

MAINTENANCE - BEARING REPLACEMENT

The 970-C Consistency Monitor is designed for long life but any device with moving parts will eventually require maintenance. Excessive wear of probe shaft bearings will be indicated by increased water leakage from the outer bearing. Initially water flow will be only a few ml/min. but when it approaches 200 ml/min. the bearings should be replaced with the spare set furnished.

Bearing replacement is quite simple but it is best to perform the operation in the instrument shop.

1. Disconnect water supply, remove motor splash cover and disconnect incoming wires. Remove probe from pan and wash off adhering syrup, protecting motor from splashing.
2. Loosen the two spline head set screws in the motor end of the flexible coupling and back off the three screws in the motor mount sleeve. Carefully pull barrel and shaft assembly out of the motor mount.
3. Remove rotor and pull the shaft out from the flexible coupling end. Remove the three set screws at the rotor end of the barrel and pull out the inner bearing retainer bushing.
4. Inspect shaft and inside of the barrel for possible scale or dirt accumulation and clean them up.
5. Press old bearings out of their retaining O-rings using finger pressure or a 5/8" rod if necessary. Inspect the two internal O-rings and the internal one on the inner bearing retainer and replace if necessary with the spares furnished. Grease O-rings lightly with silicone lubricant.
6. Press new bearings into the retainers until the O-rings snap into the bearing grooves. Be very Careful not to get grease on the inside bearing surfaces or it will cause erratic and high readings until it is eventually washed out by the purge water.
7. Inspect shaft for excessive wear or scoring and replace if necessary. Wipe shaft clean and slide it through the outer bearing. Slip on the inner bearing retainer and press it into the barrel until it seats. Replace the three set screws that hold it in place so that the shaft is seated in the flexible coupling and set screws are tight. Replace rotor.
8. Slide barrel and shaft assembly into motor mount sleeve and tighten the three set screws with the water purge connection at the required angle.
9. Push flexible coupling fully on to motor shaft seeing that one set screw is over the flat and tighten the two screws through the access hole.

10. Install probe, connect water and wires. Be sure the barrel fills with water before operating. If probe is ever to be operated on the bench, pour barrel full of water and keep probe horizontal so that both bearings are wetted continuously.
11. New bearings and shafts sometimes give a high reading until they have run in for an hour or so. After the reading stabilizes, recheck zero and span adjustments as previously described.

TROUBLESHOOTING

If motor fails to run, see if shaft and rotor are free by turning with a finger through the access hole. Check to see that 120 VAC is reaching the AC terminals of the rectifier on the circuit board. If not check continuity of the 2 ampere fuse and the on-off switch on the front panel. The DC output of the rectifier appears on wiring terminals 1 (-) and 3 (+) and should be approximately 130 VDC.

Changes in armature current with rotor load actuate the indicating meter and supply the 4-20 mA. output signal. With the motor running free the armature current is at a minimum. The voltage drop across the 300 ohm armature resistor is a good measure of this current. Voltage can be measured between terminals 3 (+) and 2 (-). With the motor running free this voltage should be about 15 volts. With the motor at stall the voltage should be about 90 volts. Armature current (terminal 2) changes from about 50 to 300 mA as load is applied.

The motor should never stall completely in normal operation even in very heavy masecuite but if it does, it could indicate worn motor brushes or a dirty commutator segment. Check brushes and replace if badly worn. Remove back end bell of motor and inspect the commutator, cleaning with fine sandpaper if needed. To be sure that external friction is not the cause, disconnect the probe shaft at the probe end of the flexible coupling and check for dirty or scaled bearings or compaction of sugar crystals around the rotor.

The Bodine motors have special brushes which should be ordered from *Liegler and Associates*. In ordering replacement brushes, specify the motor manufacturer and brush dimensions.

The circuit board is protected by a 2 ampere fuse. If the fuse blows check the wiring between the monitor and the probe as it is a sign that terminals 1 and 2 have been shorted. Maximum motor current at stall is only 0.3 ampere when properly connected. Do not over-fuse as circuit board damage can result.