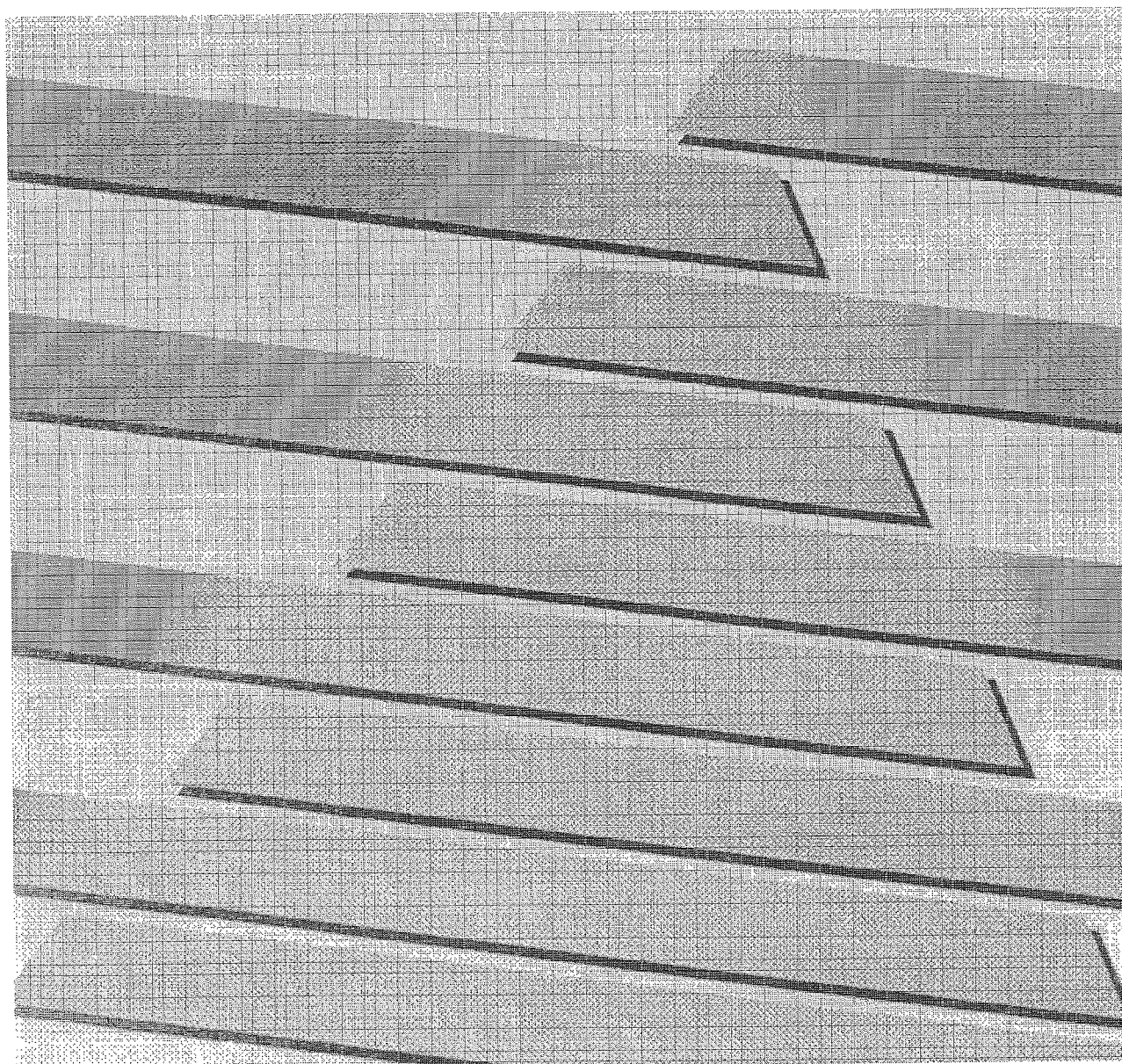




**ALLEN-BRADLEY**

# **Allen-Bradley 1329 Inverter Duty AC Induction Motors**

**Installation Manual**



## Important User Information

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**ATTENTION:** High voltage and rotating parts of electrical machinery can cause serious or fatal injury. Installation, operation and maintenance of 1329 motors and associated machinery should be performed by qualified personnel only. Familiarization with NEMA MG2 Safety Standard for Construction and Guide for Selection, Installation and Use of Fractional and Integral HP Motors, the National Electrical Code and sound local practices is recommended. For equipment covered by these instructions, it is important to observe safety precautions to protect personnel from possible injury. Personnel should be instructed to:

