



Installation & Maintenance Manual

Techtop Canada Inc.
2-2795 Brighton Road
Oakville, ON L6H 6J4
www.techtop.com
info@techtopcanada.com

***Before you install, operate or perform maintenance,
become familiar with the following:***

NEMA Publication MG-2: Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors.
IEC 60072-1 Electrical and IEC72-1 Mechanical specifications
ANSI C51.5, the National Electrical Code (NEC) and local codes and practices.
OSHA standard 1910.147 titled: The Control of Hazardous energy (lockout/tag-out).

RECIEVING

Once you receive your motor, instantly observe the condition of the shipping container. *Immediately report any damage to the commercial carrier that delivered your motor.*
Verify that the part number of the motor you received is the same as the part number listed on your purchase order.

HANDLING

Use correct material handling equipment to avoid injury. Use *caution* when removing the motor from its packaging. Sharp corners may exist on motor shaft, motor key, sheet metal and other surfaces.

SAFETY NOTICE

Only qualified personnel, trained in the safe installation and operation of this equipment, should install this motor. ***When improperly installed or used, rotating equipment can cause serious or fatal injury.*** Equipment must be installed in accordance with the National Electrical Code (NEC), local codes and NEMA MG2 Safety Standards for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators and OSHA regulation standard 1910.147 titled: The control of hazardous energy (lockout/tag-out).
Use correct material handling equipment to avoid injury. Use *caution* when removing the motor from its packaging. Sharp

corners may exist on motor shaft, motor key, sheet metal and other surfaces.

1. Connect Power and Ground to the motor according to NEC or IEC and local codes.
2. Provide a ***permanent guard*** to prevent accidental contact of body parts or clothing with rotating or moving parts of motor. Beware of burns if motor is hot.
3. Shaft key must be secured before starting motor.
4. Mounting bolts should be high tensile steel. Be sure to use a suitable locking device on each bolt (spring washer or thread lock compound).
5. Do not apply power to the motor until the motor is securely mounted by its mounting holes.
6. This motor must only be connected to the proper line voltage, line frequency and load size.
7. Motors are not to be used for load holding or restraining unless a properly sized brake is installed. If a motor mounted brake is installed, provide proper safeguards in case of brake failure.
8. Disconnect all power services, stop the motor and allow it to cool before servicing.
9. For single phase motors, discharge the start and/or run capacitors before servicing.
10. Do not by-pass or render any inoperative safety devices.

GUARDING

After motor installation is complete, a guard of suitable dimensions must be constructed and installed around the motor. This guard must prevent personnel from coming in contact with any moving parts of the motor or drive assembly, but must allow sufficient cooling air to pass over the motor. If a motor mounted brake is installed, provide proper safeguards for personnel in case of brake failure. **WARNING:** Guards must be installed to form a safe and uncompromised perimeter around rotating parts such as couplings, pulleys, external fans, and unused shaft extensions.

All parts should be permanently guarded to prevent accidental contact by personnel. *Accidental contact with body parts or clothing can cause serious or fatal injury.* When this motor is installed according to these instructions, it complies with the EEC Machinery Directive. Electromagnetic Compatibility (EMC) requirements for CE compliance are met when the incoming power is purely sinusoidal.

HAZARDOUS LOCATIONS

Ensure that the motor installed is proper for the location in which it will operate. Division 2 motors should never be installed in locations requiring a Division 1 motor. Familiarize yourself with the ratings and the specific details of the motors working environment.

CLASS I: (Gases, Vapors)

Group A: Acetylene

Group B: Butadiene, ethylene oxide, hydrogen, propylene oxide

Group C: Acetaldehyde, cyclopropane, diethyl ether, ethylene, isoprene

Group D: Acetone, acrylonitrile, ammonia, benzene, butane, ethylene dichloride, gasoline, hexane, methane, methanol, naphtha, propane, propylene, styrene, toluene, vinyl acetate, vinyl chloride, xylem

CLASS II (Combustible Dusts)

Group E: Aluminum, magnesium and other metal dusts with similar characteristics.

Group F: Carbon black, coke or coal dust

Group G: Flour, starch or grain dust

Division 1: In which ignitable concentrations of hazards exists, under normal operating conditions and/or where hazard is caused by frequent maintenance or repair work or frequent equipment failure.

