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| **Maintenance and Troubleshooting of Electric Motors** |  |
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**Troubleshooting AC Motors**

Problem A - Motor won't start or motor accelerates too slowly

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| **A1:** Check input power to starter. Is there power on all lines? (Three-phase motors won't start on one-phase.) | http://www.reliance.com/prod_elements/nortarw.gif | Restore power on all lines |
| http://www.reliance.com/prod_elements/ysdwnarw.gif |   |   |
| **A2:** Check starter. Is overload protection device opened? | http://www.reliance.com/prod_elements/ysrtarw.gif | Replace or reset device. Does it open again when starting? |
| http://www.reliance.com/prod_elements/noysdwnarw.gif |
| **A3:** Is there power on all lines to motor? | http://www.reliance.com/prod_elements/nortarw.gif | Repair starter |
| http://www.reliance.com/prod_elements/ysdwnarw.gif |   |   |
| **A4:** Is voltage to motor more than 10% below nameplate voltage? | http://www.reliance.com/prod_elements/ysrtarw.gif | Restore proper voltage. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **A5:** Check motor terminal connections. Are any loose or broken? | http://www.reliance.com/prod_elements/ysrtarw.gif | Repair connections. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **A6:** May be wrong motor for application. Is starting load too high? | http://www.reliance.com/prod_elements/ysrtarw.gif | Install Design C or Design D motor. Install larger motor. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **A7:** Is driven machine jammed or overloaded? | http://www.reliance.com/prod_elements/ysrtarw.gif | Remove jam or overload. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |  |
| **A8:** Are misalignments, bad bearings or damaged components causing excessive friction in driven machine or power transmission system? | http://www.reliance.com/prod_elements/ysrtarw.gif | Repair or replace component. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **A9:** Are bad bearings, bent shaft, damaged end bells, rubbing fan or rotor or other problem causing excessive friction in the motor? | http://www.reliance.com/prod_elements/ysrtarw.gif | Repair or replace motor. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **A10:** Check stator. Are any coils open, shored or grounded? | http://www.reliance.com/prod_elements/ysrtarw.gif | Repair coil or replace motor. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **A11:** Check commutator. Are any bars or rings broken? | http://www.reliance.com/prod_elements/ysrtarw.gif | Replace rotor. |

Problem B - Motor runs noisy

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| **B1:** Are vibrations and noise from driven machine or power transmission system being transmitted to motor? | http://www.reliance.com/prod_elements/ysrtarw.gif | Locate source of noise and reduce. Isolate motor with belt drive or elastomeric coupling. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |  |
| **B2:** Is a hollow motor foundation acting as a sounding board? | http://www.reliance.com/prod_elements/ysrtarw.gif | Redesign mounting. Coat foundation underside with sound dampening material. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **B3:** Check motor mounting. Is it loose? | http://www.reliance.com/prod_elements/ysrtarw.gif | Tighten. Be sure shaft is aligned. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **B4:** Is motor mounting even and shaft properly aligned? | http://www.reliance.com/prod_elements/nortarw.gif | Shim feet for even mounting and align shaft. |
| http://www.reliance.com/prod_elements/ysdwnarw.gif |   |   |
| **B5:** Is fan hitting or rubbing on stationary part or is object caught in fan housing? | http://www.reliance.com/prod_elements/ysrtarw.gif | Repair damaged fan, end bell or part causing contact. Remove trash from fan housing. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **B6:** Is air gap no uniform or rotor rubbing on stator? | http://www.reliance.com/prod_elements/ysrtarw.gif | Recenter rotor rubbing on worn bearings or relocate pedestal bearings. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **B7:** Listen to bearings. Are they noisy? | http://www.reliance.com/prod_elements/ysrtarw.gif | Lubricate bearings. If still noisy, replace. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **B8:** Is voltage between phases (three-phase motors) unbalanced? | http://www.reliance.com/prod_elements/ysrtarw.gif | Balance voltages. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **B9:** Is three-phase motor operating on one-phase? (Won't start on single-phase.) | http://www.reliance.com/prod_elements/ysrtarw.gif | Restore power on three-phases. |

