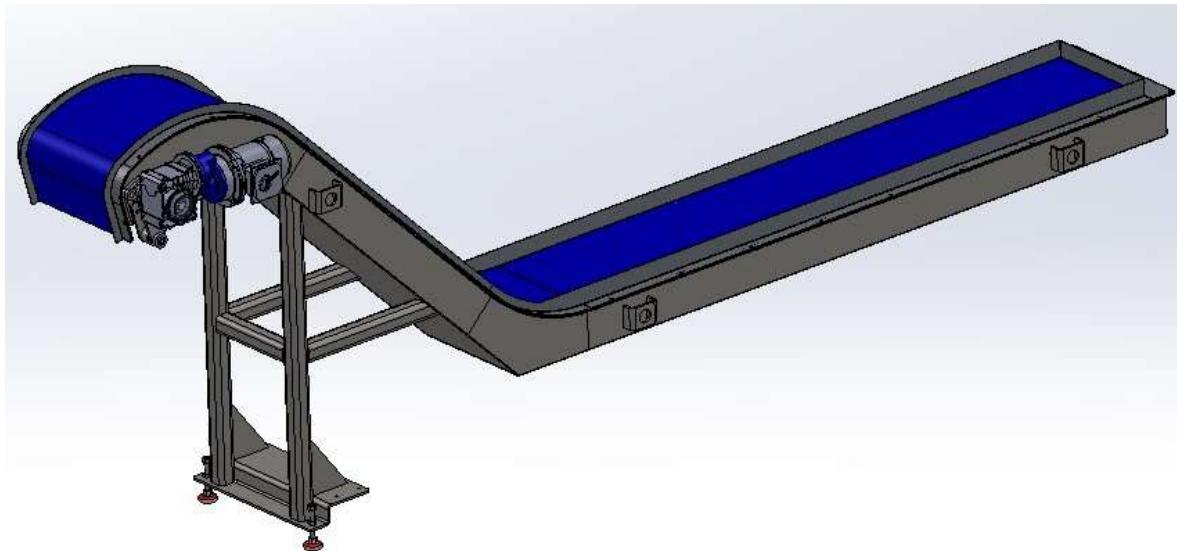




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MAGNETIC CONVEYOR

Owners Manual



Magnetic Conveyor Owners Manual

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Magnetic Conveyor Owners Manual

Introduction

The management and employees of Master Conveyors Inc. thank you for specifying our equipment.

This manual provides information on how to install, operate and maintain your new conveyor.

If special circumstances or questions arise please contact Master Conveyors Inc. at: (519) 737-9042 quoting the serial number(s) of the machine(s).

Note: The serial number(s) can be found on a rectangular plate next to the drive unit and on the inside cover of this manual.

The key to a successful installation is careful and methodical working principles. Please follow all instructions fully and complete the installation in the order described as some operations cannot be finished until a later component has been installed.

Delivery Inspection

Upon delivery of your magnetic conveyor check your packing slip or bill of lading accompanying the unit. If any components are missing contact Master Conveyors Inc. **immediately** with a description of the missing components and the serial number(s) of the machine(s).

If any components have been damaged in transit, note it on the bill of lading and contact the Carrier **immediately**.

Warranty

- a) Seller warrants that the material and workmanship on the equipment manufactured by Master Conveyors will be free from defects at the time of shipment. If during the first 12 months (or 2000 hours, whichever comes first) of operation after final shipment, the Buyer establishes to the Seller's satisfaction that any part or parts manufactured by Master Conveyors was defective at the time of shipment, Master Conveyors, at its own expense, will repair or replace (but not install) replacement parts. Buyer must contact Master Conveyors within 12 months after delivery to user to allow any warranty coverage to be applied. Seller's liability under this warranty is limited to replacement parts

only and the Seller will make no allowance for corrective work done unless agreed to in writing by Master Conveyors. Charges for correction of defects by others will not be accepted unless agreed to in writing, prior to work being performed, by an officer of the company. Damage or deterioration due to extraordinary or ordinary wear and tear (including, but not limited to, use of equipment to handle product of sizes, or weights and shapes or at speeds or methods which differ from information originally provided to Seller), chemical action, wear caused by abrasive materials or by improper maintenance and lubrication, or by improper storage and handling shall not constitute defects. Failure to install or assemble equipment properly shall not constitute defects. Warranty does not cover consumable items.

- b) Seller has made no representation, warranties, or guarantees, expressed or implied, not expressly set forth on above paragraph. Seller shall not be liable hereunder for any consequential damages included but not in limitation, damages which may arise from loss or anticipated profits or production from increased cost or operation of spoilage material.
- c) The components used in manufacture of said equipment, which were manufactured by others, will carry such manufacturer's customary warranty, which Seller will obtain for Buyer upon request.

Note: To protect warranties on any conveyor components (i.e. gearbox, motor, bearings, belt, etc.) call the Seller's home office for authorization before disassembling, or replacing. Failure to do so will immediately void all warranties.

- d) No representative of Master Conveyors has been conferred with any authority to waive, alter, vary or add to the terms of warranty stated herein, without prior authorization in writing executed by an officer of the company.

Safety Considerations

Safety is always an important factor in any working process and due care must be taken to protect your personal safety.



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Master Conveyors Inc. will continue its best efforts to design, build and market safe products and will continue to advocate and urge their safe installation and operation.

The employer is required to train and instruct every employee in the safe operation and servicing of this machine. Instructions must include:

1. Keep all guards in place, at all times, when the conveyor is running.
2. Keep unauthorized persons away from the machine.
3. Operate, service and maintain the machine according to safe procedures.
4. **Do not** start or operate the machine until persons are known to be clear of the equipment.
5. Lockout **all** sources of power when carrying out **any** maintenance work on the machine.

Safety at Installation

1. Wear safety glasses, safety shoes and gloves.
2. Ensure area around installation site is free of debris.
3. Be aware of any sharp edges while handling conveyor components.
4. Be careful in and around the conveyor(s) during installation and be aware of the location of other personnel.
5. Only allow **suitably qualified personnel** to assemble and install the equipment.
6. Only a **suitably qualified electrician** should wire in the equipment according to your local electrical codes.
7. Ensure there are no foreign objects (nuts, bolts, tools etc.) on the frame or belt before starting for the first time.
8. Check the oil level in the gear reducer.

Typical Tools Required for Installation

The following is a list of typical tools required to perform the installation process.

- Overhead crane or fork lift truck.
- Portable drills and carbide drill bits (only required if your conveyor will be bolted to the cement floor).
- Assorted clamps and vice grips.
- Assorted hand tools including wrenches, hammers, pliers, screwdrivers etc.
- Measuring tapes, squares and spirit levels.

Installation Instructions

Before beginning the installation process ensure that you have fully read the following information and that you are comfortable in your abilities to complete the various tasks.

Ensure that you have read all the relevant safety information in the preceding pages in order to protect both yourself and co-workers from injury and to protect the equipment from damage.

Depending upon the type and configuration some conveyors are supplied fully assembled and only require installing while others are supplied partially assembled and need to be completed on site. Please follow the relevant instructions below for your specific conveyor(s).

Fully Assembled Conveyors

1. Unpack the conveyor and check for damage.
2. Ensure the installation area is flat and free of debris.
3. Locate the horizontal in-feed section in the required position and ensure that it is level in both directions.



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4. Conveyors are supplied with one of three leg options:
 - a) Fixed
 - b) Adjustable
 - c) Castors

For fixed legs, drill through the holes in the feet and use suitable anchors to fasten the conveyor to the floor.

For adjustable legs, slacken the clamping bolts on the legs and adjust the leg length. Re-tighten the clamping bolts and check the in-feed for level. Drill through the holes in the feet and use suitable anchors to fasten the conveyor to the floor.

For castors, lock the wheels with the wheel locks (if fitted).

5. Check the oil level in the gear reducer.
6. If your conveyor is supplied with its own control box this now needs to be wired into a suitable electrical supply. If your conveyor is supplied without a control box then it will need to be wired into the control system of your machine.

Note: All electrical wiring **must** be completed by a **qualified electrician** according to local codes.

Note: Before starting the conveyor for the first time ensure there are no foreign objects (nuts, bolts, tools etc.) on the frame or belt.

7. To start the conveyor press the <Start> button on the control panel or issue the start command from your machine control system.

Operating the Conveyor

The procedures for routine operation of the conveyor will vary depending on whether the conveyor has its own control system or if it is tied into your machine control system.

For stand-alone conveyors press the <Start> button to run the conveyor and the <Stop> button to stop the conveyor. The <Reverse> button (if fitted) will 'jog' the belt in the reverse direction.

For conveyors which are tied into another machine control system, the start and stop commands will have to be issued from that system.

In either case it is important that the conveyor is started **before** any parts/chips can accumulate in the in-feed and that it is stopped **after** being allowed to run off any material it is currently carrying.

Failure to observe these conditions could lead to overloading of the system at start-up and/or premature wear. Always start the conveyor **before** applying its load and stop the conveyor **after** it has been allowed to clear the belt.

Typical Loads

Figs. 1-4 show typical loads which can be carried on your magnetic conveyor.

