoothly. If not, shut power off at once. Recheck the assembly including all connections before restarting. For single phase motors, also examine capacitor wiring and mechanism for switching between starting and running.

3. If excessive vibration is noted, check for loose mounting bolts, too flexible motor support structure or transmitted vibration from adjacent machinery. Periodic vibration checks should be made; foundations often settle.

4. Operate under load for short period of time; check operating current against nameplate.

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 standard of performance established for operation at normal ratings.

Maintenance

Inspection

Although LIFE-LINE 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 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 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.

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, with single shields on each side.

Thrust Bearing

Thrust bearings are angular contact ball 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

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.

Warning:

When servicing, disconnect all power sources; all rotating parts should be at standstill. Make sure any accessory re-start device is de-energized.

Frequency of Regreasing

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

See motor nameplate for insulation class, frame and identity of bearings.

Enclosure	Ins.	Frame 210	Frames 250 & 280	Frames 320 to 440
WPI	B	2 yrs	18 mos	1 yr
Dripproof Enclosed-Fan Cooled WPI	B	18 mos	1 yr	9 mos
Dripproof Enclosed-Fan Cooled WPI	F			
Dripproof Enclosed-Fan Cooled WPI	F	1 yr	9 mos	6 mos
Dripproof Enclosed-Fan Cooled WPI	H			
Dripproof Enclosed-Fan Cooled WPI	H	9 mos	6 mos	3 mos

NOTE:

For motors over 1800 rpm - grease twice as frequently
For heavy duty - dusty locations - grease twice as frequently

Type of Grease

Use Westinghouse 53701RY grease unless a special grease is specified on the nameplate. Some equivalent greases are:
Chevron SRI-2 — Standard Oil of California
Premium RB — Texaco Inc.
Unirex N2 — Exxon
Dolium R — Shell Oil Company
Rykon Premium — American Oil

Caution:

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

Procedure for Regreasing

When regreasing, stop motor, remove inlet and outlet plugs, and add grease with hand lever operated gun only. Add quantity of grease per chart below. Do not expect grease to appear at the outlet, but if it does, discontinue greasing at once. 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
Lower Guide Bearings	
¾ to 1¼	¼ cu. in. or 0.1 oz.
1¼ to 1¾	¼ cu. in. or 0.2 oz.
1¾ to 2¾	¾ cu. in. or 0.6 oz.
2¾ to 3¾	2 cu. in. or 1.6 oz.
Upper Thrust Bearing	
	Frames 210-280
	3.6 cu. in. or 2 oz.
	Frames 320-440
	5.4 cu. in. or 3 oz. per Brg.

1 oz. = 1.8 cu. in. by Weight

End-Play Adjustment

All vertical high thrust motors are designed for momentary up-thrust. This up-thrust is taken by the lower guide bearing which is restricted in movement by the drive hub locknut. This adjustment is made at the factory for new motors and need not be readjusted.

If the motor should be disassembled for any reason, the end-play adjustment must be made to avoid bearing damage.

The procedure for end-play adjustment is as follows:

1. Assemble motor with lower inner bearing cap pulled down tight.
2. Assemble upper bearing, drive hub, drive hub lockwasher and locknut onto shaft. Tighten drive hub locknut until bearings are just starting to pre-load. When slight pre-load is experienced, there is no end-play and the rotor will not turn as freely by hand.
3. After slightly pre-loading the bearings, back off the drive hub locknut ⅛ turn for frames 210 through 280 and ¼ turn for frames 320 and larger.
4. Check end-play. End-play should be .005 to .010 inches.
5. 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.
6. When end-play is established, lock the nut in place with the lockwasher.

For motors that are supplied to withstand continuous up-thrust, end-play adjustment is not required. Drive hub locknut should be secured tight and locked with the lockwasher.

Repair and Renewal Parts

Repair and renewal parts information may be obtained from the nearest Westinghouse Sales Office. Be sure to use title and number from Figs. 5, 6 and 7 which describe the part or parts required, and give the complete nameplate reading on the motor for positive identification.

1 Not applicable to 3600 rpm motors on frame 210TP or 210VP. For information regarding these ratings, contact Westinghouse.



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

Note:
Bearings - AFBMA number is on the motor nameplate.