Problem C - Motor overheats

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| **C1:** Is ambient temperature too high? | http://www.reliance.com/prod_elements/ysrtarw.gif | Reduce ambient, increase ventilation or install larger motor. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |  |
| **C2:** Is motor too small for present operating conditions? | http://www.reliance.com/prod_elements/ysrtarw.gif | Install larger motor. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **C3:** Is motor started too frequently? | http://www.reliance.com/prod_elements/ysrtarw.gif | Reduce starting cycle or use larger motor. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **C4:** Check external frame. Is it covered with dirt which acts as insulation and prevents proper cooling? | http://www.reliance.com/prod_elements/ysrtarw.gif | Wipe, scrape or vacuum accumulated dirt from frame. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **C5:** Feel output from air exhaust openings. Is flow light or inconsistent indicating poor ventilation? | http://www.reliance.com/prod_elements/ysrtarw.gif | Remove obstructions or dirt preventing free circulation of air flow. If needed, clean internal air passages. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **C6:** Check input current while driving load. Is it excessive indicating an overload? | http://www.reliance.com/prod_elements/nortarw.gif | Go to Step C11. |
| http://www.reliance.com/prod_elements/ysdwnarw.gif |   |   |
| **C7:** Is the driven equipment overload? | http://www.reliance.com/prod_elements/ysrtarw.gif | Reduce load or install larger motor. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **C8:** Are misalignments, bad bearings or damaged component causing excessive friction in driven machine or power transmission system? | http://www.reliance.com/prod_elements/ysrtarw.gif | Repair or replace bad components. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **C9:** Are motor bearings dry? | http://www.reliance.com/prod_elements/ysrtarw.gif | Lubricate. Does motor still draw excessive current? |
| http://www.reliance.com/prod_elements/noysdwnarw.gif |
| **C10:** Are damaged end bells, rubbing fan, bent shaft or rubbing rotor causing excessive internal friction? | http://www.reliance.com/prod_elements/ysrtarw.gif | Repair or replace motor. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **C11:** Are bad bearings causing excessive friction? | http://www.reliance.com/prod_elements/ysrtarw.gif | Determine cause of bad bearings (See Problem D). |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **C12:** Check phase voltage. Does it vary between phases? | http://www.reliance.com/prod_elements/ysrtarw.gif | Restore equal voltage on all phases. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **C13:** Is voltage more than 10% above or 10% below nameplate? | http://www.reliance.com/prod_elements/ysrtarw.gif | Restore proper voltage or install motor built for the voltage. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **C14:** Check stator. Are any coils grounded or shorted? | http://www.reliance.com/prod_elements/ysrtarw.gif | Repair coils or replace motor. |

Problem D - Motor bearings run hot or noisy

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| **D1:** Check loading. Is excessive side pressure, end loading or vibration overloading bearings? | http://www.reliance.com/prod_elements/ysrtarw.gif | Reduce overloading.\* Install larger motor. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |  |
| **D2:** Is sleeve bearing motor mounted on a slant causing end thrust? | http://www.reliance.com/prod_elements/ysrtarw.gif | Mount horizontally\* or install ball bearing motor. |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **D3:** Is bent or misaligned shaft overloading bearings? | http://www.reliance.com/prod_elements/ysrtarw.gif | Replace bent shaft or align shaft.\* |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **D4:** Is loose or damaged end bell overloading shaft? | http://www.reliance.com/prod_elements/ysrtarw.gif | Tighten or replace end bell.\* |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **D5:** Are bearings dry? | http://www.reliance.com/prod_elements/ysrtarw.gif | Lubricate.\* |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **D6:** Is bearing lubricant dirty, contaminated or of wrong grade? | http://www.reliance.com/prod_elements/ysrtarw.gif | Clean bearings and lubricate with proper grade\* |
| http://www.reliance.com/prod_elements/nodwnarw.gif |   |   |
| **D7:** Remove end bells. Are bearings misaligned, worn or damaged? | http://www.reliance.com/prod_elements/ysrtarw.gif | Replace. |
| *\*Bearings may have been damaged. If motor still runs noisy or hot, replace bearings.* |