Division 2: In which ignitable concentrations of hazards are handled, processed or used, but are normally in closed containers

or closed systems from which they can only escape through accidental rupture or breakdown of such containers.

MOUNTING

Foot mounted: Foot mounted motors should be mounted to a rigid foundation to prevent excessive vibration. Shims may be used if the location is uneven. *Improper alignment may void the motor's warranty.*

Flange mounted: Flange mounted motors should be properly seated and aligned. *Note:* If improper rotation direction is detrimental to the load, check the rotation or 'bump' the motor prior to coupling the load to the motor shaft.

V-belt drive: Mount the sheave pulley close to the motor housing. Allow clearance for end to end movement of the motor shaft. *Do not over tighten belts as this may cause premature bearing failure or shaft breakage.*

Direct coupled: Direct coupled motors should be carefully aligned and the shaft should rotate freely without binding or drag.

NOTE: Techtop Motors with frame 254T and larger are shipped with an opposite drive end bearing lock. If front end bearing locks are desired, please contact Techtop for assistance.

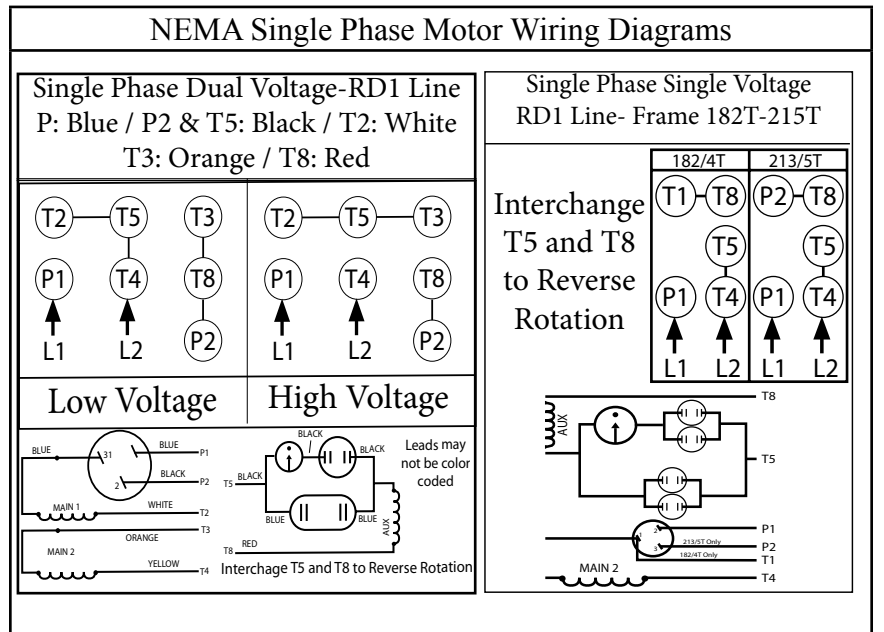
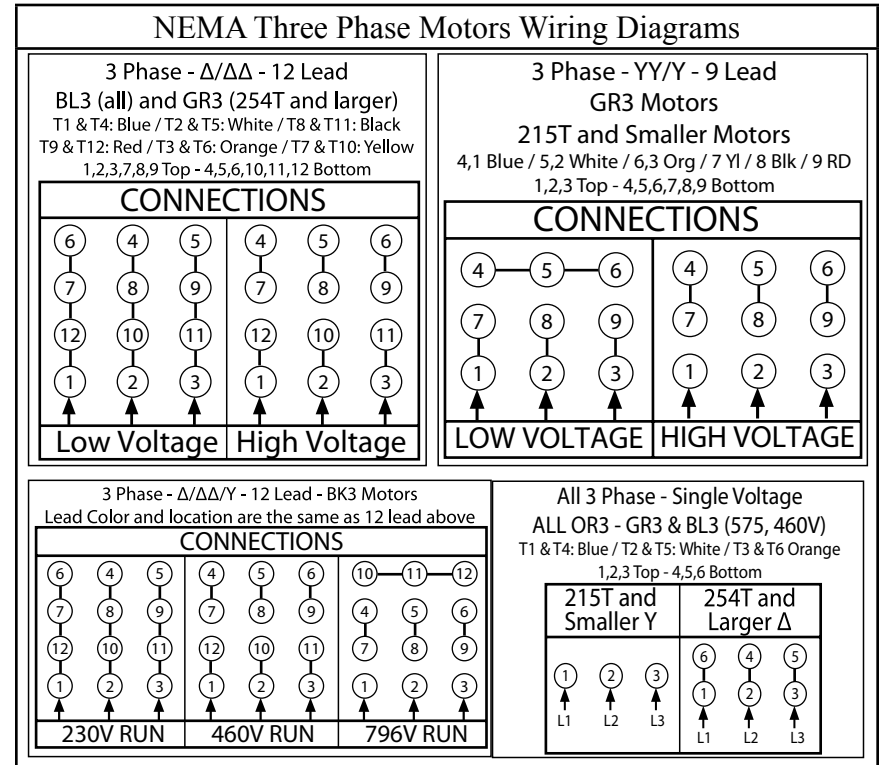
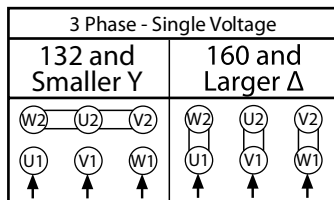
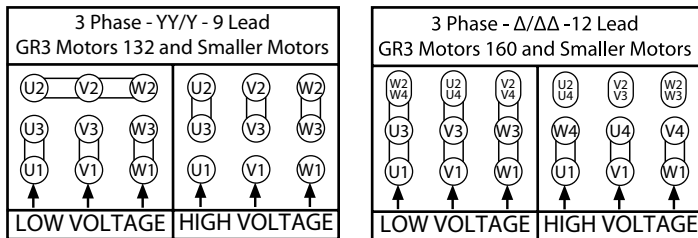
GROUNDING