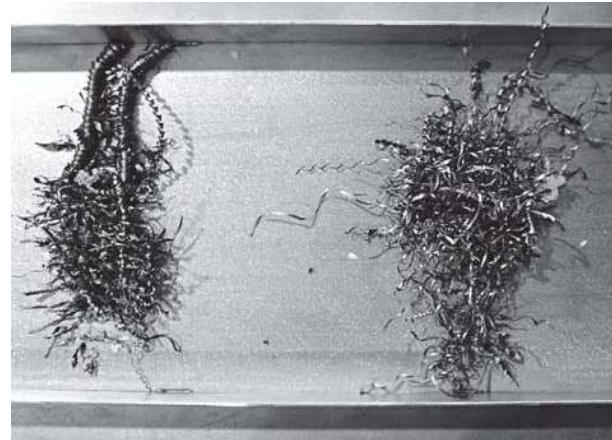


Fig. 1



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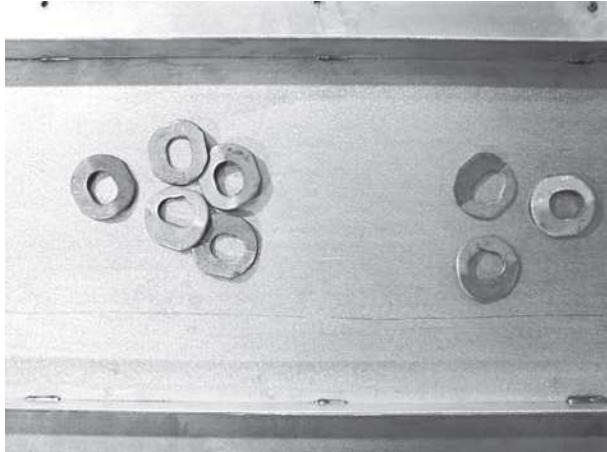


Fig. 2

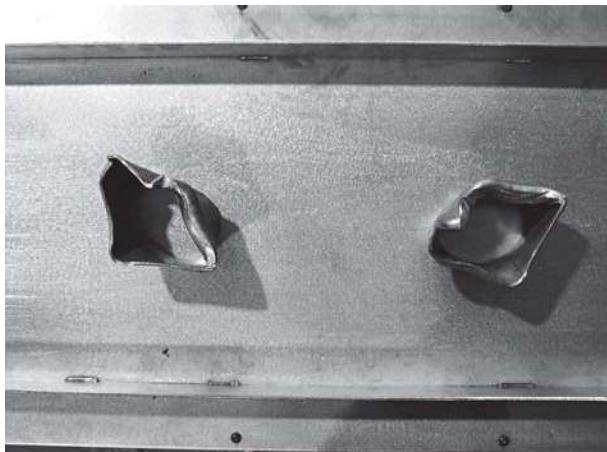


Fig. 3

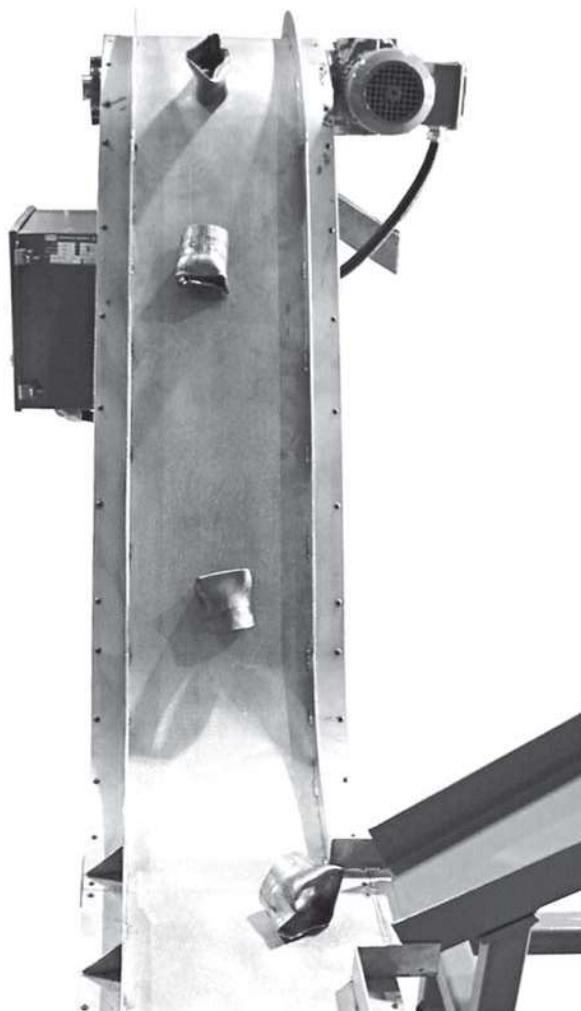


Fig. 4

Routine Maintenance

Belt Care

1. **Lubrication** - Standard conveyors use an oil bath system, an optional drip-feed oiler is available (see Appendix for more information if a drip-feed oiler is installed on your system).



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On oil bath systems a sight gauge is mounted on the side of the in-feed area. Ensure that the oil is at the correct level at all times.

Note: There should only be 1"-2" of oil in the bottom of the conveyor.

Once a year (at the annual inspection) the oil should be drained and replaced with fresh oil as follows (see Fig. 5):

- a. To drain the old oil remove the drain plug and filler plug and allow the oil to drain out.
- b. Replace the drain plug and add Kleen-flo ISO 32 (or equivalent) hydraulic oil until it reaches the correct level on the sight gauge.
- c. Replace the filler plug.

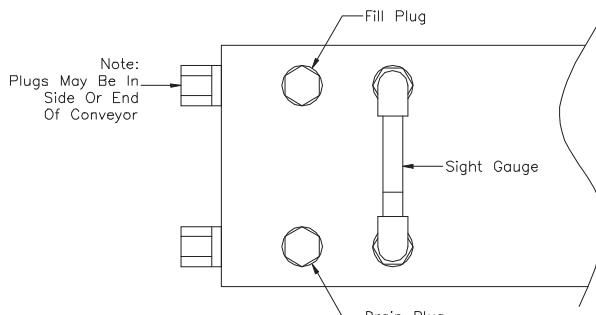


Fig. 5

2. **Belt Tension** - Check for correct belt tension at least monthly (more frequently if the conveyor carries heavy loads or runs continuously) or after any occurrence of jamming.

The belt is fitted with either an external or internal spring loaded tensioning system as specified in your original order. See Figs. 6-7.



Fig. 6

To adjust the belt tension slacken the locknuts and increase the tension on the spring. Re-tighten the locknuts when the belt is correctly adjusted.

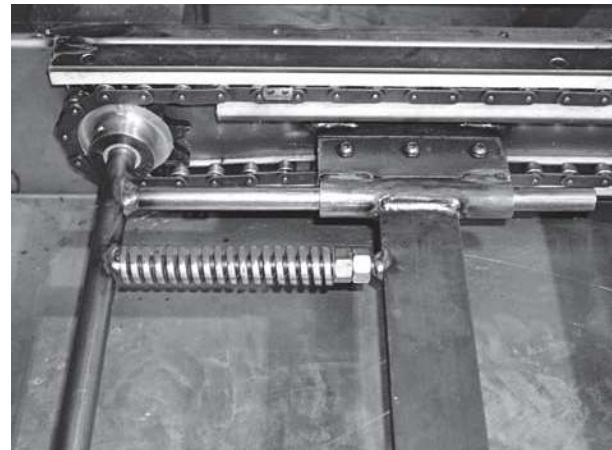


Fig. 7

Note: The top cover will need to be removed on conveyors with internal tensioners.

Motors

1. **Cleaning** - All motors should be kept free of dirt and grease accumulations. Open motors should be periodically vacuumed to remove dust and dirt from the windings.
2. **Ventilation** - For best results motors should be operated in an area where adequate ventilation is available.
3. **Temperature** - Most of the current smooth body, T.E.N.V. and T.E.F.C. motors run hot to the touch. As long as maximum ambient temperatures are not exceeded and the amperage draw is within the allowable range there should not be a problem.

Note: The temperature and amperage limits can be found on the motor nameplate.

4. **Lubrication** - Most electric motors are lubricated for life and under normal operating conditions require no more lubrication. Under severe conditions where additional lubrication is required use the following chart as a guide. See Fig. 8.



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Condition	Lubricating Frequency
Normal 8 hr Day - Light Loads	2-3 Years
Heavy 24 hr Day - Heavy Loads - Dirty Conditions	1 Year
Extreme - Shock Loads - High Temperature	3-6 Months
Typical Lubricants	
Chevron Oil Co. - SRI #2	Gulf Refining Co. - Precision #2 or #3
Shell Oil Co. - Alvania #2, Dolium R	Mobil Oil Co. - Mobilux Grease #2
Texaco Inc. - Premium RB	Sinclair Refining Co. - AF #2

Fig. 8

Note: The chart above is based on motors with grease lubricated bearings, running at speeds of 1750 RPM or less and operating within an ambient temperature range of between 0°F to 120°F (-18°C to 49°C).

Gear Reducers

- Ventilation** - During normal operation gear reducers build up heat and pressure and **must** be vented to protect the seals and gears.
- Cleaning** - After approximately two to three weeks of operation the reducer **must** be drained, flushed out and refilled to the correct level with fresh oil. This is done to remove any brass particles created during the normal wear-in period of the worm gear. From then on the oil should be changed every 2500 hours of operation or every 6 months, whichever comes first.