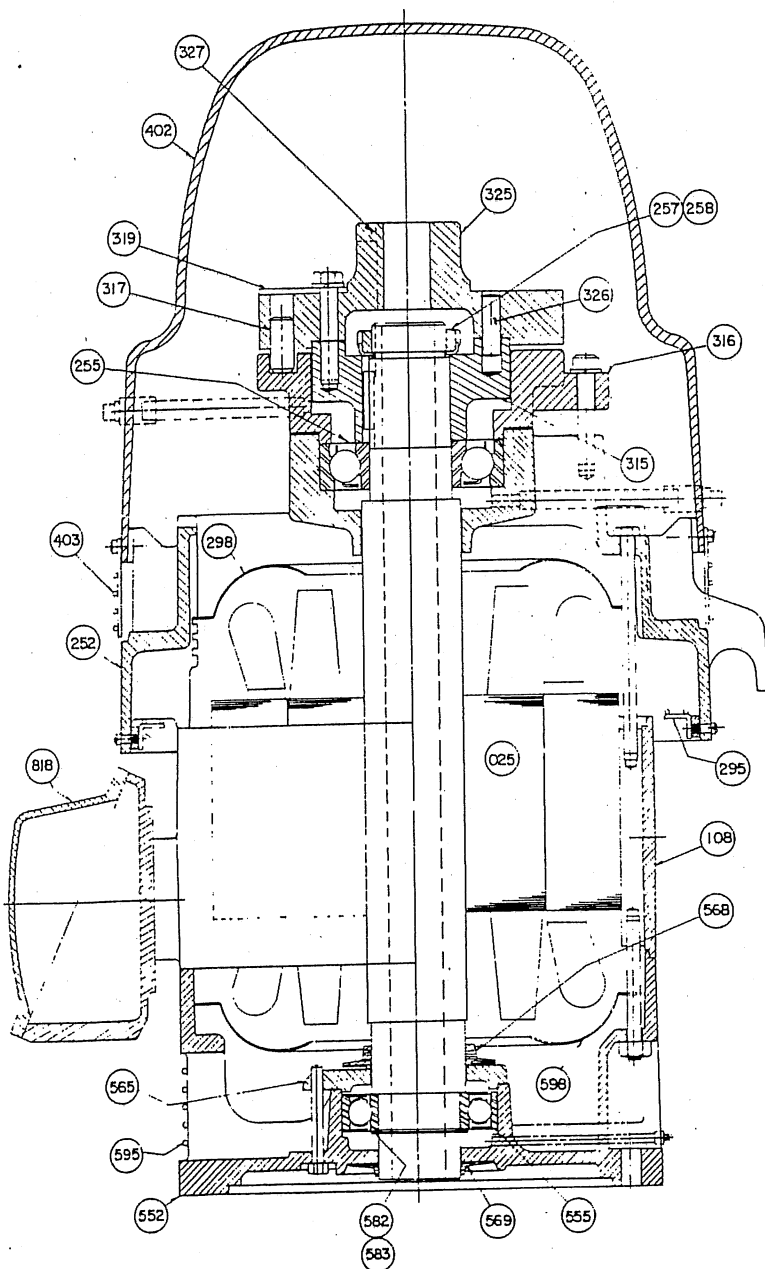
To obtain Westinghouse No. 53701RY grease in small containers, order:
S# 773A773G35 - 35 lb. can

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.

