



Electric Vertical Hollow Shaft Motors

This Manual Covers for the following WorldWide Electric Motors



WPEVHS

Installation, Operation, and Maintenance Product Manual

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General Introduction

Main Specifications

Vertical hollow shaft motors are three-phase squirrel cage induction motors specially designed for driving deep-well turbine pumps. The motors have been designed according to NEMA standards with the following standard specifications:

- Power Supplied: 60 Hz, 230/460 V or 460 V
- Insulation Class: F
- Protection Grade: WPI (IP23) With Rodent Screens

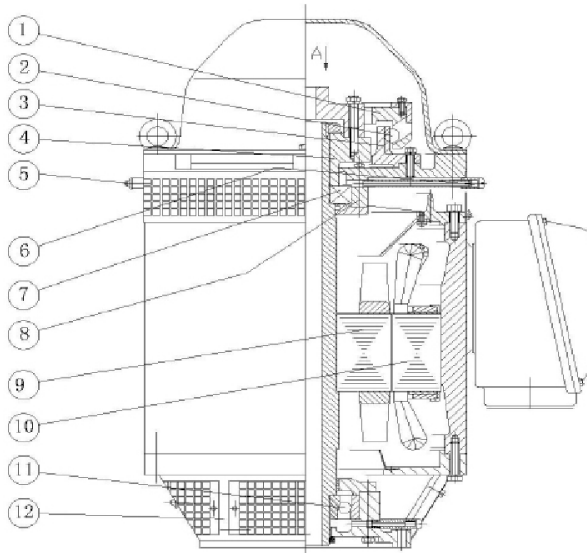
Operating Conditions

- Duty Type: Continuous (S1)
- Ambient Temp.: -10°C to 40°C
- Max. Altitude: Not more than 3300 F.A.S.L. (1000 M) above sea level
- Suitable For: Operation Indoor / Outdoor Locations

Motor Construction Diagram

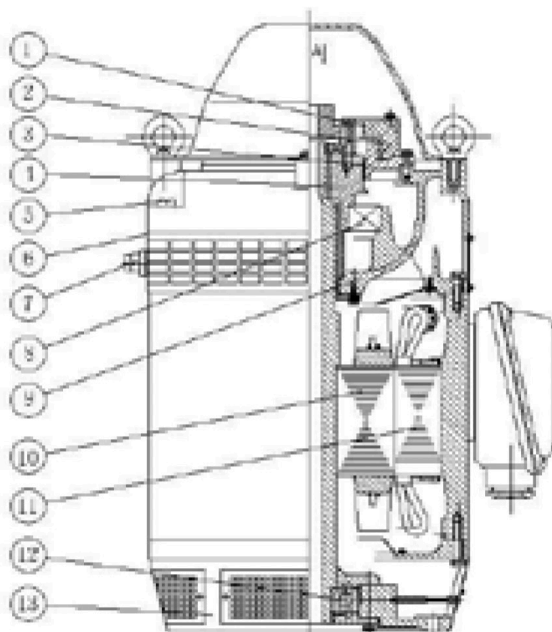
The following diagram shows the (WPI / IP23) construction features:

10 - 30 HP



- (1) NON-REVERSE FLANGE
- (2) STEEL BALL
- (3) NON-REVERSING RATCHET PLATE
- (4) BEARING HOUSING
- (5) ZERK FITTING FOR REGREASING TOP BEARING
- (6) GREASE RELIEF PLUG
- (7) RADIAL BALL BEARING
- (8) END BRACKET
- (9) ROTOR
- (10) STATOR
- (11) THRUST BEARING
- (12) BASE

40 - 500 HP



- (1) NON-REVERSE FLANGE
- (2) STEEL BALL
- (3) NON-REVERSING RATCHET PLATE
- (4) BEARING HOUSING
- (5) OIL FILL PLUG
- (6) OIL GAUGE
- (7) OIL DRAIN PLUG
- (8) THRUST BEARING
- (9) END BRACKET
- (10) ROTOR
- (11) STATOR
- (12) RADIAL BALL BEARING
- (13) BASE