Note: Where high temperatures and/or a dirty atmosphere exist more frequent changes may be necessary. Periodically check to ensure the correct level of oil is in the reducer. Too little oil will cause accelerated wear on the gears. Too much oil can cause overheating, seal deterioration and leakage.

- Lubrication** - The correct oil to use in your reducer depends on the worm's RPM, ambient temperature and the severity of use. The following chart can be referred to for reducers with 1750 RPM worm speed, operating under normal duty and with ambient temperatures from 18°F to 125°F (-8°C to 52°C). See Fig. 9.

Ambient Temperature	
15°F to 60°F (-9°C to 16°C)	50°F to 125°F (10°C to 52°C)
A.G.M.A.#7 Compound	A.G.M.A.#8 Compound
Mobil - Compound #DD	Mobil - #600W Super Cyl. Oil
Shell - Macoma Oil #69	Shell - Valvata Oil J81 & J82
Sinclair - #87 H.D. Oil	Sinclair - Superheat Valve Oil
Sun - Sun EP 1110	Sun - Sun EP 1150
Texaco - Vanguard Cyl. Oil	Texaco - 650 Cyl. Oil
Keystone - WG 1x Oil	Keystone - WG B Oil
Gulf - EP Lubricant #115	Gulf - EP Lubricant #145 P

Fig. 9

Note: For ambient temperatures other than those mentioned, or for severe duty, please consult with the gear reducer manufacturer.

- General** - Inspect weekly to make sure reducer remains securely bolted.

Bearings

- Lubrication** - Greasing frequency should be regulated to as many times as necessary to keep a small film of grease leaking at the seals. This will protect against foreign materials entering the bearing. The following list is provided to aid you in acquiring the correct (or an equivalent) grease. See Fig. 10.

Normal Duty	Heavy Duty
Texaco - Multifak #2	Sun - Prestige 742 EP
Mobil - Mobilux #2	Exxon - Lidok #2 EP
Amoco - Lithium MP	Arco - Litholene HEP2
Shell - Alvania #2	Shell - Alvania #2 EP

Fig. 10

Note: Do not over grease as this can cause blown seals or overheating bearings.

- Replacement** - If bearing replacement becomes necessary, remember to clean off the shaft, file smooth any grooves or set screw marks and oil the shaft **before** slipping on the new bearing.

Note: If the bearing does not slide easily onto the shaft, use a **soft** metal bar or mallet to **tap** against the **inner** race.

- General Maintenance** - Set up a weekly check on all bearings to ensure they remain tightly bolted down, set screws remain fastened securely and they are correctly lubricated.



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General Maintenance

1. When terminating operation of the conveyor make sure that no accumulation of chips/parts are left on the belt. A large force is applied at start-up and any excess weight could cause premature wear. For the same reason **always** start the conveyor **before** introducing parts/chips to the in-feed area.
2. Once a year remove all covers/guards and thoroughly clean the inside of the conveyor.
3. While the covers are off check the UHMW tracks for wear and replace if necessary. See Fig. 12.

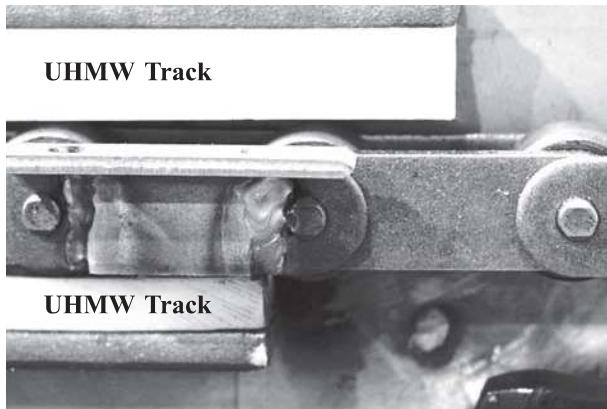


Fig. 12

Note: The UHMW tracks are custom made for your specific conveyor. Please contact Master Conveyors Inc. and specify your conveyor serial number when ordering).

To check for UHMW track wear place a straight edge across the conveyor above a magnet and measure the distance between the top of the magnet and the underside of the straight edge. If the distance is less than 1/16" the UHMW tracks will need to be replaced. See Fig. 13.

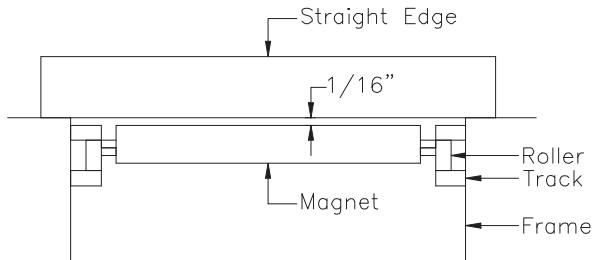


Fig. 13

Consumable Parts

After the conveyor has been used for a long period of time it will become necessary to replace certain parts. The service life of consumable parts varies depending upon the materials carried, the general operating conditions, regular maintenance (or lack of) and the total operating time.

The general condition of the conveyor should be inspected daily (i.e. at the start or end of a shift) and an in-depth inspection should be carried out during regularly scheduled maintenance procedures.

When you need to procure consumable parts contact Master Conveyors Inc. at (519) 737-9042 quoting the serial number(s) of the machine(s), the part names and numbers and the quantities of each part required.

Note: Please refer to the illustrations in the Appendix of this manual for specific part numbers for your particular conveyor(s).



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Inspection List

The following list shows the maintenance and inspection items for your reference. See Fig. 14.

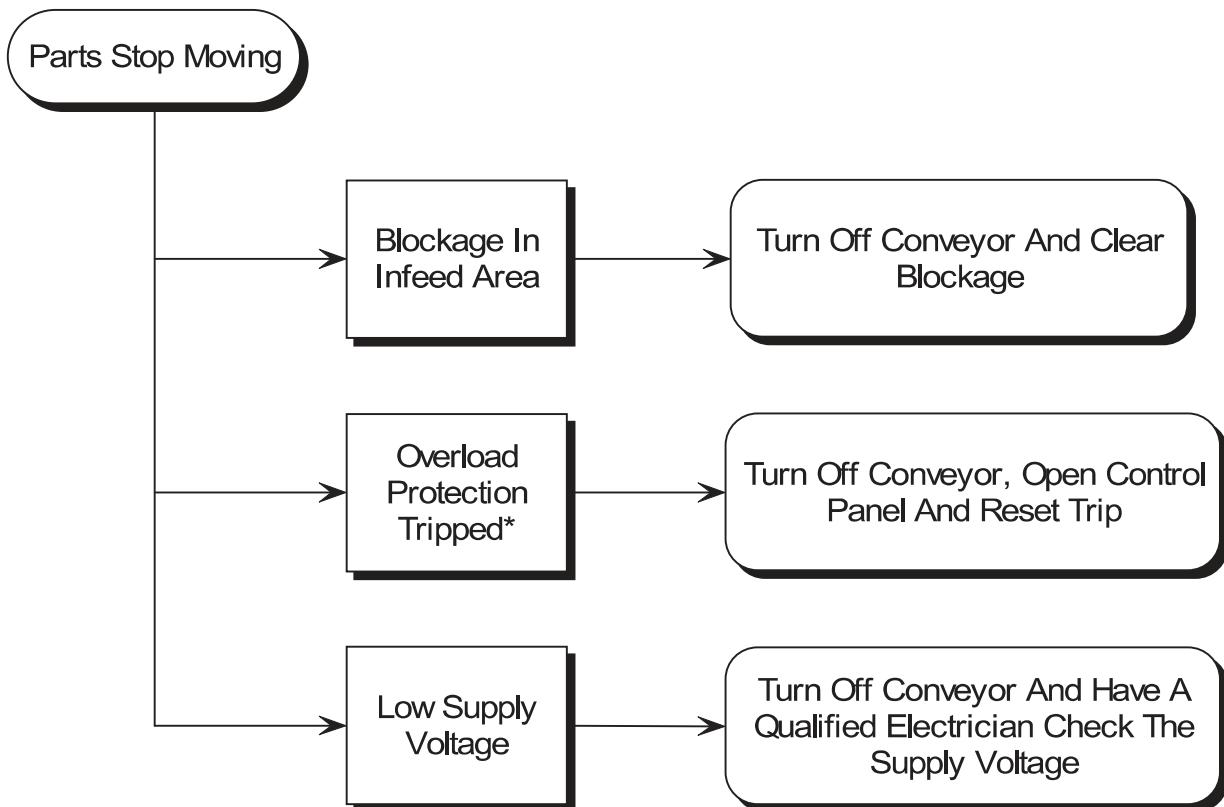
Daily Inspections	a) Check for abnormal sounds around the conveyor b) Check for cleanliness c) Check that the conveyor is clear before starting d) Check the level of the oil bath lubrication system
Monthly Inspections	a) Lubricate all bearings b) Carry out the daily checks
Annual Inspections	a) Remove covers and guards and thoroughly clean inside the conveyor b) Drain and replace the oil in the oil bath lubrication system c) Inspect and replace UHMW track d) Check the tightness of all fasteners on the conveyor e) Carry out the monthly checks f) Carry out the daily checks