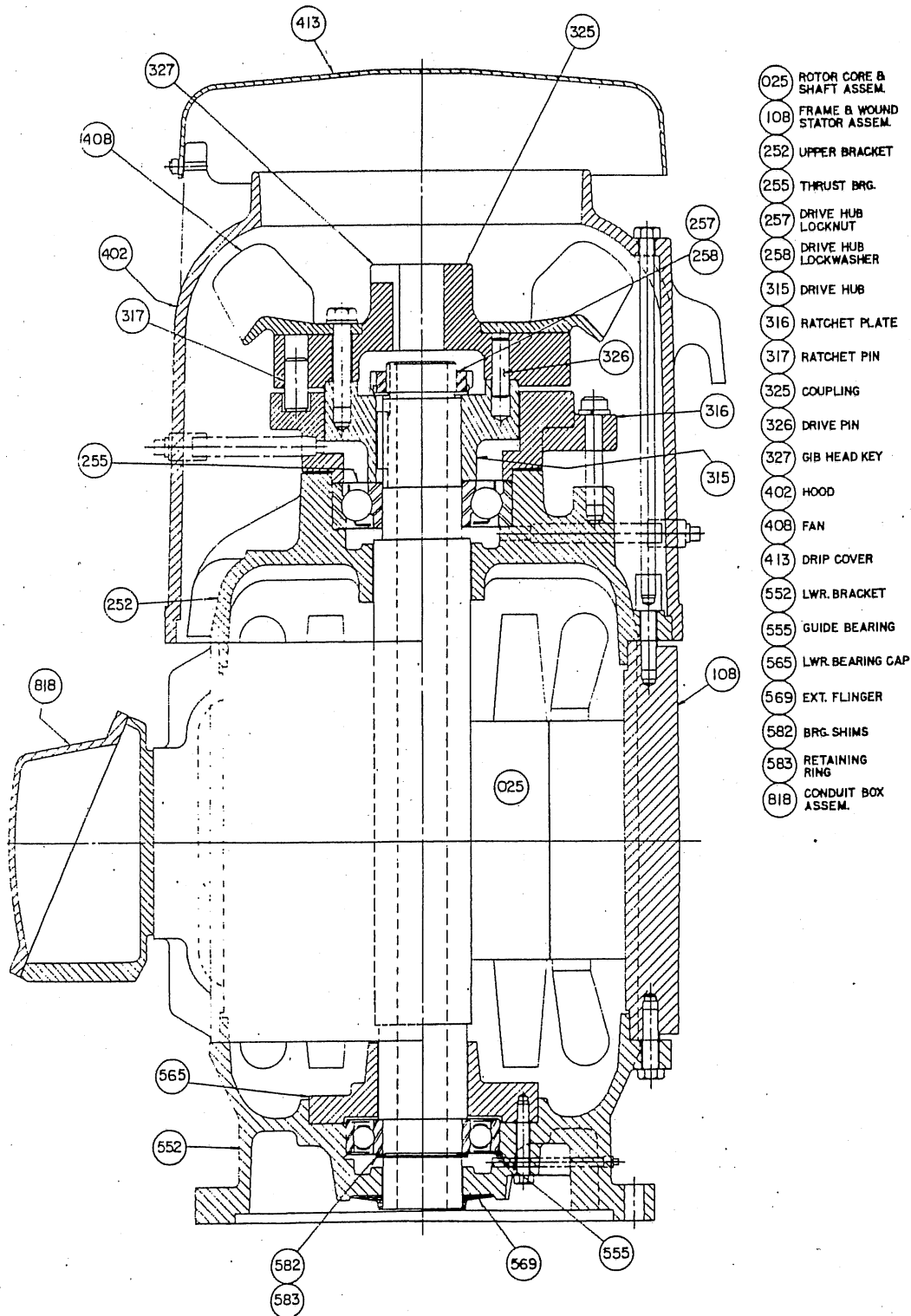
Warranty

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.



- (025) ROTOR CORE & SHAFT ASSEM.
- (108) FRAME & WOUND STATOR ASSEM.
- (252) UPPER BRACKET
- (255) THRUST BRG.
- (257) DRIVE HUB LOCKNUT
- (258) DRIVE HUB LOCKWASHER
- (295) UPPER BRACKET SCREEN
- (298) UPPER AIRSHIELD
- (315) DRIVE HUB
- (316) RATCHET PLATE
- (317) RATCHET PIN
- (319) RATCHET PIN COVER
- (325) COUPLING
- (326) DRIVE PIN
- (327) GIB HEAD KEY
- (402) HOOD
- (403) HOOD SCREEN
- (552) LWR. BRACKET
- (555) GUIDE BEARING
- (565) INNER BRG. CAP
- (568) INT. FLINGER
- (569) EXT. FLINGER
- (582) BRG. SHIMS
- (583) RETAINING RING
- (595) LOWER BRACKET SCREEN
- (598) LWR. AIRSHIELD
- (818) CONDUIT BOX ASSEM.

Fig. 5 Arrangement of Parts, Vertical Hollow Shaft Dripproof Type T Life-Line Motors, Frames 210TP-280TP (Solid Shaft Motors use same Construction except Top Coupling and Ratchet Pins are Omitted.)



- (025) ROTOR CORE & SHAFT ASSEM.
- (108) FRAME & WOUND STATOR ASSEM.
- (252) UPPER BRACKET
- (255) THRUST BRG.
- (257) DRIVE HUB LOCKNUT
- (258) DRIVE HUB LOCKWASHER
- (315) DRIVE HUB
- (316) RATCHET PLATE
- (317) RATCHET PIN
- (325) COUPLING
- (326) DRIVE PIN
- (327) GIB HEAD KEY
- (402) HOOD
- (408) FAN
- (413) DRIP COVER
- (525) LWR. BRACKET
- (555) GUIDE BEARING
- (565) LWR. BEARING CAP
- (569) EXT. FLINGER
- (582) BRG. SHIMS
- (583) RETAINING RING
- (818) CONDUIT BOX ASSEM.

