



ELECTRIC MOTORS
GEARMOTORS AND DRIVES

Motor Trouble-Shooting Chart

Caution:

1. Disconnect power to the motor before performing service or maintenance.
2. Discharge all capacitors before servicing motor.
3. Always keep hands and clothing away from moving parts.
4. Be sure required safety guards are in place before starting equipment.

<u>Problem:</u>	<u>Like Causes:</u>	<u>What To Do:</u>
Motor fails to start upon initial installation.	Motor is miswired. Motor damaged and rotor is striking stator. Fan guard bent and contacting fan.	Verify motor is wired correctly. May be able to reassemble; otherwise, motor should be replaced. Replace fan guard.
Motor has been running, then fails to start.	Fuse or circuit breaker tripped. Stator is shorted or went to ground. Motor will make a humming noise and the circuit breaker or fuse will trip. Motor overloaded or load jammed. Capacitor (on single phase motor) may have failed. Starting switch has failed.	Replace fuse or reset the breaker. Disassemble motor and inspect windings and internal connections. A blown stator will show a burn mark. Motor must be replaced or the stator rewound. Inspect to see that the load is free. Verify amp draw of motor versus nameplate rating. First discharge capacitor. To check capacitor, set volt-ohm meter to RX100 scale and touch its probes to capacitor terminals. If capacitor is OK, needle will jump to zero ohms, and drift back to high. Steady zero ohms indicates a short circuit; steady high ohms indicates an open circuit. Disassemble motor and inspect both the centrifugal and stationary switches. The weights of the centrifugal switch should move in and out freely. Make sure that the switch is not loose on the shaft. Inspect contacts and connections on the stationary switch. Replace switch if the contacts are burned or pitted.
Motor runs but dies down.	Voltage drop. Load increased.	If voltage is less than 10% of the motor's rating contact power company or check if some other equipment is taking power away from the motor. Verify the load has not changed. Verify equipment hasn't got tighter. If fan application verify the air flow hasn't changed.
Motor takes too long to accelerate.	Defective capacitor Faulty stationary switch. Bad bearings. Voltage too low.	Test capacitor per previous instructions. Inspect switch contacts and connections. Verify that switch reeds have some spring in them. Noisy or rough feeling bearings should be replaced. Make sure that the voltage is within 10% of the motor's nameplate rating. If not, contact power company or check if some other equipment is taking power away from the motor.
Motor runs in the wrong direction.	Incorrect wiring.	Rewire motor according to wiring schematic provided.
Motor overload protector continually trips.	Load too high. Ambient temperature too high. Protector may be defective. Winding shorted or grounded.	Verify that the load is not jammed. If motor is a replacement, verify that the rating is the same as the old motor. If previous motor was a special design, a stock motor may not be able to duplicate the performance. Remove the load from the motor and inspect the amp draw of the motor unloaded. It should be less than the full load rating stamped on the nameplate. Verify that the motor is getting enough air for proper cooling. Most motors are designed to run in an ambient temperature of less than 40°C. (Note: A properly operating motor may be hot to the touch.) Replace the motor's protector with a new one of the same rating. Inspect stator for defects, or loose or cut wires that may cause it to go to ground.

Motor Trouble-Shooting Chart

10/13/00 (continued)

Problem:	Like Causes:	What To Do:
<p>Motor vibrates.</p>	<p>Motor misaligned to load.</p> <p>Load out of balance. (Direct drive application.)</p> <p>Motor bearings defective.</p> <p>Rotor out of balance.</p> <p>Motor may have too much endplay.</p> <p>Winding may be defective.</p>	<p>Realign load.</p> <p>Remove motor from load and inspect motor by itself. Verify that motor shaft is not bent. Rule of thumb is .001" runout per every inch of shaft length.</p> <p>Test motor by itself. If bearings are bad, you will hear noise or feel roughness. Replace bearings. Add oil if a sleeve of bearing. Add grease if bearings have grease fittings.</p> <p>Inspect motor by itself with no load attached. If it feels rough and vibrates but the bearings are good, it may be that the rotor was improperly balanced at the factory. Rotor must be replaced or rebalanced.</p> <p>With the motor disconnected from power turned shaft. It should move but with some resistance. If the shaft moves in and out too freely, this may indicate a preload problem and the bearings may need additional shimming.</p> <p>Test winding for shorted or open circuits. The amps may also be high. Replace motor or have stator rewind.</p>
<p>Bearings continuously fail.</p>	<p>Load to motor may be excessive or unbalanced.</p> <p>High ambient temperature.</p>	<p>Besides checking load, also inspect drive belt tension to ensure it's not too tight may be too high. An unbalanced load will also cause the bearings to fail.</p> <p>If the motor is used in a high ambient, a different type of bearing grease may be required. You may need to consult the factory or a bearing distributor.</p>
<p>The motor, at start up, makes a loud rubbing or grinding noise.</p>	<p>Rotor may be striking stator.</p>	<p>Ensure that motor was not damaged in shipment. Frame damage may not be repairable. If you cannot see physical damage, inspect the motor's rotor and stator for strike marks. If signs of rubbing are present, the motor should be replaced. Sometimes simply disassembling and reassembling motor eliminates rubbing. Endbells are also sometimes knocked out of alignment during transportation.</p>
<p>Start capacitors continuously fail.</p>	<p>The motor is not coming up to speed quickly enough.</p> <p>The motor is being cycled too frequently.</p> <p>Voltage to motor is too low.</p> <p>Starting switch may be defective, preventing the motor from coming out of start winding.</p>	<p>Motor may not be sized properly. Verify how long the motor takes to come up to speed, Most single phase capacitor start motors should come up to speed within three seconds. Otherwise the capacitors may fail.</p> <p>Verify duty cycle. Capacitor manufacturers recommend no more than 20, three-second starts per hour. Install capacitor with higher voltage rating, or add bleed resistor to the capacitor.</p> <p>Verify that voltage to the motor is within 10% of the nameplate value. If the motor is rated 208-230V, the deviation must be calculated from 230V.</p> <p>Replace switch.</p>
<p>Run capacitor fail.</p>	<p>Ambient temperature too high.</p> <p>Possible power surge to motor, caused by lightning strike or other high transient voltage.</p>	<p>Verify that ambient does not exceed motor's nameplate value.</p> <p>If a common problem, install surge protector.</p>