Bearing Types / Sizes / Max. Thrust Loads

Model	Rated Output (hp/kw)	Protection Degree	Angular Contact Bearing (Type)	Radial ball Bearing (Type)	Max Thrust Load Allowable	
					(N)	(lb)
WPEVHS10-18-215TP-10	10/7.5	WP-1	7310B	6210	11120	2500
WPEVHS15-18-254TP-10	15/11		7312B	6212	14234	3200
WPEVHS20-18-254TP-10	20/15		7312B	6212	14234	3200
WPEVHS25-18-284TP-12	25/18.5		7312B	6212	14234	3200
WPEVHS30-18-286TP-12	30/22		7312B	6212	14234	3200
WPEVHS40-18-324TP-16.5	40/30		7221B	6213	24496	5500
WPEVHS50-18-326TP-16.5	50/37		7221B	6213	24496	5500
WPEVHS50-18-460-326TP-16.5	50/37		7221B	6213	24496	5500
WPEVHS60-18-364TP-16.5	60/45		7224B	6314	24937	5600
WPEVHS60-18-460-364TP-16.5	60/45		7224B	6314	24937	5600
WPEVHS75-18-365TP-16.5	75/55		7224B	6314	24937	5600
WPEVHS75-18-460-365TP-16.5	75/55		7224B	6314	24937	5600
WPEVHS100-18-404TP-16.5	100/75		7230B/DT	6317	59683	13400
WPEVHS100-18-460-404TP-DB-16.5	100/75		7230B/DT	6317	59683	13400
WPEVHS125-18-405TP--16.5	125/90		7230B/DT	6317	59683	13400
WPEVHS125-18-460-405TP-DB-16.5	125/90		7230B/DT	6317	59683	13400
WPEVHS150-18-460-444TP-DB-16.5	150/110		7232B/DT	6318	64138	14400
WPEVHS200-18-460-445TP-DB-16.5	200/150		7232B/DT	6318	64138	14400
WPEVHS200-18-460-445TP-DB-20	200/150		7232B/DT	6318	64138	14400
WPEVHS250-18-460-445TP-DB-20	250/185		7232B/DT	6318	64138	14400
WPEVHS300-18-460-5006P-DB-20	300/225		7236B/DT	6322	106673	24000
WPEVHS350-18-460-5006P-DB-20	350/260		7236B/DT	6322	106673	24000
WPEVHS350-18-460-5006P-DB-24.5	350/260		7236B/DT	6322	106673	24000
WPEVHS400-18-460-5008P-DB-20	400/300		7236B/DT	6322	106673	24000
WPEVHS400-18-460-5008P-DB-24.5	400/300		7236B/DT	6322	106673	24000
WPEVHS450-18-460-5008P-DB-20	430/315		7236B/DT	6322	106673	24000
WPEVHS450-18-460-5008P-DB-24.5	430/315		7236B/DT	6322	106673	24000
WPEVHS500-18-460-5008P-DB-20	500/375		7236B/DT	6322	106673	24000
WPEVHS500-18-460-5008P-DB-24.5	500/375		7236B/DT	6322	106673	24000

* Double thrust bearing design (100-500 HP) for deeper well applications

Operating Instructions

Inspection Before Operation

The following steps should be followed carefully before operation:

- Check nameplate data to make certain that the motor matches requirements.
- Inspect the general condition of the motor, making certain there are no loose fasteners. Turn the motor in the correct direction of operation to ensure that the motor turns freely and that there was no damage during shipment.
- Measure the insulation to ground with a megger capable of at least 500 megohms (Reading should be at least 500 megohms.)
- Remove top cover and inspect non-reversing ratchet to ensure that it moves freely and that it was not damaged during shipment.