- Avoid contact with energized circuits. Disconnect and lock out all power sources before attempting maintenance or repair.
  - Avoid contact with rotating parts. Properly secure all guards before motor is energized.
  - Be sure shaft key is captive and secured according to mechanical drive specifications for the machine before motor is energized.
  - Provide proper safeguards for personnel against possible failure of motor-mounted brake, particularly on applications involving overhauling loads.
  - Failure to properly ground the motor or motors may cause serious injury to personnel. Grounding should be in accordance with the National Electrical Code and consistent with sound local practice.
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## Storage

Motors must be kept clean and the following precautions must be taken when the 1329 motors are stored for any length of time:

- Store the motor(s) indoors. If stored for more than 12 months, refer to "Lubrication".
- Keep motor(s) covered to minimize accumulation of airborne dust & dirt.
- Cover or tape over all ventilation openings, conduit connections etc. to prevent entry of rodents, snakes, birds, insects or other foreign material into the motor(s).

Motors must be kept dry, and the following precautions should be followed:

- Store in a dry well ventilated area.
- Minimize temperature fluctuations to help prevent condensation.
- Utilize a space heater or heaters if required.
- Treat unpainted flanges, shafts, and fittings with a rust inhibitor.

## Installation

**Location** – The location of the 1329 motors should be planned according to the following criteria:

### Non-Hazardous Locations:

- The ambient air surrounding the motor should not exceed 40°C (104°F) unless specifically designed for a higher ambient as noted on the nameplate. The free flow of air around the motor should not be obstructed.
- **Dripproof Motors** (DP type ST motors) may be used in a well ventilated indoor location reasonably free of dirt and moisture.
- **Standard Enclosed Motors** (FC, NV, BC, WP type ST motors) may be used where they are exposed to dirt, moisture and most other outdoor conditions.
- **Severe Duty Enclosed Motors** (FC, NV, BC, WP type SD motors.) may be used in highly corrosive or excessively moist areas.

### Hazardous Locations:

- **Explosion Proof Motors** bearing the Underwriters' Laboratories label designating the motor UL Class and Group as defined in the National Electrical Code are designed for operation in areas classified by local authorities as hazardous in accordance with standards set forth in that Code.

**NOTE:** Explosion Proof motors are only qualified with Bulletin 1336 and Bulletin 1352 AC Inverters.

**Mounting** – Motors should be permanently installed according to the following guidelines:



**ATTENTION:** Hazard of serious or fatal injury exists when moving or lifting motors. Eyebolts are only designed for lifting the motor. Do not lift the motor if connected to a machine. Securely tighten eyebolts before lifting.

Direction of lift must not exceed a 15 degree angle with shank of eyebolt.

- Mount motors on a rigid flat base. The plane of the four base mounting pads should be within .25 mm (.010") on motors thru 210 frame size, and within .38 mm (.015") for larger units. This may be accomplished by using shims under the motor feet. Grout in larger motors if necessary. Standard transition or sliding bases are suitable for floor mounting. The use of alternate mounting positions (sidewall, ceiling, vertical) may require modification of the drain system, consult Allen-Bradley if alternate positions are required.  
**IMPORTANT:** *Remove drain plugs from the frame or endshields of enclosed motors used outdoors or in high moisture areas.*
- Align motors accurately. For direct drive, use flexible couplings if possible. Misalignment and runout between direct connected shafts will cause increased bearing loads and vibration even when connection is made with a flexible coupling. This will decrease bearing life. Proper alignment per the specification of the driven equipment coupling & motor mfg., is critical.
- Act with care and in accordance with prescribed procedures for handling, fitting or installing equipment.
- Some larger motors are furnished with roller bearings. Roller bearings should NOT be used for direct drive. Some larger motors are furnished with sleeve bearings. Sleeve bearings are for direct drive only.
- For base assembly and motor mounting, the bolts must be carefully tightened to prevent changes in alignment and possible damage to equipment. It is recommended that a washer be used under each nut or bolt head to get a secure hold on the motor feet; or as an alternate, flanged nuts or bolts may be used. The recommended tightening torques for medium carbon steel bolts (identified by three radial lines at 120 degrees on the head) are shown in Table A:

**Table A. Motor Mount Bolt Tightening Torques**

Bolt Size		Recommended Torque in Ft.-lb. (N-M)			
Inch	(Metric)	Minimum		Maximum	
1/4	(M6)	7	(9)	11	(15)
5/16	(M8)	14	(19)	21	(28)
3/8	(M10)	25	(34)	37	(50)
1/2	(M12)	60	(81)	90	(122)
5/8	(M16)	120	(163)	180	(244)
3/4	(M20)	210	(285)	320	(433)

NOTE: For low carbon steel bolts, use 50% of the tightening torques recommended above. There are no ID marks on low carbon steel bolts.

- The application of pulleys, sheaves, sprockets and gears on motor shafts is shown in NEMA Standard MG-1-14.07. The application of the V-belt dimensions to alternating current motors is shown in MG1-14.42A. Align sheaves carefully to avoid axial thrust on motor bearings. The motor sheave should be positioned as close as possible to the motor bearing. Adjust tension to belt manufacturers recommendations. Excessive tension will reduce bearing life.

#### **Power Supply and Connections –**

- When connecting to Variable Frequency Drives, care must be taken to ensure the Drive is tuned properly to provide the proper Volts/Hertz or motor flux throughout the operating speed range. See nameplate and drive startup manual.
- For direct connection to a distribution system, the nameplate voltage and frequency must agree with power supply. The motors will operate satisfactorily on line voltage within  $\pm 10\%$  of the nameplate value or frequency within  $\pm 5\%$ , with the combined variation not to exceed  $\pm 10\%$ .
- Wiring of motor, control, overload protection and grounding must meet the National Electrical Code and local building codes.

**Thermal Protectors –** The motor is provided with either a normally closed thermostat contacts or stator RTD's. The thermostats are located one per phase. The RTD's are two per phase 100 ohm platinum unless stated otherwise on the nameplate.

The thermostat must be wired into the stop circuit on a three wire control circuit or the auxiliary interlock of the Drive or a separate overload alarm circuit. The RTD must be wired to a temperature monitor whose output alarm contact is connected in the same manner as a motor thermostat.

Consult your Drive hardware user manual for information on stop circuit terminals.



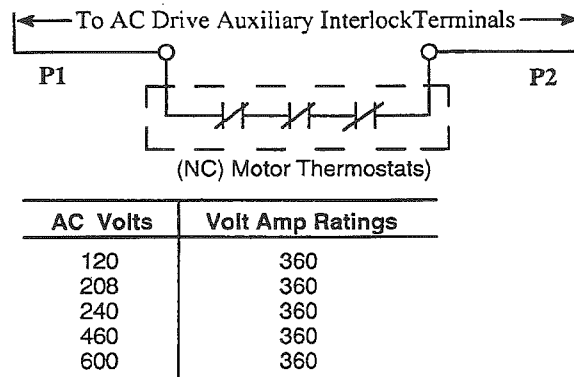
**ATTENTION:** Motor is equipped with an “Overheat Protective Device”. This device must be wired to shut down the motor or activate an alarm in the event of an overtemperature. Depending on control logic circuitry and applicable codes, motor may unexpectedly restart when protective device automatically resets after cooldown. Verify that control logic is proper for the application and appropriate “Auto-Restart” warning signs are visible at the motor if necessary. Unexpected starting of equipment can cause serious or fatal injuries.