Ground the motor according to NEC and local codes. In the USA, consult the National Electrical Code, Article 430 for information on grounding of motors and generators, and Article 250 for general information on grounding. In making the ground connection, the installer should make certain that there is a solid and permanent metallic connection between the ground point, the motor or generator terminal housing, and the motor or generator frame. In non-USA locations consult the appropriate national or local code applicable.

WIRING YOUR MOTOR

Connect the motor as shown in the connection diagram on the motor nameplate. Be sure to identify the proper wiring diagram for the motor you are installing. *If you have difficulty determining the proper wiring diagram for your motor, please contact Techtop for assistance.* If this motor is installed as part of a motor control drive system, connect and protect the motor according to the control manufacturer's diagram. When using AC motors with frequency inverters, be certain that the motors maximum speed rating is not exceeded. The wiring, fusing and grounding must comply with the National Electrical Code or IEC and local codes. *Note:* If improper rotation direction is detrimental to the load, check the rotation or 'bump' the motor prior to coupling the load to the motor shaft. When the motor is coupled to the load and started, it should start quickly and run smoothly. If not, stop the motor *immediately* and determine the cause. Possible causes are: low voltage at the motor, motor connections are not correct or the load is too heavy. Check the motor current after a few minutes of operation and compare the measured current with the nameplate rating.

IEC WIRING DIAGRAMS



WARNING: Do not touch electrical connections unless you first ensure that power has been disconnected. Please refer to: OSHA standard 1910.147 titled: The Control of Hazardous energy (lockout/tag-out).

WARNING: Surface temperatures of motor enclosures may reach temperatures which can cause discomfort or injury to personnel coming in contact with hot surfaces. Protection should be provided by the user to protect against accidental contact with hot surfaces. *Failure to observe this precaution could result in bodily injury.*

LUBRICATION PROCEDURE

Caution: Keep grease clean. Mixing dissimilar grease is not recommended and may result in *premature bearing failure*.

1. Re-lubrication is recommended when the motor is warm and the shaft is stationary.
2. Remove all dirt and wipe the outside of the grease fills and drains.
3. Clean the grease fitting (or area around grease hole, if equipped with slotted grease screws). If the motor has a purge plug, remove it. Motors can be re-greased while stopped (at less than 80°C) or while running.
4. When applicable, locate the grease inlet at the top of the bearing hub. If the motor is not equipped with grease fitting, clean the area and replace the 1/8-inch pipe plug with grease fitting.
5. Remove grease drain plug located opposite the grease inlet.
6. Apply grease gun to fitting (or grease hole). *Too much grease or injecting grease too quickly can cause premature bearing failure.* Slowly apply the recommended amount of grease, taking a few minutes or so to apply.
7. Operate the motor for 20 minutes and reinstall the purge plug if previously removed.