Fig. 14



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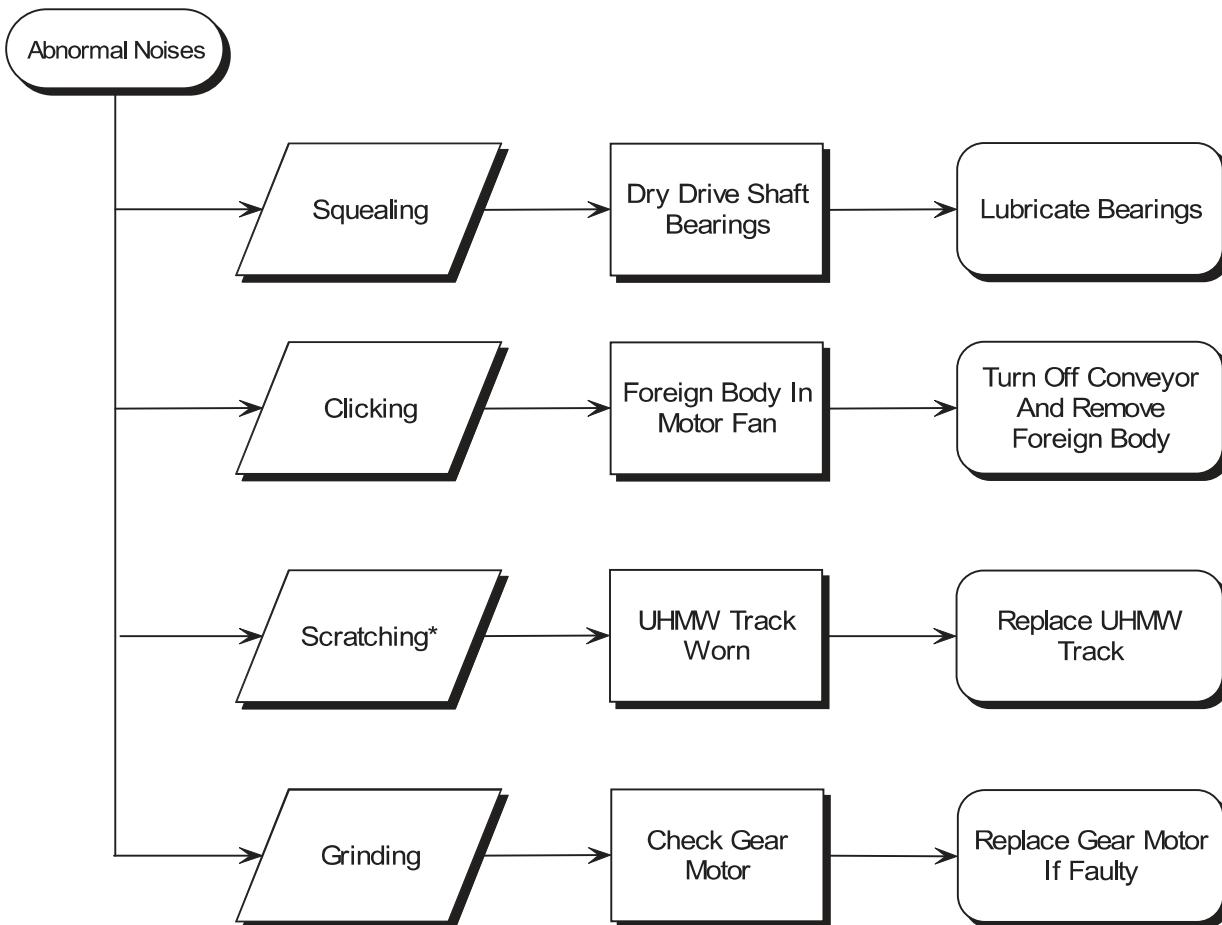
Troubleshooting



*Note: Only Applies To Control Systems Supplied By Master Conveyors Inc.

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MANUFACTURING
Magnetic Conveyor Owners Manual

Troubleshooting

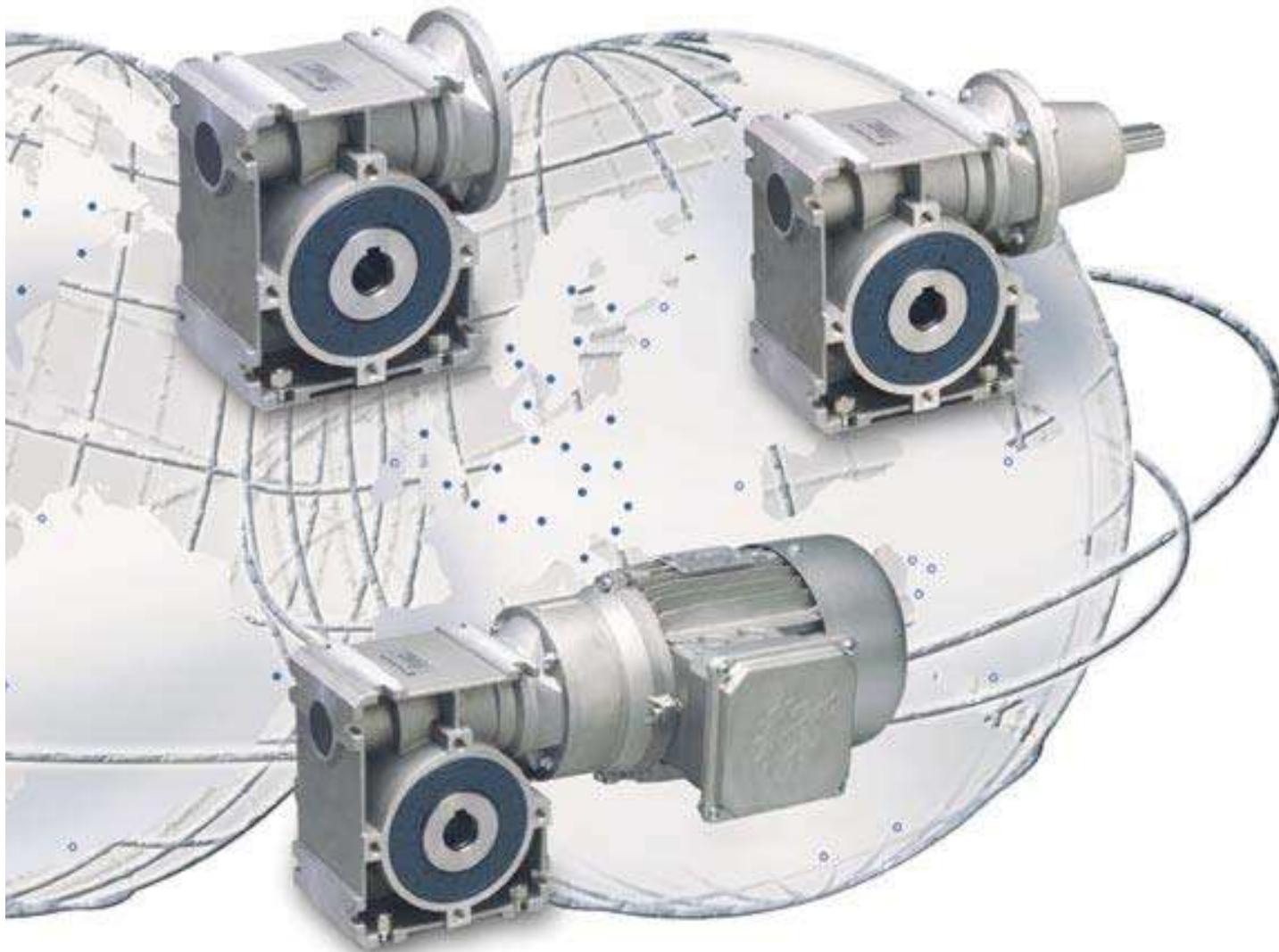


*Note: Only Applies If There Are No Moving Parts On The Conveyor

UNIVERSAL – Schneckengetriebe, Typ SD / SI

UNIVERSAL – Worm Gear Units, Typ SD / SI

UNIVERSAL – Réducteurs à roue et vis sans fin, Typ SD / SI

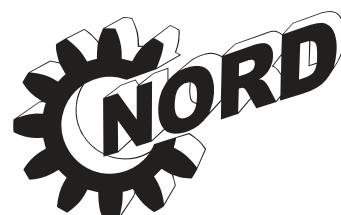


Diese Sicherheitshinweise sind aufzubewahren
These safety instructions must be kept available
Ces instructions de sécurité doivent être observées

Getriebbau NORD

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Δ Warnung

Es wird vorausgesetzt, daß die grundsätzlichen Planungsarbeiten der Anlage sowie Transport, Montage, Installation, Inbetriebnahme, Wartung und Reparaturen von qualifiziertem Personal ausgeführt bzw. durch verantwortliche Fachkräfte kontrolliert werden. Bei Arbeiten am Getriebemotor muß garantiert sein, daß keinerlei Spannung anliegt, und dieser gegen Wiedereinschaltung gesichert ist.

Δ Warnung

Veränderungen gegenüber dem Normalbetrieb (höhere Leistungsaufnahme, Temperaturen, Schwingungen, Geräusche usw. oder Ansprechen der Überwachungseinrichtungen) lassen vermuten, daß die Funktion beeinträchtigt ist. Zur Vermeidung von Störungen, die ihrerseits mittelbar oder unmittelbar schwere Personen- oder Sachschäden bewirken könnten, muß das zuständige Wartungspersonal dann umgehend verständigt werden.