**Thermostat Connection** – The Thermostat should be wired to the AC Drive Auxiliary Interlock terminals as detailed in Figure 1–A.



**ATTENTION:** Disconnect and lock out power from motor before connecting thermostat. Failure to do so could result in personal injury from electrical shock or contact with rotating parts.

**Figure 1–A. Thermostat Connections**



## Start-Up

- A. Measure insulation resistance of stator windings. The minimum resistance required is 1.6 ohms. Do not attempt to operate if insulation resistance is below this value.



**ATTENTION:** If a high potential insulation test is required, procedures and precautions outlined in NEMA Standards MG1 should be followed. Prior to measuring insulation resistance, disconnect motor leads from VFD type Drive. Failure to do so may stress drive components beyond voltage rating limits.

- B. If the insulation resistance is low, dry out the moisture using one of the following methods:
1. Bake in an oven at a temperature of not more than 85°C (185°F) until the insulation resistance is constant for 1/2 hour.

2. Enclose motor with a canvas or similar covering, leaving a hole at the top for moisture to escape. Insert heating units or lamps until insulation resistance is constant for 1/2 hour. To guard against fire hazard, do not leave motor unattended during this procedure.
  3. With locked rotor apply 10% rated voltage to stator. Allow the current to increase gradually until the winding temperature reaches 90°C (194°F). Do Not exceed this temperature. Maintain this temperature until insulation resistance is constant for 1/2 hour.
- C. Operate at no load to check direction of rotation and that the motor is running free. If a drive bypass arrangement has been provided, verify correct bypass operation first. To reverse bypass rotation, interchange leads L1 and L3 on the input of the bypass main disconnect. Do Not reverse motor leads.
- D. Operate under no load for an initial period of at least one hour to observe whether any unusual noises or hot spots develop.
- E. Check operating current against the nameplate current. Do Not exceed the value of the nameplate amperes multiplied by the service factor (if any) under continuous load.

## Maintenance

**Inspection** – Inspect motor at regular intervals. Keep motor clean and ventilating openings clear.

**Lubrication** – Anti-Friction bearing motors (ball or roller) are adequately lubricated at the factory. Motors should be relubricated at intervals consistent with the type of service (see Table B) to provide maximum bearing life. Excessive or too frequent lubrication may damage motor. It is not necessary to lubricate at time of installation unless the motor has been in storage for 12 months or longer.

To Lubricate:

1. Stop Motor.
2. Disconnect power and lock out service.
3. Wipe all grease fittings clean.
4. Remove fill and drain plugs from the bearing hub.
5. Free drain hole of any hard grease (use a piece of wire if necessary).
6. Add grease\* with a hand operated, low pressure grease gun.
7. Leave the relief plug off temporarily. Run motor for 20–30 minutes to expell excess grease.
8. Stop motor, disconnect and lock out power, then wipe off drained grease, replace filler and drain plugs.
9. Motor is ready for operation.

\*The amount and type of grease is very important. Use Chevron SRI 2, Shell Dolimur or equivalent unless a special grease is specified on the nameplate.



Sleeve bearing motors must have their oil reservoirs filled to the center of the oil level gauge on the endshield, prior to initial operation. The oil should be maintained at this level during operation. Oil is added thru the oil ring sight gauge hole above each bearing. The bearings have an approximate capacity of  $\frac{1}{3}$  gallon to  $1\frac{1}{2}$  gallons each depending on frame size of the motor.

Use a grade of mineral oil having a viscosity of 300 seconds Saybolt @ 100° F. The oil should be a premium quality oil containing oxidation and corrosion inhibitors.

