



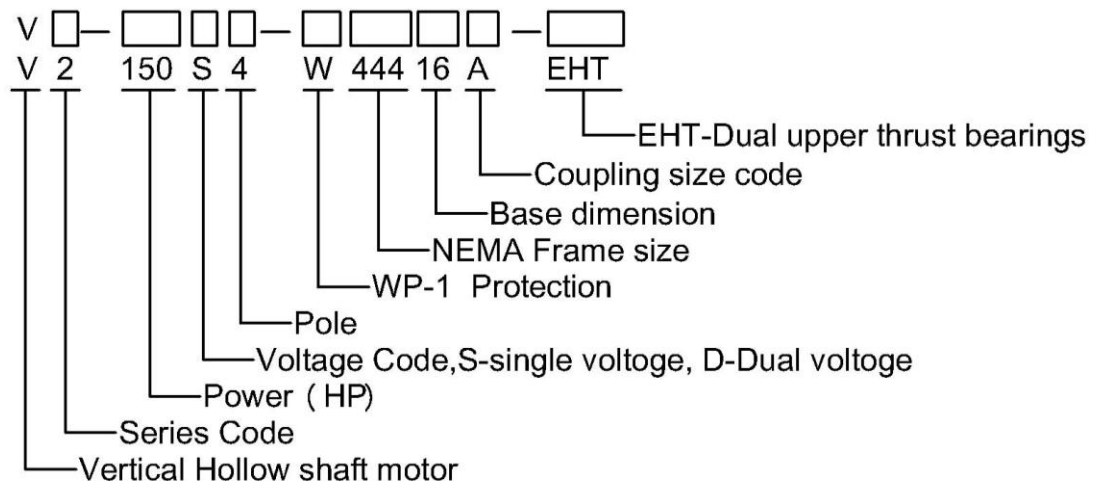
VERTICAL HOLLOW SHAFT MOTOR NEMA PREMIUM EFFICIENCY V1 AND V2 SERIES

1. General Description

The V1/V2 series vertical hollow-shaft motors are three phase squirrel cage induction motors. Specifically designed for driving deep-well water pumps, they have a high axial thrust load capacity, NEMA Premium Efficiency. The motors have high starting torque and run quietly with low vibration. They are Open Drip Proof with WP-1 protection. V1 series motors are suitable for inverter rated 10:1 VT. V2 series motors are suitable for inverter duty 20:1 VT.

2. Designations, Operation Conditions, and Descriptions

2.1 Designation



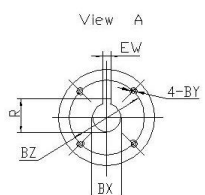
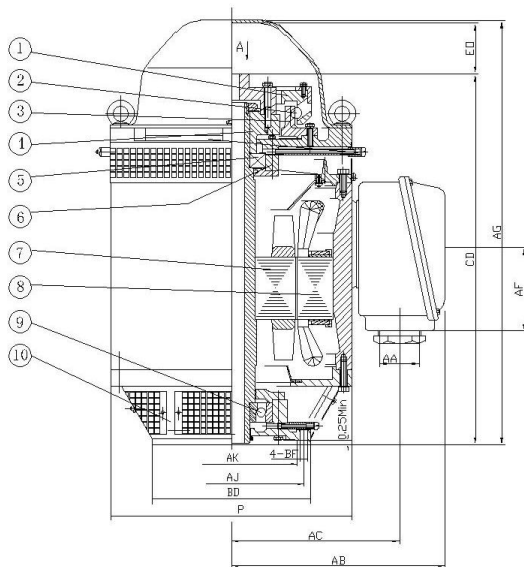
2.2 Operation Conditions

Duty: Continuous duty (S1)