Filling With Oil

- For 320 frame and above, upper motor bearing chamber must be filled with oil before start up!
- Remove the oil fill plug and fill with ISO 32 Turbine Oil to middle of sight gauge. **DO NOT OVERFILL!**
- Replace the fill plug. Check for oil leaks.
- Oil should be inspected monthly for possible contamination. Oil must be replaced when oil looks to be contaminated.
- Under normal operation, oil must be replaced every 12 months to provide proper lubrication.

Electrical Connections

1. Motors should be connected by a qualified electrician. Failure to follow safety instructions can result in serious personal injury or death. Disconnect all power before servicing. Install and ground motor per local and national electrical codes. Always wear ANSI-approved safety goggles when working with equipment.

2. Connect leads according to the following diagrams.

10 - 100 HP

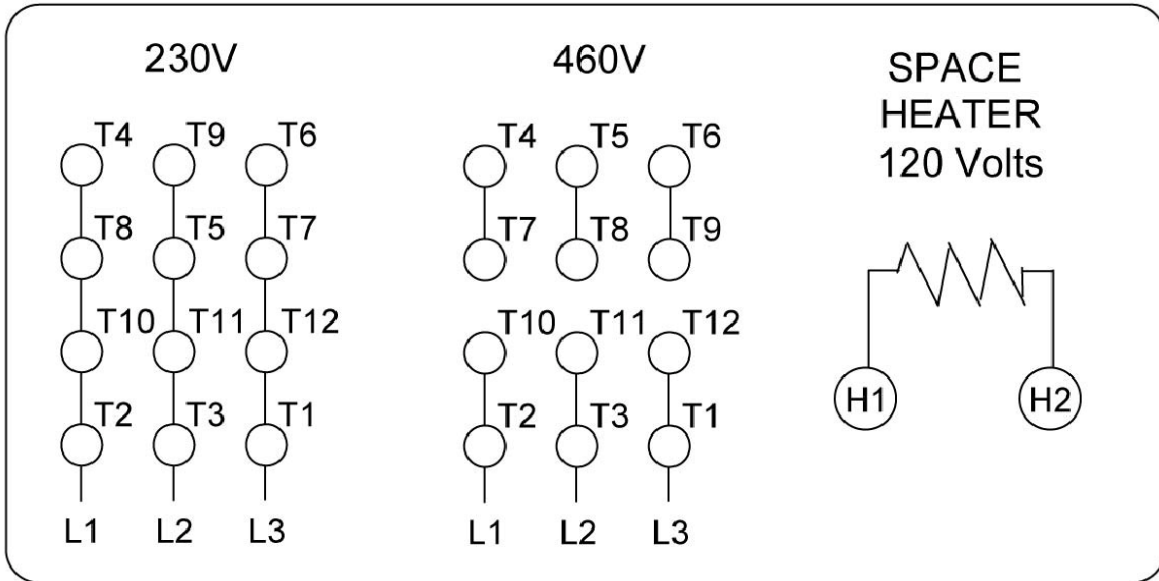
- Motors are equipped with 120VAC space heaters.
- The leads are labeled H1 and H2.
- These leads are located in the terminal junction box.
- Space heaters are provided to prevent condensation in the motor windings and can be used as an option.

125 - 500 HP

- Motors are equipped with space heaters and winding resistance temperature detectors (RTDs).
- The leads for the space heaters are labeled H1 and H2.
- These leads are located in the terminal junction box.
- Space heaters are provided to prevent condensation in the motor windings and can be used as an option.
- The winding RTD's leads are labeled with A1 A2 A3, B1 B2 B3 and C1 C2 C3.
- These leads are also located in the terminal junction box.
- Winding RTDs are used for thermal protection to monitor the motor winding temperature to prevent from overheating.
- These precision wound resistors can be used in conjunction with a customer supplied instrument to detect the highest slot temperature.