Table B. Motor Lubrication Guide

Type of Service	Typical Examples	HP Range	Lubrication Interval	
			Horizontal	Vertical
Easy	Infrequent use, 1 hour-per-day, valves, door openers	.5 - 7.5	10 yrs	9 yrs
		10 - 40	7 yrs	3 yrs
		50 - 150	4 yrs	1.5 yrs
		200 - 350	3 yrs	9 mos
		400 - UP	1 yr	3 mos
Standard	1 or 2 shifts, Machine tools, Air conditioning, conveyors, Oil wells, Garage compressors, Refrigeration Equipment, Woodworking, Laundry.	.5 - 7.5	7 yrs	3 yrs
		10 - 40	4 yrs	1 yrs
		50 - 150	1.5 yrs	6 mos
		200 - 350	1 yrs	3 mos
		400 - UP	6 mos.	1.5 mos
Severe	Continuous Duty 24 hours-per-day 365 days-per-year, Mining machinery, Severe vibration.	.5 - 7.5	4 yrs	1.5 yrs
		10 - 40	1.5 yrs	6 mos
		50 - 150	9 mos	3 mos
		200 - 350	6 mos	1.5 mos
		400 - UP	3 mos	1 mos
Very Severe	Dirt and vibration High ambient End of shaft hot (pumps and fans)	.5 - 7.5	9 mos	6 mos
		10 - 40	4 mos	3 mos
		50 - 150	4 mos	2 mos
		200 - 350	3 mos	1 mos
		400 - UP	2 mos	3 weeks

NOTE: For roller bearings, divide above times by three

## Service

**Inspection** – Your motor should be serviced only by qualified persons who have the proper tools and equipment. In-warranty service for your motor can be obtained from any of the nationwide network of Authorized Service Centers. Consult Allen-Bradley for the Service Center nearest you.

**Explosion-Proof Motors** – Explosion-proof motors have special features and are manufactured in accordance with UL and carry its label. Therefore, repairs must be made at a service shop that is UL recognized in order to retain the UL label.

**Motor Windings** – To clean motor windings use a soft brush, if this is not sufficient, contact Allen-Bradley for the location of the nearest Service Center to obtain details on compatible solvents that may be used for cleaning and the hazards of explosion or fire that might exist in your plant when using solvents.

**Troubleshooting** – Refer to the following troubleshooting table if difficulties are encountered with your motor.



**ATTENTION:** Motor troubleshooting must be carried out by qualified persons with the proper tools and equipment. Hazard of electrical shock or injury from rotating parts exist when troubleshooting or servicing motors. Failure to follow proper troubleshooting sequences could result in equipment damage or possible injury to personnel.

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## Motor/Drive Tuning

**Application Note:** The correct voltage boost and volts/hz settings are application dependent and unique to each 1329 motor. Please follow the adjustment and start-up procedure in your drive users manual.