Fig. 6 Arrangement of Parts, Vertical Hollow Shaft Fan-Cooled or Type T Life-Line Explosionproof Motor, Frames 210TP-280TP (Solid Shaft Motors use same Construction except Ratchet Pins are Omitted.)

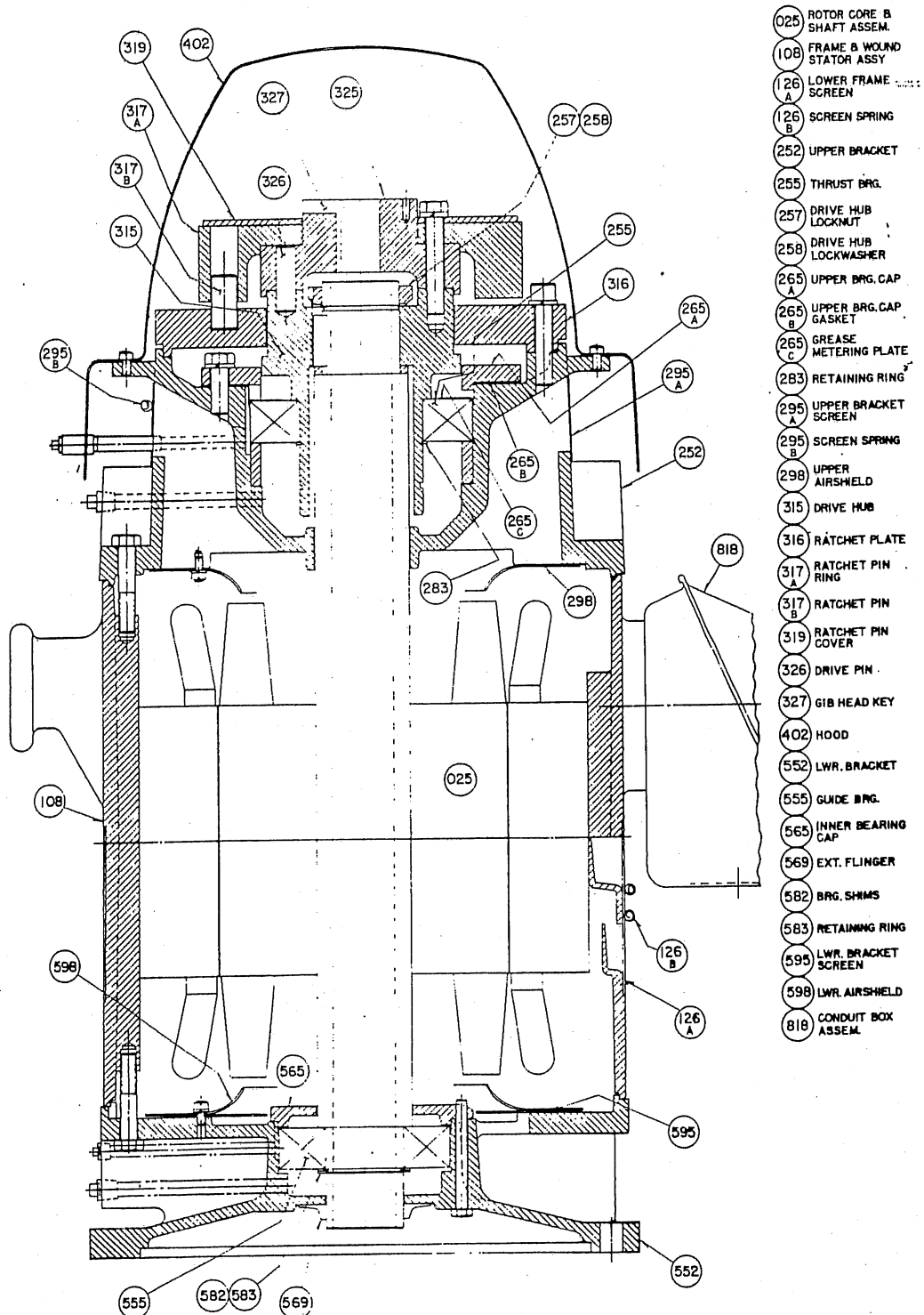


Fig. 7 Arrangement of Parts, Vertical Hollow Shaft Dripproof Life Line Motor, Type G Frames 320TP-440TP
(Solid Shaft Motors use same Construction except Top Coupling and Ratchet Pins are Omitted.)

Instruction Leaflet
2950-GL

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