Δ Im Zweifelsfall die entsprechenden Betriebsmittel sofort abschalten!

Aufstellung, Vorbereitung

- Fundamente ausreichend bemessen und schwingungsfrei ausführen
- Getriebe oder -motor fest und ohne Verspannung montieren
- ausreichende Belüftung vorsehen
- serienmäßiges Innengewinde nach DIN 332 zum Aufziehen von Verbindungselementen auf die Wellen benutzen
- Schläge auf die Wellen vermeiden (Lagerbeschädigung!)
- Maschine und Getriebe möglichst mit elastischen Kupplungen verbinden
- vor dem Einschalten Abtriebselemente aufziehen bzw. Paßfeder sichern
- bei Aufsteckgetrieben mit Drehmomentstütze Gummipuffer verwenden
- die EU-Maschinenrichtlinie ist zu beachten
- bei Anwendungen bei denen der Ausfall eines Getriebe oder -motors zu einer Personengefährdung führen könnte, sind entsprechende Sicherheitsmaßnahmen vorzusehen

Elektrischer Anschluß

- Motoranschluß nach Schaltbild vornehmen
- Übereinstimmung von Netzzspannung und Frequenz mit den Typenschild-Daten sicherstellen
- Sichere Schutzleiterverbindung herstellen
- evtl. falsche Drehrichtung korrigieren durch Vertauschen von 2 Phasen
- Nicht benötigte Kabeleinführungsöffnungen und den Kasten selbst staub- und wasserdicht verschließen
- Überbelastung und Phasenausfall durch Schutzschalter vorbeugen
- Einstellen des Motorschutzschalters auf Nennstrom
- Schaltbilder auf der letzten Seite
- Bei Bremsmotoren ist die Betriebs- und Wartungsanleitung B1090 zu beachten.

Wirkungsgrade

Da bei neuen Getrieben der Schneckenradsatz einlaufen muß, ist die Reibung zunächst noch größer als nach dem Einlauf.

Δ Caution

It is presumed that fundamental project work as well as all work with regard to transport, assembly, installation, starting-up, maintenance and repair is performed by qualified personnel resp. supervised by skilled labour taking overall responsibility. Make absolutely sure that no voltage is applied at all while work is being done on the geared motor. Drive must also be secured against switching on while work is in progress.

Δ Caution

Any deviation from normal operating conditions (increased power consumption, temperature, vibrations, noise etc.) or warning signals by monitoring equipment suggest malfunction. Inform the responsible maintenance personnel at once to prevent the trouble from getting worse and causing, directly or indirectly, serious physical injury or material damage.

Δ In case of doubt switch-off the machine immediately!

Preparing and performing installation

- the foundation (base) should be of adequate size and vibration-proof
- install gear unit or geared motor rigid and braceless
- ensure sufficient ventilation
- make use of tapped hole (DIN 332) to fit transmission element to the shaft end
- avoid shocks on shafts (bearing damage!)
- preferably use flexible coupling between output shaft and driven machine
- fit transmission element to shaft end or secure feather key before starting the motor
- use rubber buffer on shaft mounting gearboxes with torque arm
- the EC-machinery directive must be observed
- in applications where the failure of the gearbox or motor could be hazardous for personnel, appropriate safety measures must be taken

Connection of motor

- Connect motor according to diagram
- make sure that mains voltage/frequency are in accordance with nameplate information
- make secure protective conductor connection
- if motor is running in reverse direction, interchange two phases
- Close unused cable entrance holes and the box itself in a dust- and watertight manner.
- Install protective switches to prevent overload and phase failure
- set motor protection switch to nominal current
- wiring diagrams on the last page
- When using brakemotors observe the O&M manual B1090

Efficiencies

New worm gears in gearboxes must be run-in for an initial phase before reaching their maximum rated efficiency. During the initial run-in phase the coefficient of friction is higher than after completing the run-in phase.

Δ Avertissement

Il est impératif que les travaux fondamentaux de l'installation, ainsi que tous les travaux de transport, montage, installation, mise en exploitation, entretien et réparation soient accomplis par du personnel qualifié et contrôlés par des techniciens spécialisés dans ce domaine. Avant toute intervention sur le motoréducteur, il faut s'assurer que celui-ci n'est plus sous tension et que la remise sous tension soit interdite.

Δ Avertissement

Si en utilisation normale, des modifications de fonctionnement apparaissent telles que puissance absorbée trop élevée, température élevée, vibrations fortes, bruit intense etc. ou en rapport avec les contrôles techniques, cela laisse supposer que différentes fonctions de l'appareil peuvent être détériorées. Pour éviter ensuite des problèmes, qui pourraient entraîner de graves accidents corporels ou de graves dégâts matériels, le personnel d'entretien compétent doit immédiatement être informé.

Δ Si vous êtes dans le doute, coupez immédiatement l'alimentation!

Mise en place, préparation

- prendre largement les dimensions des embases et les réaliser exemptes de vibrations
- monter les réducteurs et motoréducteurs solidement et sans haubanage
- prévoir une aération suffisante
- prévoir le taraudage conforme à la norme DIN 332 pour monter des accouplements sur les arbres d'entrée et de sortie
- éviter de donner des coups sur les arbres (cela pourrait détériorer le roulement!)
- lier autant que possible la machine et le réducteur avec des accouplements élastiques
- avant la mise en service, enlever l'élément d'accouplement ou/et fixer la clavette
- utiliser pour l'exécution arbre creux avec bras de réaction une butée en caoutchouc
- La directive machine EU est à prendre en considération
- pour les applications où la défaillance d'un réducteur ou d'un moteur pourrait blesser des personnes, des mesures de sécurité doivent être prises

Branchements électriques

- brancher le moteur selon le schéma
- s'assurer que la tension du réseau et la fréquence correspondent aux données inscrites sur la plaque signalétique
- Le câble de raccordement doit être protégé
- corriger un éventuel mauvais sens de rotation par une inversion de deux phases
- Les entrées de câbles non utilisés doivent être obturées, la boîte elle-même devant être fermée de façon à être étanche à l'eau et à la poussière
- prévoir une protection électrique contre les surcharges, court-circuit et défaut de phases
- régler la protection électrique suivant l'intensité nominale du moteur
- schéma de branchement à la dernière page
- Pour les moteurs frein veuillez vous reporter à la notice de mise en service et d'entretien B1090

Rendements

Le couple roue et vis d'un réducteur neuf doit fonctionner pendant quelques heures avant d'obtenir son rendement maximum. Pendant cette phase de rodage les rendements sont inférieurs aux rendements indiqués dans le catalogue.

Wartung

GETRIEBE/MOTOR

Die UNIVERSAL-Schneckengetriebe sind mit synthetischem Öl gefüllt, dadurch ist über die gesamte Lebensdauer eine einwandfreie Funktion gewährleistet. Daher sind die UNIVERSAL-Schneckengetriebe wartungsfrei. Entlüftungsschrauben sind nicht erforderlich, die UNIVERSAL-Schneckengetriebe sind vollkommen geschlossen. Die Lager des Motors haben ebenfalls eine Lebensdauerschmierung. Bei Bremsmotoren ist die Betriebs- und Wartungsanleitung B1090 zu beachten.

Zusammenbau von Modulen und Anbau eines Motors

- Montageanleitungen der Anbau-Module beachten
- Eventuelle Hinweise des Motorlieferanten beachten
- Schläge auf die Motorwelle beim Aufstecken der Kupplungshülse vermeiden (Lagerbeschädigung)
- Bei Außenbefestigung oder feuchter Umgebung sind die Fugen zwischen Motor und Getriebe mit geeigneter Dichtpaste gegen Eindringen von Feuchtigkeit abzudichten.

Inbetriebnahme

- bei längeren Lagerzeiten besondere Vorkehrungen treffen (siehe Werknormblatt "Langzeitlagerung")
- Luftgekühlte Motoren sind für Umgebungstemperaturen von -20°C bis +40°C sowie Aufstellungshöhen bis 1.000 m über NN ausgelegt
- Der Einsatz im Ex-Bereich ist nicht zulässig, sofern nicht ausdrücklich von NORD geprüft und schriftlich freigegeben.
- Getriebe oder -motor nur mit den zulässigen Leistungsdaten betreiben

Maintenance

GEARBOX/MOTOR

The UNIVERSAL series of worm-gearboxes are filled with synthetic lubricant/bearing-grease. This ensures proper operation throughout the full lifetime of the units. Therefore UNIVERSAL drives are maintenance-free. No breather plugs are required. UNIVERSAL drives are completely sealed. The motor bearings are also lifetime lubricated. When using brakemotors observe the O&M manual B1090.

Assembly of modules and fitting of a motor

- observe the assembly instructions of the optional modules
- observe instructions of the motor supplier if any
- avoid shocks onto the motor shaft when fitting the coupling-sleeve (bearing damage !)
- For outdoor operation or in other humid/wet environment seal the gap between motor and gearbox with suitable sealant against the ingress of humidity.