Table C. Motor Troubleshooting Guide

Malfunction	Probable Cause	Possible Solution
Motor does not start	<ul style="list-style-type: none"> <li>• Blown fuses</li> <li>• Overload trips</li> <li>• Improper Drive Adjustments</li> <li>• Improper line connections</li> <li>• Open circuit in control switch, motor thermostat or RTD circuits.</li> <li>• Mechanical problems</li> <li>• Short circuited stator</li> <li>• Poor stator coil connection</li> <li>• Rotor malfunctions</li> <li>• Motor may be overloaded</li> <li>• Wrong Application</li> </ul>	<ul style="list-style-type: none"> <li>• Replace fuses with proper type and rating.</li> <li>• Check and reset overload.</li> <li>• Check VFD drive instruction manual for proper startup procedures, specifically voltage boost or IR comp. Verify V/Hz adjustments are tuned according to Nameplate Data*.</li> <li>• Check connections with diagram supplied with motor.</li> <li>• Check for loose wiring connections. Also see that all control contacts are closing.</li> <li>• Check to see if motor and drive components turn freely. Check bearings and lubrication.</li> <li>• Motor must be rewound.</li> <li>• Remove end bells, locate with test lamp.</li> <li>• Look for broken bars or end rings.</li> <li>• Reduce load.</li> <li>• Verify operating speed range matches motor name plate.</li> </ul>
Motor stalls	<ul style="list-style-type: none"> <li>• One phase may be open</li> <li>• Wrong application</li> <li>• Overload</li> <li>• Improper Drive Adjustments</li> <li>• Open circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Check lines for open phase.</li> <li>• Change type or size. Consult manufacturer</li> <li>• Reduce Load</li> <li>• Verify V/HZ Adjustments*</li> <li>• Fuses blown, check overload relay, stator, motor thermostat and control logic circuits.</li> </ul>
Motor does not come up to speed	<ul style="list-style-type: none"> <li>• Wrong application</li> <li>• Voltage too low at motor terminals because of line drop.</li> <li>• Starting load too high</li> <li>• Broken rotor bars or loose rotor</li> <li>• Open primary circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Consult Allen-Bradley for proper type</li> <li>• Check connections. Check conductors for proper size. Consult VFD instruction manual.</li> <li>• Check initial load motor can carry</li> <li>• Look for cracks near the the rings. A new rotor may be required as repairs are usually temporary.</li> <li>• Locate fault with testing device and repair.</li> </ul>
Motor takes too long to accelerate	<ul style="list-style-type: none"> <li>• Excessive load</li> <li>• Accel Ramp Incorrect</li> <li>• Low voltage during start</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce load.</li> <li>• Check Drive Accel Ramp.</li> <li>• Check for high resistance, adequate wire size and proper drive setup.</li> </ul>
Noisy Operation	<ul style="list-style-type: none"> <li>• Airgap not uniform</li> <li>• Rotor unbalance</li> <li>• PWM Wave Shape</li> </ul>	<ul style="list-style-type: none"> <li>• Check and correct bracket fits or bearing.</li> <li>• Rebalance.</li> <li>• If variable torque load, use squared V/Hz curve*</li> </ul>
Scraping noise	<ul style="list-style-type: none"> <li>• Fan rubbing air shield</li> <li>• Fan striking insulation</li> <li>• Motor loose on bedplate</li> </ul>	<ul style="list-style-type: none"> <li>• Remove interference.</li> <li>• Clear fan.</li> <li>• Tighten holding bolts.</li> </ul>

\* NOTE: The correct voltage boost and Volts/Hz settings are application dependent and unique to each motor. Please follow the adjustment and start-up procedure in the Drive users manual.

IMPORTANT: These troubleshooting instructions do not cover all details or variations in equipment, or address every possible condition to be met in connection with installation, operation or maintenance. Should additional information be required, contact the nearest Allen-Bradley office.

Table C. Motor Troubleshooting Guide (Cont.)