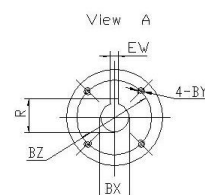
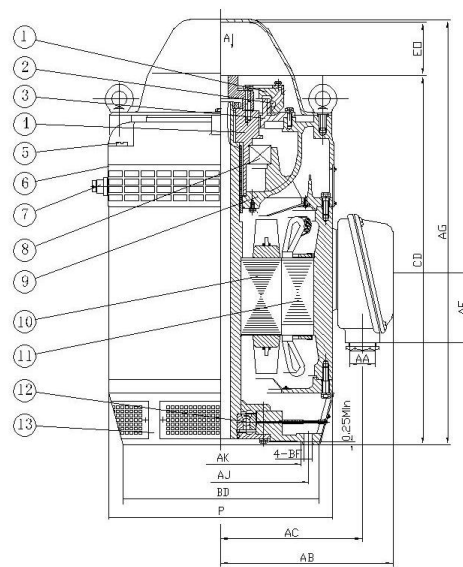
Ambient temperature: -15~ +40°C

Altitude: Not to exceed 3300 feet (1000meters)

2.3 Description



10 HP – 30 HP



40 HP – 500 HP

2.3.1 Description (10HP – 30 HP)

- | | |
|------------------------------|----------------------------|
| 1. Non-reverse flange | 6. End bracket |
| 2. Steel Ball | 7. Rotor |
| 3. Non-reverse ratchet plate | 8. Stator |
| 4. Shaft coupling | 9. Angular contact bearing |
| 5. Radial ball bearing | 10. Base |

2.3.2 Description (40HP – 500 HP)

- | | |
|------------------------------|----------------------------|
| 1. Non-reverse flange | 8. Angular contact bearing |
| 2. Steel Ball | 9. End bracket |
| 3. Non-reverse ratchet plate | 10. Rotor |
| 4. Bearing mount | 11. Stator |
| 5. Oil fill plug | 12. Radial ball bearing |
| 6. Oil Gauge | 13. Base |
| 7. Oil Drain | |

3. Cautions for Mounting

The following preparations should be made before mounting:

Carefully check all data on the motor nameplate to be certain all of the application requirements are met.

- 3.1 Inspect motors carefully to ascertain all parts are assembled in good condition and that no fasteners, bolts, or nuts have become loose or detached during transportation. Turn the motor in the indicated direction by hand to make sure the rotor rotates freely.
- 3.2 Measure the phase-to-phase and phase-to-ground insulation resistance by using a 500 V Megger. The reading should not be less than 0.5 Meg ohms. If the reading is less than 0.5 Meg ohms the stator windings must be dried. To dry the motor, disassemble the motor and dry it in an oven, maintaining the temperature at around 100°C. The heating process should last 12 to 24 hours. If there is no drying oven available incandescent lamps may be placed inside and around the motor for the same purpose. A third way to dry the motor is by applying a low voltage (about 10% of the rated value) to the stator windings with the rotor locked. Drying will be accomplished by the current generated heat. In either of the latter two cases, precautions must be taken not to overheat the windings.
- 3.3 Before mounting, it is necessary to run the motor at no load.
 - a. Remove the oil fill plug and fill the oil reservoir to the middle of the sight gauge. See oil recommendations below.
 - b. The motors wiring diagram is on the nameplate. After connecting the terminals, the motor may be run at no load. If the motor does not start, turn off the power immediately, and interchange any two of line connections. If the motor still does not turn, then check the power supply circuit.
 - c. When the motor is ran for the first time and has reached the rated speed, cut the power off and re-inspect. Check that no connections are loose. Make adjustments as necessary.
 - d. Running at no load should continue for 2 to 3 hours. During this period, check for any irregularities or unusual noise. After completion of this trial, inspect the bearings thermally to ensure that they have not been over-heated.
 - e. Drain the oil into a clean container. The oil can be used again when the motor is mounted.

4. Motor Mounting

- 4.1 Make sure that the specifications and the capacity of the starting equipment meet the requirements on the nameplate.
- 4.2 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.
- 4.3 In the course of the installation the motor should be handled carefully and placed vertically. Never let the motor lay on its side.
- 4.4 When lifting the motor to the pump proper safety procedures should be used at all times.
- 4.5 Refill the oil chamber with oil prior to operation.