Entretien

DU REDUCTEUR/ DU MOTEUR

Les réducteurs et les motoréducteurs à roue et vis sans fin UNIVERSAL sont remplis d'huile synthétique ce qui garantit un bon fonctionnement pendant toute la durée de vie. De ce fait, les réducteurs à roue et vis sans fin UNIVERSAL ne nécessitent pas d'entretien. Les vis d'évent ne sont pas non plus nécessaires et les réducteurs à roue vis sans fin sont livrés entièrement fermés. Les roulements des moteurs sont également graissés à vie. Pour les moteurs frein veuillez vous reporter à la notice de mise en service et d'entretien B1090.

Assemblage des modules et montage du moteur

- prendre en considération la notice de montage
- éventuellement tenir compte des recommandations du fournisseur du moteur
- éviter les coups sur l'arbre du moteur lors du montage de l'accouplement (endommagement des roulements)
- Pour des installations à l'extérieur ou dans un milieu humide, il faut appliquer de la pâte à joint sur les plans de joint entre le moteur et le réducteur, ou entre les modules, pour éviter la pénétration d'humidité.

Mise en fonctionnement

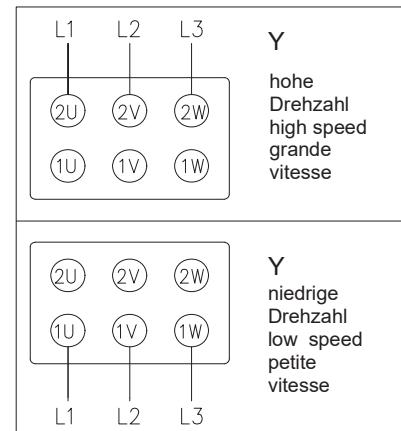
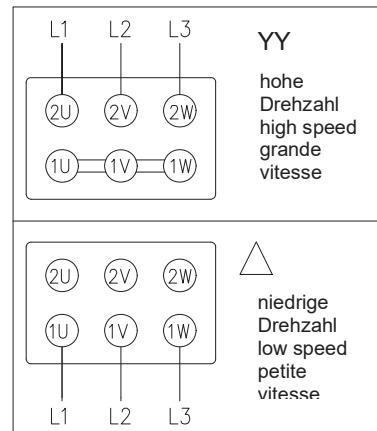
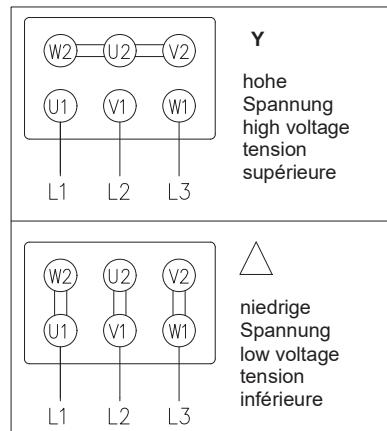
- si un stockage longue durée du réducteur est prévu, il faut prendre les dispositions nécessaires (voir spécification "Stockage longue durée")
- les moteurs autoventilés sont dimensionnés pour des températures ambiantes comprises entre -20°C et +40°C, ainsi que pour une altitude à 1000 mètres au-dessus du niveau de la mer
- Leur utilisation dans des atmosphères explosives Ex est interdite, à moins que ces moteurs ne soient expressément prévus à cet effet et avec accord écrit de NORD
- Les réducteurs et les moteurs ne doivent fonctionner qu'avec les caractéristiques de puissance indiquées.

Schaltbilder / Wiring diagrams / Schémas de branchement

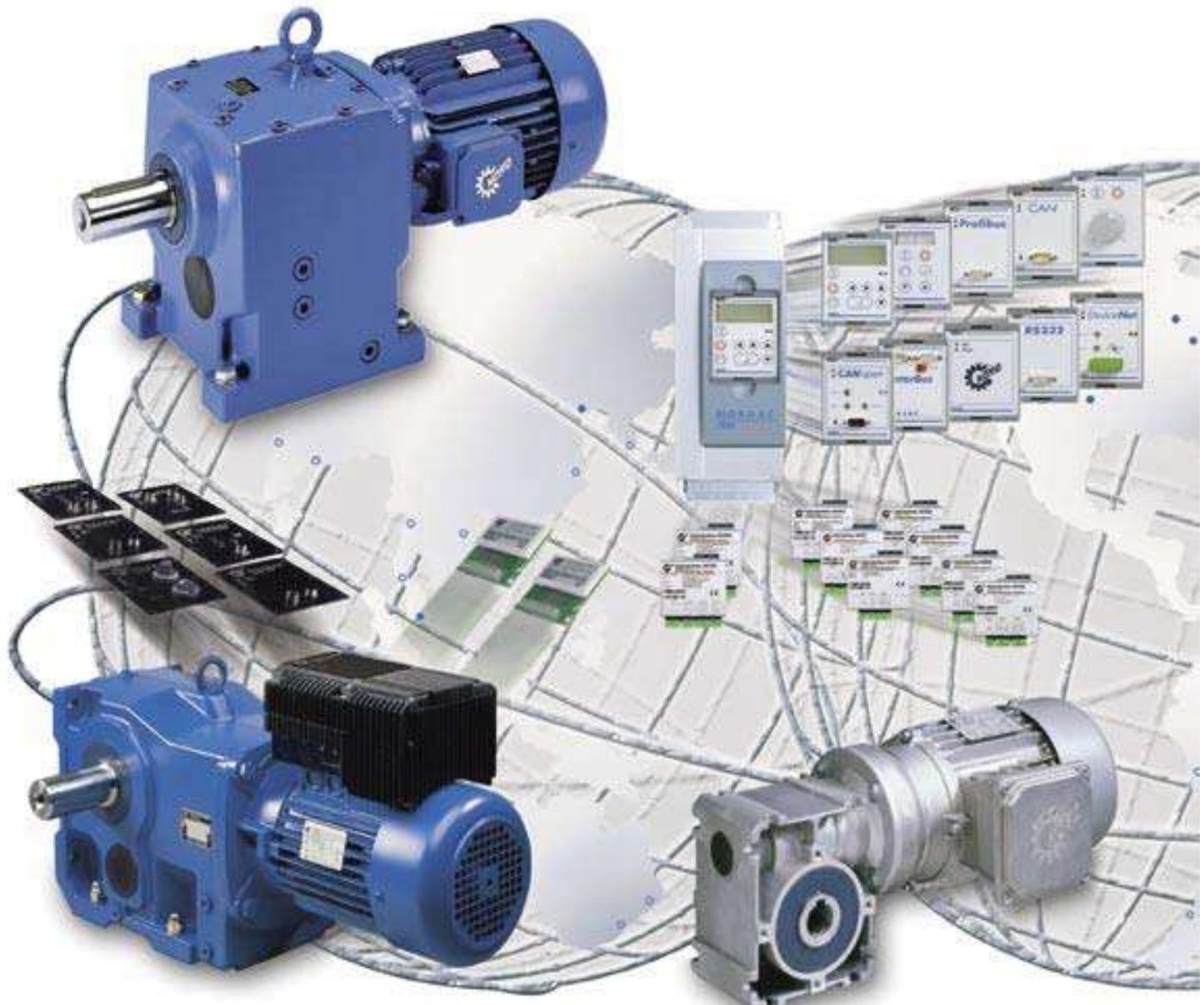
Drehstrommotor
Three phase motor
Moteur triphasé

Drehstrommotor, polumschaltbar
Dahlanderschaltung
Three phase motor, polechanging,
Dahlander connection
Moteur triphasé à commutation de pôles, couplage Dahlander

Drehstrommotor, polumschaltbar
getrennte Wicklungen
Three phase motor, polechanging,
separate windings
Moteur triphasé à commutation de pôles,
bobinages séparés



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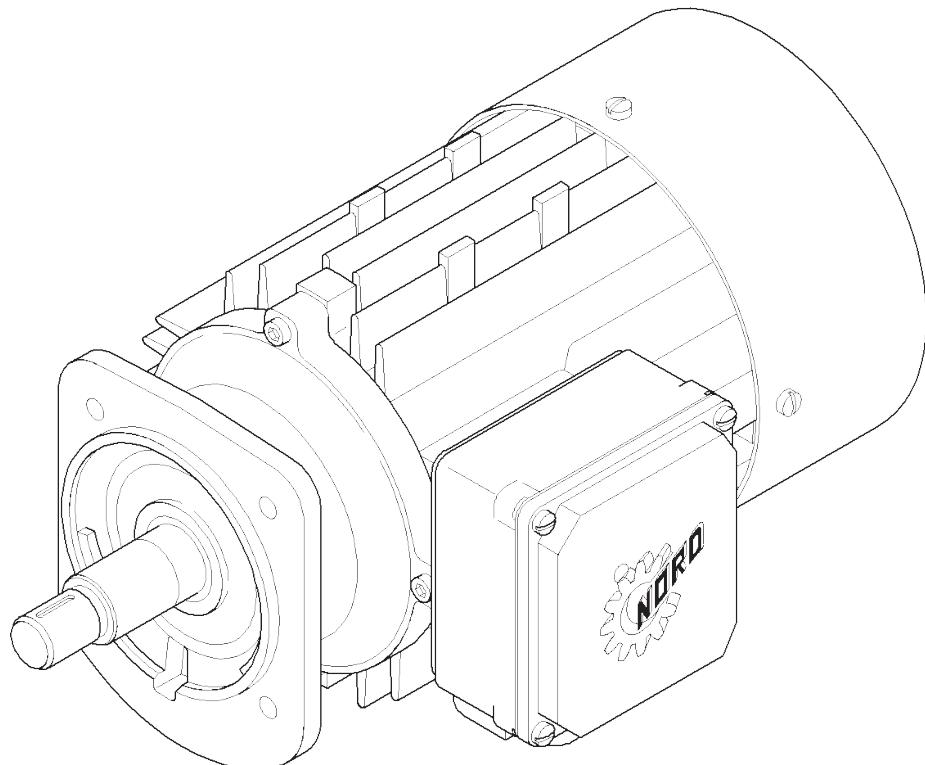
BIM 1004

USA

CDN

MOTORS

AC Induction, Single and Polyphase Installation and Maintenance Instructions



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INTRODUCTION

1. General

This manual includes general motor description and operation, inspection, testing and fault isolation procedures and information, general lubrication instructions and materials, general installation, removal, and handling instructions, and general repair and parts information.