Malfunction	Probable Cause	Possible Solution
Motor overheats while running under load	<ul style="list-style-type: none"> <li>• Overload</li> <li>• Improper Drive Adjustment</li> <li>• Frame or bracket vents may be clogged with dirt and prevent proper ventilation of motor.</li> <li>• Motor may have one open phase</li> <li>• Grounded coil</li> <li>• Unbalanced terminal voltage</li> <li>• Excessive current</li> <li>• Unbalanced AC Current</li> <li>• Dirty Windings</li> <li>• Excessive ambient temperature</li> <li>• Misapplication</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce load</li> <li>• Verify V/Hz Adjustments**</li> <li>• Open vent holes and check for continuous stream of air from the motor.</li> <li>• Check that all leads are properly connected.</li> <li>• Locate and repair</li> <li>• Check for faulty leads or connections.</li> <li>• Verify motor nameplate rating is not exceeded.</li> <li>• Verify balanced stator resistance &amp; phase wiring, check for open circuits.</li> <li>• Clean</li> <li>• Verify ambient does not exceed nameplate rating.</li> <li>• Consult Allen-Bradley</li> </ul>
Motor Vibrates	<ul style="list-style-type: none"> <li>• Motor misaligned</li> <li>• Weak support</li> <li>• Coupling out of balance</li> <li>• Driven equipment unbalanced</li> <li>• Worn or damaged bearings</li> <li>• Bearings not in line</li> <li>• Balancing weights shifted</li> <li>• Motor running single phase</li> <li>• Excessive end play</li> <li>• Bent shaft</li> <li>• Non uniform air gap or rubbing parts</li> </ul>	<ul style="list-style-type: none"> <li>• Realign</li> <li>• Strengthen base</li> <li>• Balance coupling</li> <li>• Rebalance equipment</li> <li>• Replace bearing</li> <li>• Line up properly</li> <li>• Rebalance motor.</li> <li>• Check for open circuit.</li> <li>• Adjust bearing.</li> <li>• Straighten or replace shaft</li> <li>• Check and correct bracket fits or bearings (refer to scraping noise).</li> </ul>
Hot bearings	<ul style="list-style-type: none"> <li>• Bent or sprung shaft</li> <li>• Excessive belt pull</li> <li>• Pulleys too far away</li> <li>• Pulley diameter too small</li> <li>• Misalignment</li> <li>• Improper Drive Adjustment</li> <li>• Insufficient or excessive grease/oil</li> <li>• Deterioration of grease, or lubricant contaminated</li> <li>• Overloaded bearing</li> <li>• Broken ball or rough races</li> <li>• Shaft currents</li> </ul>	<ul style="list-style-type: none"> <li>• Straighten or replace shaft.</li> <li>• Decrease belt tension.</li> <li>• Move pulley closer to bearing.</li> <li>• Use larger pulleys</li> <li>• Correct misalignment</li> <li>• Verify V/Hz Adjustments**</li> <li>• Maintain proper quantity of lubricant in bearing, bearing should not be more than 1/2 filled with grease.</li> <li>• Remove old grease, wash bearings, repack bearings.</li> <li>• Check alignment, side and end thrust.</li> <li>• Remove old bearing, clean housing thoroughly and install new bearing.</li> <li>• Use insulated bearing on non-drive end.</li> </ul>
Low insulation resistance or insulation breakdown.	<ul style="list-style-type: none"> <li>• Moisture, Dirt, Metal particles or other contaminants</li> <li>• Excessive temperature shortened life.</li> <li>• Mechanical damage</li> <li>• Excessive dv/dt (voltage change)</li> </ul>	<ul style="list-style-type: none"> <li>• Thoroughly clean and dryout motor.</li> <li>• Refer to Motor Overheats above.</li> <li>• Identify cause and repair</li> <li>• Identify source (ie. lightning) and take corrective action.</li> </ul>

\* NOTE: Consult Drive Start-up Manual

\*\* NOTE: The correct voltage boost and Volts/Hz settings are application dependent and unique to each motor. Please follow the adjustment and start-up procedure in the Drive users manual.

IMPORTANT: These troubleshooting instructions do not cover all details or variations in equipment, or address every possible condition to be met in connection with installation, operation or maintenance. Should additional information be required, contact the nearest Allen-Bradley office.