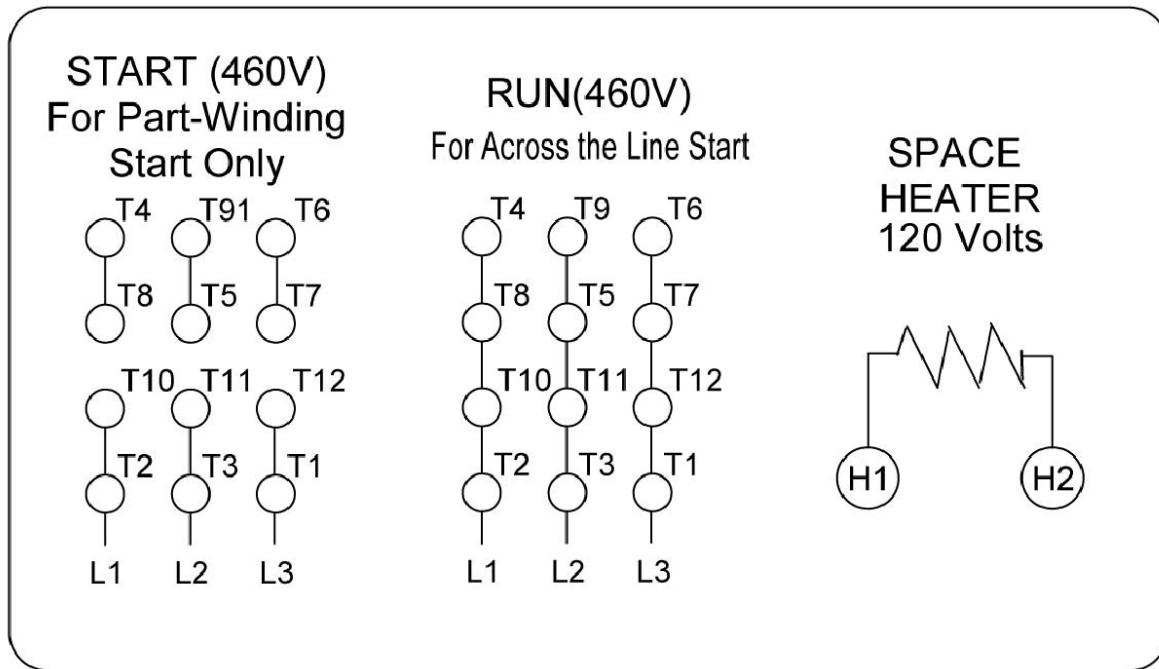
3. The motor must be grounded properly. A grounding terminal lug is located inside the terminal junction box.