8. Install grease drain plug located opposite the grease inlet.

| SUGGESTED LUBRICATION INTERVALS | | | |
|---------------------------------|--------------|----------|----------|
| NEMA Frame | RPM | DUTY | INTERVAL |
| 210-360 | 1800 or less | standard | 2 years |
| 210-360 | 1800 or less | severe | 1 year |
| 210-360 | > 1800 | standard | 6 months |
| 210-360 | > 1800 | severe | 3 months |
| 400-510 | 1800 or less | standard | 1 year |
| 400-510 | 1800 or less | severe | 6 months |
| 400-510 | > 1800 | standard | 3 months |
| 400-510 | > 1800 | severe | 1 month |

| SUGGESTED LUBRICANT VOLUME | | |
|----------------------------|-------------------|---------------------|
| NEMA frame | Volume (Cubic in) | Volume fluid ounces |
| 250 | 1.00 | .55 |
| 280 | 1.25 | .69 |
| 320 | 1.50 | .83 |
| 360 | 1.75 | .97 |
| 400 | 2.25 | 1.2 |
| 440 | 2.75 | 1.5 |
| 500 | 3.00 | 1.7 |

MAXIMUM SIDE LOADING

When application calls for significant side loading of the motor, *the application may require roller bearings to avoid early life failure of motor.*

Properly assess the resultant side load before installing your motor. If your side load exceeds the value shown in the table, please contact Techtop to explore options for use of roller bearings.

| Allowable Side Load for Ball Bearing Motors | | | |
|----------------------------------------------------|-----------------|-----------------|-----------------|
| <i>Frame Size</i> | <i>3600 RPM</i> | <i>1800 RPM</i> | <i>1200 RPM</i> |
| 143T | 106 | 154 | 179 |
| 145T | 109 | 154 | 176 |
| 182T | 180 | 227 | 260 |
| 184T | 180 | 227 | 260 |
| 213T | 230 | 300 | 350 |
| 215T | 230 | 300 | 350 |
| 254T | 470 | 593 | 703 |
| 256T | 470 | 589 | 705 |
| 284T | 570 | 735 | 838 |
| 286T | 570 | 735 | 838 |
| 324T | 660 | 860 | 990 |
| 326T | 660 | 850 | 980 |
| 364T | 820 | 1080 | 1240 |
| 365T | 820 | 1080 | 1240 |
| 404T | | 1270 | 1450 |
| 405T | | 1290 | 1480 |
| 444T | | 1560 | 1760 |
| 445T | | 1520 | 1760 |
| 447T | | 1450 | 1660 |
| 449T | | 1490 | 1660 |

If the application calls for significant thrust loads, please contact Techtop to determine if you have the correct motor for your application.

NOTES

1. Overhung loads are considered to include belt tension and sheave weight.
2. Belt loads considered to act in a vertically downward direction.
3. To determine load at shaft end subtract 15%.
4. Overhung load radial limits are based on a bearing L-10 life of 26,280 hours.
5. Overhung load limits don't include effects of any unbalanced magnetic pull.

CONDENSATE DRAINS

Many Techtop motors come standard with one way sintered brass breather drains. These drains allow the motor to expel liquids from the casing without allowing liquid to enter the motor. *Drains may require periodic maintenance to keep them clean of debris and flowing freely.* Occasionally, remove the brass drains and wash them thoroughly. Eliminate any built up debris which may be impeding their operation.

For motors which are equipped with rubber plugs in their condensate drain holes, be sure to remove the plug (i.e. especially if the motor is installed in a location where condensate build up is likely).

In all instances, ensure that the drain is in the lowest portion of the motor. Some motors may require rotation of the end plates (i.e. if the mounting location is not a typical horizontal mounting).

SEAL REPLACEMENT

Inspect seals regularly for excessive wear which could lead to bearing failure. If significant wear is present, please contact Techtop for replacement seals.