2. Related Publications

The related publications listed in Table 1 provide additional information to support maintenance and fault isolation of the motor and its installation.

Publication Number	Publication Title
BIM 1001	Hollow Shrink Disc Shaft
BIM 1002	Hollow Keyed Shaft and Fixing Element
BIM 1003	Expansion Chambers
BIM 1004	Motors AC Induction, Single Phase and Polyphase
BIM 1009	NORD Gearbox Inputs (Motor Adapters and Couplings)
BIM 1010	UNICASE® Helical Gearboxes
BIM 1011	NORDBLOC® Helical Gearboxes
BIM 1012	Standard Helical Inline Gearboxes
BIM 1020	UNICASE® Shaft Mount Gearboxes
BIM 1030	UNICASE® Helical Worm Gearboxes
BIM 1031	MINICASE® Worm Gearboxes
BIM 1033	SI Design UNIBLOC® Worm Gearboxes
BIM 1040	UNICASE® 90.1 Helical Bevel Gearboxes
BIM 1090	Motor Brakes
BIM 1142	NORDBLOC® 92 Series Helical Bevel Gearboxes
BIM 4010	Titan Mechanical Adjustable Speed Drives
BIM 4020	NORDISC® Friction Disc Mechanical Adjustable Speed Drives

Table 1. Related Publications

DESCRIPTION AND OPERATION

1. General

This manual provides general installation and maintenance information for the NORD family of motors described in this section.

2. Description

The NORD motors covered in this manual are single phase and poly-phase motors (refer to Table 2), can be single speed or two-speed, and may include the options listed in the Motor Options Section. Motor options, electrical requirements, performance characteristics, and motor data are identified on the motor nameplate. The nameplate drawing is provided in Figure 1. Definition of each entry field is provided in Table 2.

3. Operation

The motors described in this manual are alternating current (AC) induction motors, single speed or two-speed, and convection-cooled, fan cooled, or blower cooled. The motors may use single phase or three phase alternating current. Cooling options include convection cooling (TENV), fan cooling (TEFC), and blower cooling (TEFB). Because the fan is mounted on the motor shaft, the fan speed is identical to the motor speed, and the cooling capacity varies with the motor speed. The blower uses its own motor and a separate power supply to provide a specific airflow and cooling capacity. The blower power data are provided in Table 8.

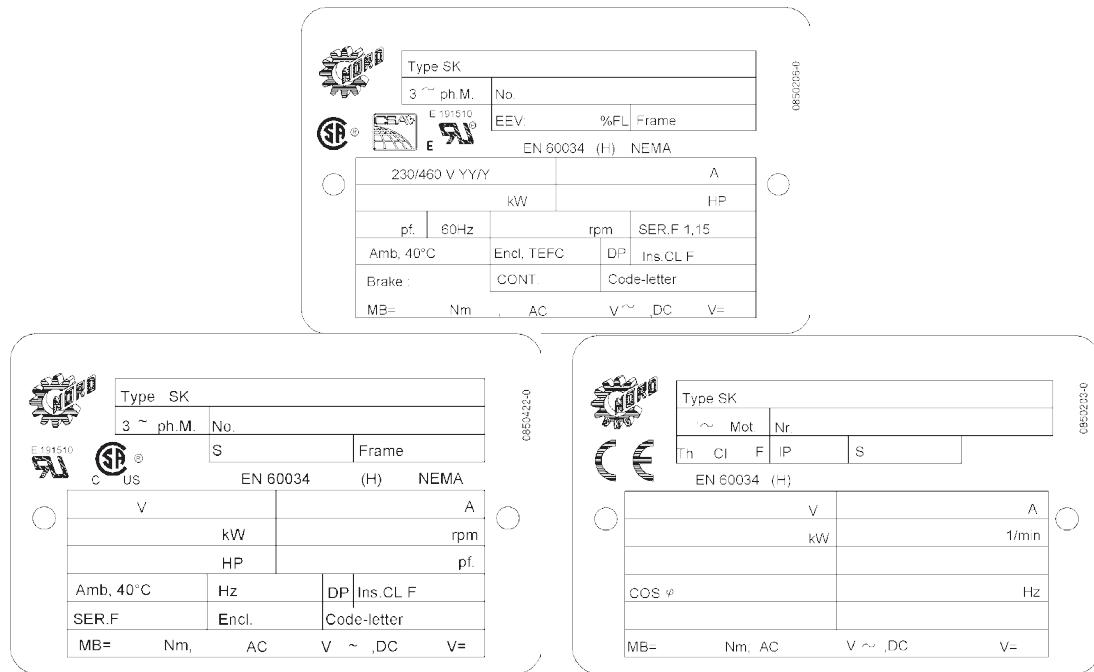


Figure 1. Motor Nameplates

Field	Definition	Field	Definition
Type	Model Number	DP	Drip Proof
3~ph.M.	Number of Motor Phases	Ins. Cl	Insulation Class
No.	Motor Number	SER. F	Service Factor (allowable horsepower loading)
S	Duty Cycle (i.e. S1, S3-40%)	Encl.	Enclosure Description
Frame	Motor Frame Size	Code	NEMA Code Letter
V	Motor Voltage	EEV	
A	Motor Full-Load Amperage	COS φ	Power Factor
HP	Motor Horsepower	MB=	Motor Brake Force (Newton Meters)
rpm	Motor Speed	AC	Alternating Current
pf.	Power Factor	V~	AC Voltage
Amb	Maximum Ambient Temperature	V=	DC Voltage
Hz	Motor Power Frequency		

Table 2. Nameplate Data

INSPECTION

1. Inspection Interval
Inspect the motor after every 500 operating hours.

2. Inspection Criteria
Inspect the motor according to the criteria in Table 3.

CAUTION: **IF IT IS NECESSARY TO CLEAN THE MOTOR EXTERIOR, DO NOT USE SHOP AIR. SHOP AIR CAN FORCE CONTAMINANTS INTO THE MOTOR, AND CAN CAUSE THE BLOWN CONTAMINANTS TO AFFECT OTHER COMPONENTS.**

Inspect	Check	Action
Motor exterior	Check the external surfaces for contamination. Accumulation of dirt and fibrous deposits must be removed.	Clean the motor external surfaces using clean, lint-free cloths. Clean deposits from between cooling fins using a vacuum cleaner and a stiff-bristled nylon brush.
	Check the external surfaces for oil film and greasy deposits.	Clean the oil film and greasy deposits from the motor surface using clean, lint-free cloths. If necessary, moisten the cloth with an approved non-flammable, residue-free solvent. Do not pour solvent on the motor.
	Check for evidence of damage or overheating.	If the motor has physical damage, replace the motor.
Motor mountings	Make sure the mounting hardware is secure.	If the mounting hardware is not secure, check the motor/gearbox alignment, and tighten the mounting hardware.
Motor electrical connections	Check that all electrical connections are secure.	If the electrical connections are not secure, tighten them.
	Check the electrical connections for evidence of arcing.	Loose electrical connections can cause arcing, which is evident by discoloration and charring. If you find evidence of arcing, replace the damaged connections.
Insulation resistance	Using an ohmmeter, check and record the resistance of motor winding insulation.	Compare the current resistance reading to previous readings. If the resistance drops significantly, perform an internal inspection for insulation damage or deterioration.
Motor Brake	On motors that have a brake, use a feeler gauge to check the air gap in between the brake pad and the rotor according to NORD Gear Corporation Manual BIM-1090, Motor Brakes Installation and Maintenance Instructions.	If the air gap exceeds the maximum allowed for that brake configuration provided in the manual, adjust the air gap or replace the brake pad according to the instructions in NORD Gear Corporation Manual BIM-1090, Motor Brakes Installation and Maintenance Manual.

Table 3. Motor Inspection Criteria

TESTING AND FAULT ISOLATION

1. General

NOTE: NORD electric motors do not require periodic testing. However, if a motor is removed from its installation, NORD recommends that the motor be checked according to the static and dynamic testing provided below before it is reinstalled. Finding a condition that will require future repair before the motor is reinstalled decreases the overall maintenance time.

This section provides general test information and functional checks for the types of motors covered by this manual. All tests provided below may not apply to all motor types and models. Read and understand the tests and checks before performing them on your motor. Understand how the test or check is to be performed and the pass/fail criteria.

Record and date all measurements taken. Retain the measurements in a file. Comparing current and previous measurements is useful in tracking motor condition and brake wear, if the motor is equipped with a brake.