Sketch #1: 10 - 100 HP, 230/460 V



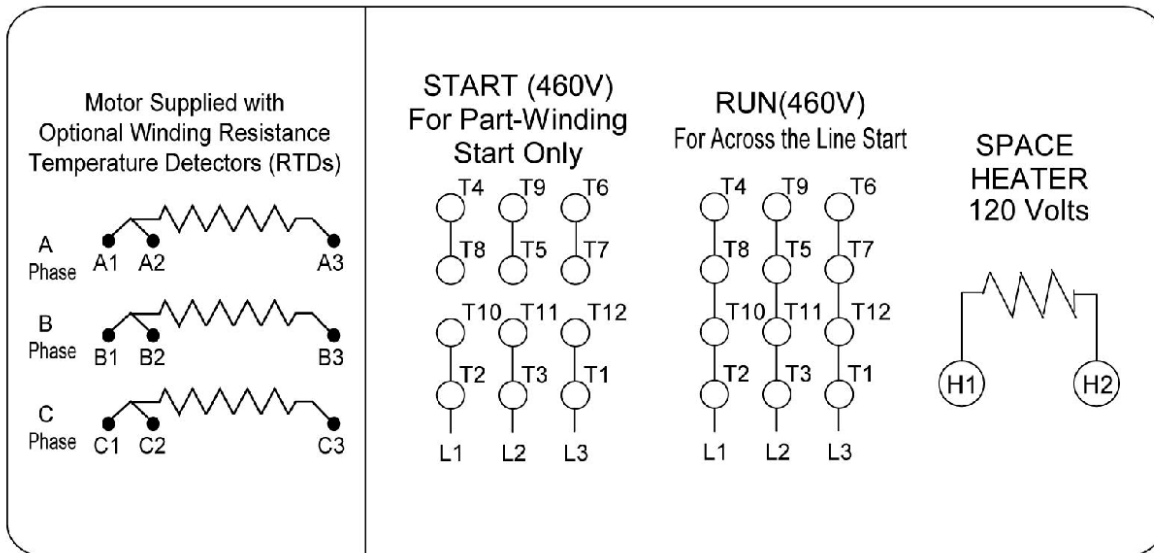
Sketch #2: 50 - 100 HP, 460 V Only

The start connection is only used for Part-Winding Start (PWS) starting. Motors being powered by across-the-line, solid state reduced voltage soft starter or by VFD, must be connected in the RUN connection.



Sketch #3: 125 - 250 HP, 460 V Only

The start connection is only used for Part-Winding Start (PWS) starting. Motors being powered by across-the-line, solid state reduced voltage soft starter or by VFD, must be connected in the RUN connection.



Pre-Installation Test

1. Check Rotation – When connected correctly, the rotation will be counter-clockwise looking from the top of the motor.
2. Check Voltage – Voltage at the motor leads should be measured to ensure that actual voltage matches the motor's rated voltage with little imbalance (less than 2.5% imbalance between phases).
Motor Protection – It is necessary to provide over current or short circuit protection devices in the control panel or motor starter which should be sized in accordance with the motor's full load current.
3. Test Running – After visually inspecting, filling with oil and the electrical connections are complete, the motor can be test run. **If the phase sequence is incorrect, the non-reversing ratchet will stop the motor from running in the wrong direction. Shut off power and switch any two line leads to reverse the motor rotation.** Monitor the motor during this test run to make certain there is no noise, vibration or high current to indicate a potential problem.
4. Run the motor at no load for 2-3 hours. During this period check for any irregularities or unusual noises. After the no load run-in inspect the bearings carefully to ensure they have not overheated.

Installation

1. Make sure that the motor specifications match that of the pump (i.e., RPM, HP, etc.)
2. Drain the oil in the motor's oil reservoir before lifting. When lifting the motor be sure to attach the hooks of the crane to the lifting lugs of the motor.
3. During the course of installation, the motor should never be in any position other than vertical. If the motor is tipped more than 10° from vertical, oil will spill from the reservoir.
4. The motor base must be structurally sound to prevent vibration or misalignment. If significant vibration is present following the installation, check the base and alignment for potential problems and contact your installation company.
5. Refill the oil chamber with oil prior to operation.

Decibel Levels (Sound Levels)

Decibel levels (sound levels) should be measured on motor start-up, after thirty (30) days and after six (6) months. Decibel levels are also an indication as to the vibration levels of an electric motor. A decibel chart has been provided here for your convenience. If the measured motor decibel levels exceed the listed levels by more than ten percent (10%), please consult the motor manufacturer and/or your motor repair center.