5. Operation and Instruction

- 5.1 The motor should be grounded properly. An earth-connecting terminal is located inside the terminal box on the lower left.
- 5.2 The motor windings should be connected according to the wiring diagram on the motor's nameplate. Thermostats are embedded in the stator windings for thermal protection. The two leads marked with TH1 and TH2 coming from the thermostats in the terminal box should be connected to your control device. This motor is equipped with heaters. It is mounted on bottom end of the stator winding. In the terminal box the two leads marked H1 and H2 are the heater connections. The heater should be connected to a 120VAC power source.
- 5.3 The motor's correct rotating direction is counterclockwise facing from the top of the motor.
- 5.4 The motor can be started at full voltage. If the motor is started at full voltage the starting current will be 5 to 8 times of the full load current. The motor can be used with a variety of soft start applications. The locked-rotor torque is directly proportional to the square of the voltage. Check with the factory regarding appropriate soft start applications. The motor also can be used with part winding starting (PWS), Wire connection is on the nameplate.
- 5.5 The starter should be provided with overcurrent and short circuit protection devices which will correspond with the current rating on the motor's nameplate.
- 5.6 The motor will operate continuously at its HP and RPM nameplate rating so long as the frequency of the sign wave does not vary by more than 1% and the voltage does not vary by more than 10%.
- 5.7 When the motor operates at full load there should be no abnormal noise or vibration present.
- 5.8 The motors are designed class F insulation system. The maximum allowable winding temperature rise is shown as in the following table:

| Test Methods | Stator winding Max. Allowable Temperature Rise | |
|--------------|--|----------------|
| Resistance | <80K (SF1.0) | <105K (SF1.15) |

6. Trouble Shooting Chart

6.1. Motor fails to start

| | |
|--------------------------------|---|
| - Wrong direction of rotation. | Interchange any two phases to change direction. |
| - Single Phased | Check the starter, fuse and wiring connections. |
| - Overload | Reduced the load or select a large capacity motor |
| - Supply voltage too low | Adjust up to rated voltage $\pm 10\%$ |
| - Pump trouble | Check the pump |

6.2. The operation speed with load is lower than the rated speed

| | |
|--------------------------------|---|
| - Supply voltage too low | Adjust up to rated voltage $\pm 10\%$ |
| - Broken bar of the cage rotor | Replace the rotor |
| - Overload | Reduce the load or select a larger capacity motor |
| - Pump trouble | Check the pump |

6.3. The sound is unusual during operation

| | |
|---------------------------|---|
| - Single Phased | Check the starter, fuse and wiring connections. |
| - Bearings are low on oil | Fill fresh oil |
| - Bearings worn out | Replace bearings |
| - Pump trouble | Check the pump |

6.4. The high pitched sound or motor overheats

| | |
|----------------------------------|--|
| - Overload | Reduce the load or select a larger capacity motor |
| - Single phased | Check the starter, fuse and wiring connections. |
| - Air passages are blocked | Remove the grass, dirt or debris in the air passage. |
| - Short between turns or phases | Repair the windings. |
| - Supply voltage too low or high | Adjust to rated voltage $\pm 10\%$ |

6.5. Bearings are overheated

- | | |
|---|----------------------------------|
| - Worn bearings | Replace the bearings. |
| - Lubricant oil deteriorated or bearings are short of oil | Replace or refill oil reservoir. |

6.6. The non-reverse ratchet malfunctions

- | | |
|--|--|
| - There is dirt on the steel ball | Remove the dirt |
| - The groove hole of a non-reverse ratchet plate is worn | Replace the non-reverse ratchet plate. |

6.7. There is oil leaking from the oil reservoir

- | | |
|---|---|
| - The motor was tilted during transport | Remove the oil from the oil reservoir to ship. |
| - Excessive oil in reservoir | Reduce the oil level to the center of the sight glass |
| - The oil conduit is leakage | Check the seal on the oil conduit. |