## Motor Connections

Figure 1-B. Three Phase Wye Connected Dual Voltage Motor

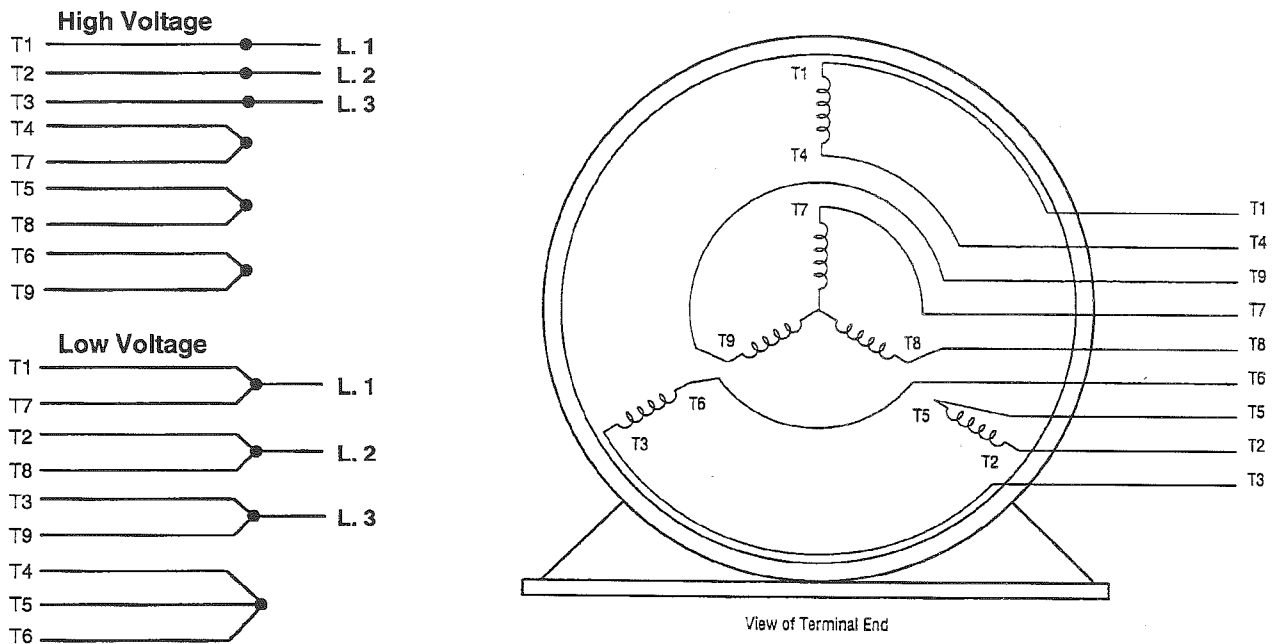
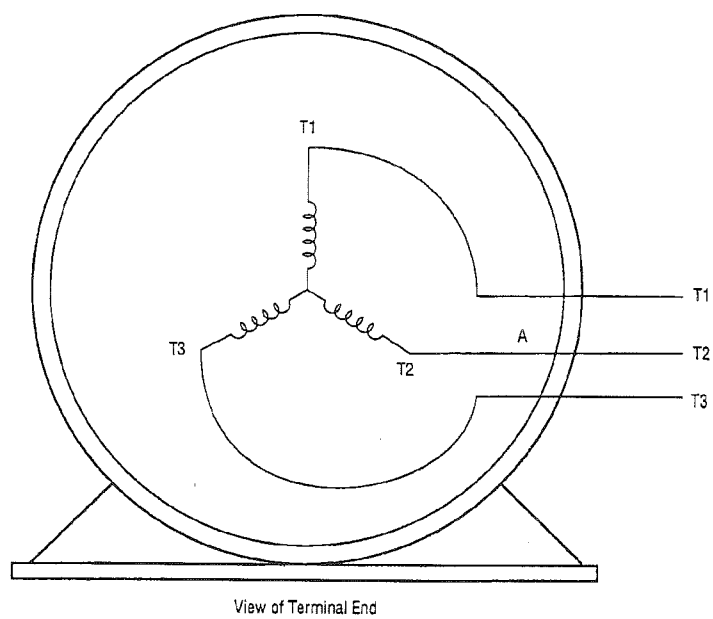


Figure 1-C. Three Phase Single Voltage Motor



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# INVERTER DUTY MOTOR SERVICE RECORD

Model No. \_\_\_\_\_ Horsepower \_\_\_\_\_ Application ☐ Variable Torque  
 Bulletin No. \_\_\_\_\_ ☐ Constant Torque  
 Speed Range \_\_\_\_\_ To \_\_\_\_\_ Volts \_\_\_\_\_ Amperes \_\_\_\_\_ Phase \_\_\_\_\_ Hz \_\_\_\_\_  
 Insulation Class \_\_\_\_\_ Frame Size \_\_\_\_\_  
 Service Factor \_\_\_\_\_ Inv \_\_\_\_\_ Sine \_\_\_\_\_  
 Temperature Sensors \_\_\_\_\_ Manufacturer \_\_\_\_\_  
 Owner Order No. \_\_\_\_\_ Item No. \_\_\_\_\_ Date Purchased \_\_\_\_\_

Machine Type		Bearings			Shaft Extension																																																																																																																																																																														
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