Model Number	HP	Decibel Level db(A)
WPEVHS10-18-215TP-10	10	88
WPEVHS15-18-254TP-10	15	88
WPEVHS20-18-254TP-10	20	88
WPEVHS25-18-284TP-12	25	88
WPEVHS30-18-286TP-12	30	88
WPEVHS40-18-324TP-16.5	40	91
WPEVHS50-18-326TP-16.5	50	91
WPEVHS50-18-460-326TP-16.5	50	91
WPEVHS60-18-364TP-16.5	60	94
WPEVHS60-18-460-364TP-16.5	60	94
WPEVHS75-18-365TP-16.5	75	94
WPEVHS75-18-460-365TP-16.5	75	94
WPEVHS100-18-404TP-16.5	100	97
WPEVHS100-18-460-404TP-DB-16.5	100	97
WPEVHS125-18-405TP--16.5	125	97
WPEVHS125-18-460-405TP-DB-16.5	125	97
WPEVHS150-18-460-444TP-DB-16.5	150	97
WPEVHS200-18-460-445TP-DB-16.5	200	100
WPEVHS200-18-460-445TP-DB-20	200	100
WPEVHS250-18-460-445TP-DB-20	250	100
WPEVHS300-18-460-5006P-DB-20	300	100
WPEVHS350-18-460-5006P-DB-20	350	100
WPEVHS350-18-460-5006P-DB-24.5	350	100
WPEVHS400-18-460-5008P-DB-20	400	100
WPEVHS400-18-460-5008P-DB-24.5	400	100
WPEVHS450-18-460-5008P-DB-20	450	100
WPEVHS450-18-460-5008P-DB-24.5	450	100
WPEVHS500-18-460-5008P-DB-20	500	100
WPEVHS500-18-460-5008P-DB-24.5	500	100

Warranty Policy

1. The warranty length for WorldWide Electric Vertical Hollow Shaft Motors shall be two years from the date of sale (invoice). Discrepancies and allowances on length of warranty or warranty decisions to be made by WorldWide Electric Corporation.
2. Motors must be inspected by an authorized EASA service center or other approved motor shop for determination of cause of failure. Authorized EASA service centers are available inside and outside of the United States. Visit the EASA website at www.easa.com to find the nearest authorized service center. These shops may also be able to assist with non-warranty service.
3. The service center must provide a written estimate for inspection and a purchase order must be issued by WorldWide Electric prior to the motor inspection.
4. After completion of the motor inspection, the service center must complete the WARRANTY REPAIR REPORT, attach detailed photographs of the failure and e-mail to WorldWide Electric for review.
5. If the failure is determined to be from a defect in material or workmanship when operated under normal conditions and in accordance with nameplate characteristic limits, WorldWide Electric shall either repair or replace the motor. WorldWide Electric shall not be liable for any labor or operating costs connected with the repair / replacement of the motor.
6. Should WorldWide Electric choose to repair the motor, the service center must provide a written estimate for repair and a purchase order must be issued by WorldWide Electric prior to the repair bein performed.
7. Should WorldWide Electric choose to replace the motor, the purchaser shall be responsible for any transportation charges connected with the replacement of the motor.

Ongoing Inspection and Maintenance

1. In the course of operation, current and voltage should be measured from time to time to ensure it matches the motor specifications. Whenever abnormal noise occurs during operation, immediate shut-down and inspection is required.
2. The non-reversing ratchet should be checked yearly to ensure no build-up of dirt or debris has occurred that could prevent its proper operation. This should be checked when the oil is being changed.
3. The oil level should be checked through the oil sight gauge periodically to ensure no oil is being lost. The oil level should be at the center-line of the sight gauge with the motor at standstill. THE LEVEL WILL DROP BELOW THE CENTER WHEN THE MOTOR IS IN OPERATION. THIS DOES NOT INDICATE A PROBLEM. IT INDICATES THE LUBRICATION PROCESS IS WORKING PROPERLY.
4. The lower motor bearing (and upper bearing on frames up to 280) has provisions for grease nipples and discharge plugs to allow grease to be inserted into bearing cavity in more severe condition applications. Motors are shipped with grease for initial running and do not need additional lubrication except in certain instances (i.e., storage in excess of three (3) months or in the presence of construction dust). In order to provide the maximum bearing life, refer to (Lubrication Table) for guidelines. Note that excessive or too frequent lubrication may damage the motor.