7. Maintenance

- 7.1 The motor must have the oil changed and/or re-greased at regular intervals. If a motor is used seasonally, the motor should be re-greased, and the oil changed at the beginning of the season.
- 7.2 The motor should operate in a clean dry environment. The surface of motor should be kept clean. The air inlet should not be blocked. No heat sources should be kept near the motor.
- 7.3 In an outdoor environment when the motor is not operated continuously the motor should be inspected for the presence of snakes, birds and small animals before starting the motor.
- 7.4 If abnormal noise occurs during operation, the motor should be shut down immediately and checked to determine the cause of the noise. Only after the issue has been resolved can the motor be put into operation again.
- 7.5 The ratchet assembly should be inspected periodically for wear or contamination. If it fails to ratchet properly inspect the ball channels and clean out any accumulated material.

- 7.6 Bearings wear out over time. When vibration or noise start to occur in motors that have been in service for a numbers of years the bearings should be checked. Allowing the motor to operate with failing bearings could lead to a catastrophic failure and the loss of the motor.
- 7.7 Attention should be paid to the level of lubricating oil in the sight glass. When the oil level is below the middle of the sight glass fresh oil must be added to ensure proper lubrication
- 7.8 In a clean dry environment, the bearings will not require re-greasing and/or re-oiling until they have been in service for about 4400 hours. However, under the following conditions grease and oil must be changed at once.
 - a.) Caking or deterioration of the grease
 - b.) Accumulation of water, impurities or dust in the oil
 - c.) Overheated bearing.
- 7.9 To change the lubricating grease and oil, the follow these steps, First remove the used lubricating grease and oil. Next flush out the oil reservoir and the bearing with an appropriate solvent. Finally fill with fresh grease and oil. For the grease lubricated bearing the amount of grease should fill about 2/3 of the bearing cavity.
- 7.10 40HP and larger HP motors: The angular contact bearing is lubricated with turbine oil with an appropriate viscosity for the region of operation. The radial ball bearing is lubricated with Mobil Polyrex EM Polyurea grease.
- 7.11 10-30HP motors: Both angular contact bearing and radial ball bearing are lubricated with Mobil Polyrex EM Polyurea grease.
- 7.12 In order to ensure normal operation, the motor must be overhauled periodically.

8. Storage

- 8.1. When the motor is to be unused for a period of time, the following steps should first be taken:
 - a.) Clean the exterior and interior of the motor thoroughly to free it of any contamination. Check all the parts to make sure that they are intact.
 - b.) Loosely cover all air inlets and outlets to prevent debris from getting into the motor.
 - c.) Coat all parts that are susceptible to rust with a layer of antirust oil or other rust preventers.

- 8.2. The motor should be packaged in the same manner as that of the manufacture before storing. The storage place must be dry and well ventilated, with a temperature maintained above 0°C. The motor in storage should be checked periodically for signs of dampness and corrosion. Necessary steps must be taken to improve storage conditions if there are signs of deterioration.

NAE VHS OIL LIST

| Oil Manufacturer | ISO VG 32 | | ISO VG 68 | |
|------------------|-------------------------------|---------------------|-------------------------------|---------------------|
| | Viscosity: 130-165 SSU @ 100F | | Viscosity: 284-347 SSU @ 100F | |
| | Mineral Base Oil | Synthetic Base Oil | Mineral Base Oil | Synthetic Base Oil |
| Chevron USA, Inc | GST Turbine Oil 32 | Cetus 32 | GST Turbine Oil 68 | Cetus 68 |
| ExxonMobil | Teresstic 32 | Rarus 824 | Teresstic 68 | |
| | DTE Oil Light | SHC 624 | DTE Oil Heavy Medium | SHC 626 |
| Pennzoil Co. Inc | Pennzbell TO 32 | Pennzbell SHD 32 | Pennzbell TO 68 | Pennzbell SHD 68 |
| Phillips 66 | Turbine Oil 32 | Multipurpose R&O 32 | Turbine Oil 68 | Multipurpose R&O 68 |
| | | Syndustrial R&O 32 | | Syndustrial R&O 32 |
| Shell Oil Co. | Tellus S2 MX 32 | S4 ME32 | Tellus S2 MX 68 | S4 ME68 |

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