## *Installation Guidelines*

When replacing a motor that has failed, if possible, determine the cause of failure. If you know why the original motor failed you may be able to improve the installation so the new motor doesn't fail for the same reason. Be particularly conscious of external conditions such as moisture, low voltage or dirt and debris that could have contributed to the failure. Here are more things you should consider when installing a motor:

**Heat** The number one enemy of a motor is heat. Overheating always results whenever there is a lack of clean, continually circulating air through a motor. Heat can damage a motor's windings, insulation, bearing lubricant and capacitors. In short, heat can quickly decrease the service life of a motor. Remember that proper ventilation is always a crucial consideration when installing a motor.

If at all possible, install a motor in a location that is free of dirt, dust or airborne debris, such as leaves. Indoors is best, but not in areas with high humidity, such as a laundry room or shower area. If the motor is installed outdoors, try to choose a shady spot that's protected from leaves and grass clippings. If you cover the motor to protect it from possible debris or water, there must be enough room between the cover and the motor to allow for a continual supply of unrecirculated outside air to flow through the motor.

A.O. Smith single-phase pool and spa motors feature a thermal overload protector that will shut down the motor if it overheats. As the windings begin to cool down, the overload protector will automatically re-start the motor. Blocked ventilation or an overload condition can cause the motor to shutdown on a repeated basis. The motor is operating as it was designed. It is important to determine what is causing the motor to overheat and correct the problem.

**TIP**: *In situations where the ambient temperature is exceptionally hot, utilizing a high efficiency E-Plus or Conservationist motor in place of a standard efficient motor can prevent the overload protector from nuisance tripping.*

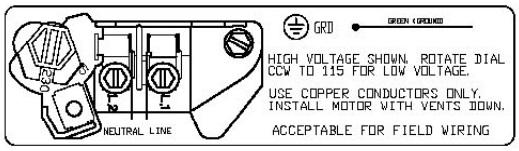
**Moisture** A.O. Smith motors have superior resistance to moisture, but you should avoid placing the motor where it can be splashed. Avoid installing the motor in low spots that could flood or under roof overhangs where gutters could overflow during heavy rains. Avoid locating the motor in the highest humidity area. It is best to elevate the motors at least two inches from the ground.

**Power source** Before you turn the motor on, check to see that the line voltage, phase and frequency match the specifications shown on the motor nameplate. Current capacity must be adequate enough to maintain rated voltage at the motor terminals under all conditions. If it's too high, contact your local utility. If it is too low check for overloaded circuits, loose connectors or wire of the wrong gauge (see wire selection guide).

**Altitude** Generally, motors will run hotter with increasing altitudes. For installations more than 3,300 feet above sea level, it's advisable to use a motor with the next larger horsepower rating than the one recommended for that application at sea level or use an E-Plus or Conservationist (high efficiency) motor of the same rating.

**Mounting** Fastening the motor to the pump and the pump and motor assembly securely to a foundation or base, will prevent vibration, loosening and future misalignment. Make sure that the motor and pump assemblies rotate freely before starting the motor.

**Electrical connections** The wiring diagrams shown on the motor make wiring your motor easy. Make sure the connections are tight to prevent failure or overheating.



DUAL VOLTAGE

**Grounding** Always make sure the motor is properly grounded before applying power. In addition to the green grounding screw inside the motor, which grounds the motor to the service ground, every pool and spa motor has a bonding lug. The bonding lug is on the outside of the motor and is used to bond the motor and all other conductive surfaces together to prevent a potential difference between the surfaces. Grounding should be done in compliance with all local and national electrical codes.

**Wire Size** Incorrect voltage at the motor terminals can cause the motor to overheat. It's a good idea to check the electrical supply wires to confirm that the wire size is sufficient to carry the required voltage. For example, if you're using a 1 HP motor at 115 volts over a distance of 150 feet use #8 wire. If the motor is being installed to operate on 230 volts, #10

**Pump Motor Recommended Wire Size**

| Motor H.P.** | DISTANCE FROM SERVICE ENTRANCE/MAIN PANEL TO MOTOR | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 50 feet | | 100 feet | | 150 feet | | 200 feet | |
| | 115V | 230V | 115V | 230V | 115V | 230V | 115V | 230V |
| 1/3 | 14 | 14 | 12 | 14 | 10 | 12 | 8 | 12 |
| 1/2 | 14 | 14 | 10 | 14 | 8 | 12 | 8 | 10 |
| 3/4 | 12 | 14 | 10 | 12 | 8 | 12 | 6 | 10 |
| 1 | 12 | 14 | 8 | 12 | 8 | 10 | 6 | 8 |
| 1-1/2 | 10 | 14 | 8 | 12 | 6 | 10 | 6 | 8 |
| 2 | 10 | 14 | 8 | 10 | 6 | 10 | 6 | 8 |
| 3 | | 12 | | 10 | | 8 | | 8 |

***Always follow all applicable codes.**
****Pump Motors with service factors greater than 1, and split phase designs.**
**No more than 15 volts drop at start, in worst case.**

wire is sufficient for the 150 feet distance. Larger wire sizes reduce the voltage drop to the motor in both the start and run modes. A lower voltage drop means the motor will run more efficiently (cooler) and have increased service life.

**Pump Seal** Always install a new seal when reassembling a pump or installing a replacement motor. A leaking pump seal may cause a motor to fail very quickly. To best protect the motor, A.O. Smith recommends the use of a Sintered Carbon Graphite Seal.

It is important that the pump seal be installed correctly. The following are installation instructions provided courtesy of U. S. Seal Mfg.

1. Disassemble pump cavity to expose defective seal. Removal of old seal and assembly of new seal requires careful operations and precautions.

   **Caution**: Lapped and polished faces of new seal are easily scratched and damaged. PROTECT FROM DAMAGE, DIRT and FINGERPRINTS.

2. Carefully remove old seal head and seat taking care not to scratch shaft or seat counterbore. NOTE HOW THE OLD SEAL IS ASSEMBLED, TO BE SURE REPLACEMENT SEAL IS INSTALLED IN IDENTICAL MANNER.
3. Clean shaft and counterbore surfaces using fine emery cloth or equivalent. Remove rust, burrs and wipe clean.

4. Shaft, seat counterbore and rubber members of seal head and seat should be lubricated with a lubricant compatible with the seal elastomer. Check seals surfaces to be sure they are free of any dirt, grit or lubricants.
5. Press seal seat firmly into counterbore to be sure it is bottomed square. SLIDE SEAL HEAD ALONG SHAFT MAKING SURE THAT SPRING IS CORRECTLY ENGAGED INTO SEAL.
6. Re-assemble pump and remember that trouble free operation of a pump includes a correct seal installation.

> **TIP**: *If the pump has been run dry long enough for the plastic pump to overheat, consider replacing the pump also. Overheating can cause the pump to warp making it impossible for the pump seal to prevent leaking.*

**Additional Protection**. Do not remove the water slinger (washer) from the shaft. It helps deflect water away from the motor bearing.

## *eMod*®

### Overview

The eMod load sensing electronic module is an accessory to a pool pump motor. It is permanently attached to the motor and is used to protect the motor and pump from damage. eMod is SVRS compliant per ASME A112.19.17-2002 for suction lift applications.

The load sensing module can turn the pool pump motor off if the input power to the motor is too low, indicating either a lack of fluid flow, or a dry running pump. It can also turn the motor off if the input power gets too high, indicating excessive load