Lubrication Table:

Conditions	Standard	Severe
Hours / Day	8 Hours 1-2 Shifts	24 Hours Continuous
Loading	Normal / High	Normal / High
Ambient	≤40°C / Clean	>40°C / Dirt / Dust
10 - 30 HP	2 Years	1 Year
40 - 75 HP	10 Months	6 Months
100 - 150 HP	6 Months	4 Months
200 - 250 HP	3 Months	1 Month

Lubrication Instructions:

- Make certain that the fittings are clean and free from dirt. Using a low pressure grease gun, pump in the recommended amount of grease until new grease appears at grease discharge point.
- Use MOBIL POLYREX-EM grease or equivalent polyurea based grease with the same thermal properties unless a special grease is specified on the nameplate. Failure to maintain grease compatibility will shorten bearing life significantly.
- Regreasing of the bearing should be performed with the motor running. This will ensure an even dispersion of the grease in the bearing cavity. After regreasing, continue to run the motor for ten (10) to thirty (30) minutes.

WARNING: Make sure all guards are in place and stay clear of all moving parts.

Storage

1. When storing the motor(s) for an extended period of time (6 months or more), the following steps should be taken:
 - Clean the exterior and interior (inside of top cover) of the motor thoroughly.
 - Cover the air inlets and outlets (mesh) of the motor to prevent the entrance of dust. Upper motor bearing chamber must be filled with oil to the top of the sight gauge.
 - When the motor is ready to be put back into operation, the old oil must be drained and replaced with new oil to the proper level for operation.
2. The motor should be stored in a clean and dry environment. The storage area should be free from vibration and be low in humidity. The temperature of the storage area should be between 40°F and 80°F. **If the motor is to be stored outdoors or even installed outdoors without running for a period of one week or more, please energize the space heaters to prevent condensation inside the motor.**

Troubleshooting

Problem	Possible Cause	Solution
Motor fails to start	Motor connected in wrong rotation	Interchange any two power supply leads
	Motor possibly being single phased	Check for possible control issue
	Motor overloaded	Load must be reduced or larger HP motor used
	Voltage supply issue	Voltage supply must be within $\pm 10\%$ rated voltage
	Motor leads not connected properly	Re-check motor connection in terminal box
	Pump trouble	Check with pump manufacturer
Motor starts but will not accelerate to proper RPM	Motor leads not connected properly	Re-check motor connection in terminal box
	Motor possibly being single phased	Check for possible control issue
	Low supply voltage	Voltage supply must be within $\pm 10\%$ rated voltage
	Overload	Check for impeller level and locked or tight shaft
Unusual sounds during operation	From upper thrust bearing	Check for proper oil level or contaminated oil
	From lower bearing	Add grease to bottom bearing
	Pump trouble	Check with pump manufacturer
Excessive vibration	Possible head shaft or line shaft issue	Check for possible misalignment or bent shaft
	Supply voltage too low or high	Voltage supply must be within $\pm 10\%$ rated voltage
	Worn Bearing	Bearing must be replaced

Problem	Possible Cause	Solution
Bearings overheated with proper oil level and proper lubrication	Worn bearings	Replace bearings
	Lubricant oil deteriorated or bearings are low on oil	Replace oil
Non-reverse backstop not working properly	Check for contamination	Clean flange, steel balls and non-reverse plate
	Non-reverse ratchet plate groove worn	Replace the non-reverse ratchet plate
Excessive heat from motor	Possible overload	Check for impeller or shaft rubbing
	Air screens clogged	Clean air screens of dirt and debris
	Control issue	Check supply voltage and motor connection
Excessive heat from bearings	Misalignment	Check for alignment issue
	Possible overload	Check for impeller or shaft rubbing
	Excessive thrust	Reduce thrust from driven equipment
	Upper thrust bearing	Check for contaminated oil or improper oil level
	Lower bearing	Needs to be greased or has excessive grease
	Air screens clogged	Clean air screens of dirt and debris
Oil is leaking from oil chamber	Drain plug	Check for proper sealant around drain plug threads
	Improper oil level	Oil level must be at the middle of sight glass



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