If the motor fails any of the test procedures provided below, use the fault isolation procedures to determine the motor problem. Refer to the REPAIR section to determine if the failure is a repairable failure.

2. Testing

A. Static Testing

1. The motor can only be static tested if it is disconnected from the component it drives and securely mounted on a fixture or mounting plate. These tests are usually conducted when a motor has been removed for any reason other than failure
2. Turn the motor shaft slowly by hand. Feel and listen for evidence of a failed bearing, which is indicated by a rough feel as the shaft rotates, and by noise.
3. Check for smooth rotation, with no evidence of binding or catching. If the shaft does not rotate smoothly, or binds or catches, the bearings are worn or failing, lack lubrication, or are contaminated.
4. Check the motor shaft for side play by applying pressure at right angles to the shaft in several places around the circumference. If the shaft moves perceptibly, the front bearing is worn.
5. If the motor shaft feels rough as it is turned or makes unusual noise, the motor bearings are failing, lack lubrication, or are contaminated. Replace the motor bearings, or clean and re-lubricate the bearings, as applicable. Refer to the REPAIR section.
6. If the bearing shaft shows play in the bearing, the bearing is worn or failing. Replace the motor bearings according to the REPAIR section.

B. Dynamic Testing

1. Find the motor voltage and rated load current values as listed on the motor nameplate.
2. Using a volt-ohmmeter, verify that the motor power supply is in the correct range.
3. Run the motor with no load. As the motor is operating, listen for unusual motor noise and check for excessive vibration. Vibration and motor noise are indications of bearing contamination, lack of lubrication, damage, or failure.
4. Use an ammeter to measure the no-load current. Record the no-load current for comparison with previous readings, and for reference during future testing.
5. If the motor passes the no-load test, operate the motor at rated load and check and record the current.
6. Check the motor operating temperature at rated load. If the motor operates at a higher than normal temperature, the motor is failing.
7. If the motor has an integral brake, check the brake operating temperature. If the brake operates at a higher than normal temperature, the brake is not releasing completely. Refer to the REPAIR section.

3. Fault Isolation

If the motor has failed or does not meet the requirements of any of the tests described above, use the fault isolation procedures provided in Table 4, Motor Fault Isolation. The table is based on the assumption that the motor has been operating correctly, and that a problem has occurred. If a newly installed motor does not operate correctly, the problem is an installation problem.

Fault	Check	Corrective Action
Motor doesn't operate	Check the circuit breaker.	The breaker has tripped. Reset the breaker. If the breaker trips immediately, the motor windings have shorted. Replace the motor.
	Check the motor and the gearbox separately to determine which has failed.	Replace the motor or the gearbox, as applicable.
	If the breaker has not tripped, check the power circuitry to the motor.	If the power circuitry has opened, repair the power circuitry.
	Check for an open in the motor windings.	If the motor windings have an open circuit, replace the motor.
Motor is noisy	Separate the motor from its gearbox and check the shaft bearings by hand according to the TEST instructions.	If the bearings feel rough, replace the bearings according to the instructions in REPAIR.
Motor thermal protection trips	Check the motor exterior for an excessive accumulation of oil and dirt that can inhibit cooling.	If the motor exterior is excessively dirty, clean the motor surface using clean, lint-free cloths. If the motor has a finned casing, use a vacuum cleaner and a stiff-bristled nylon brush to remove dirt and debris from between the fins.
	If the motor has a vented enclosure, check the vent openings to make sure they are clear.	If necessary, clean the vent openings.
	Visually check for heat-discolored paint, which is evidence of a motor overheat.	If the motor casing shows heat discoloration, the motor is failing. Replace the motor.
	Check the system load.	If the load applied to the system is above rated load, it should be reduced, if possible, to avoid affecting motor life.
Motor slows during operation	Check for increased load.	If the load has increased beyond rated load, correct the overload condition to prevent damage to the motor.
	Check for supply voltage drop.	Supply voltage must be within 10 percent of nominal voltage. If the supply voltage is less than 90 percent of rated voltage, correct the supply voltage to avoid damage to the motor.
	Check the gearbox and the motor bearings for wear and drag that increases as the system temperature rises.	If the gearbox drag increases during operation, repair the gearbox. If the motor bearing drag increases as the motor operates, replace the bearings according to REPAIR.

Table 4. Motor Fault Isolation

LUBRICATION

1. General

NORD motor frame sizes 63 up to and including 225 are prelubricated, therefore require no lubrication during normal operation.

Frame sizes 250 and larger will have grease fittings for regreasing the motor bearings. Relubricate bearings every six months (more often if conditions require) using a polyurea base grease, No. 2 consistency & stabilized against oxidation.

REMOVAL, INSTALLATION, AND HANDLING

1. General

Removing, installing, and handling any NORD electric motor follow the same general procedures. Follow the general procedures provided below. Observe all **WARNINGS** and **CAUTIONS**.

If you have any questions about the procedure to use to handle, install, or remove a specific motor, call NORD Gear Corporation. Please read the following **WARNINGS & CAUTIONS** prior to any work on the motor.

WARNING:



IF THE MOTOR HAS AN INTEGRAL BRAKE, VERIFY THAT THERE IS NO LOAD ON THE GEARBOX BEFORE RELEASING THE BRAKE. THIS WILL PREVENT POSSIBLE INJURY AND POTENTIAL EQUIPMENT DAMAGE FROM A DROPPED LOAD.

WARNING:



THE MOTOR ELECTRICAL POWER HAS DANGEROUS CURRENT LEVELS. TO PREVENT SERIOUS INJURY, SHUT DOWN THE POWER TO THE MOTOR AT ITS CIRCUIT BREAKER OR POWER SWITCH BEFORE REMOVING OR INSTALLING ANY MOTOR. LOCK OUT THE BREAKER OR SWITCH AND POST IT WITH AN "OUT OF SERVICE" PLACARD.

WARNING:



LARGE MOTORS ARE HEAVY, EASY TO UNBALANCE, AND ARE AWKWARD TO LIFT AND MOVE. EVEN SMALLER MOTORS ARE HEAVY. HAVE ASSISTANCE WHEN LIFTING AND MOVING HEAVY MOTORS. IF NECESSARY, USE APPROPRIATE LIFTING DEVICES TO LIFT AND MOVE HEAVY MOTORS.

CAUTION:

TO PREVENT DAMAGE TO THE MOTORSHAFT, BEARINGS, AND THE MATING HUB/SHEAVE IN THE GEARBOX, MAINTAIN SHAFT ALIGNMENT WHILE REMOVING THE MOTOR FROM ITS GEARBOX.

2. Removal

- A. Drain the oil from the mating gearbox, or rotate the motor/gearbox assembly so that the motor is up, to prevent oil from spilling from the gearbox when the motor is removed.
- B. Shut down the power to the motor at the main circuit breaker or power switch. Lock out the breaker or switch and place an "OUT OF SERVICE" placard on the breaker or switch.
- C. Disconnect the wiring to the motor. Tag each wire as it is disconnected.
- D. Prepare the motor for removal by supporting the motor appropriately. For smaller motors, use assistance to steady the motor or support it. For larger motors, use mechanical lifting or support devices to steady and support the motor.
- E. Remove the bolts and washers securing the motor to its mounting.
- F. Maintain motor shaft alignment, and move the motor away from its mounting pad until the motor shaft clears its mating hub/sheave or garmesh. If the motor shaft is a keyed shaft, keep the drive key with the motor.
- G. Remove and discard the flange gasket. Clean the gasket material from the flange.

3. Installation with NEMA and IEC Flanges

Refer to NORD Gearbox Inputs Installation and Maintenance Instructions in BIM1009.

- A. Make sure the flanges are clean and free of gasket material. Install a new gasket between the mating flanges, if applicable.
- B. Carefully move the motor to insert the motor shaft and its hub/sheave into the adapter spline, making sure the shaft key enters the mating keyway.
- C. Seat the motor flange against the mating flange. Install the mounting bolts and tighten them securely.
- D. Reconnect the wiring to the motor. Refer to Figure 2 for the motor and options connection diagrams.

4. Removing and Replacing C-Face Motors

- A. Shut off the power to the motor and post the shutoff with an "OUT OF SERVICE" placard. Disconnect the wiring to the motor. Tag each wire as it is disconnected.
- B. Support the motor. Remove four bolts securing the motor to the NEMA or IEC adapter.

NOTE: The bolts securing the motor to the adapter are retained using a medium strength thread locker such as blue Loctite.

- C. Pull the motor straight out from the adapter.
- D. Measure and record the dimension from the coupling to the motor flange. Use this dimension to locate the coupling on the replacement motor.
- E. Install a new drive key in the keyway, staking the key or using Loctite to retain the key in the keyway, according to the following instructions:
 - 1) If the drive key is not trapped in the keyway (the keyway is open at both ends), stake and install the drive key as follows:
 - a. Make sure the keyway is free of contamination so that the drive key will seat properly.
 - b. Add a few drops of an approved lubricant to the keyway.
 - c. Place the drive key on an appropriate surface with the shaft side of the drive key up. Stake the key in two places near each long edge to deform the edge outward.

CAUTION: SUPPORT THE MOTOR SHAFT BEFORE STAKING THE KEY TO PREVENT DAMAGE TO THE MOTOR BEARINGS.

- d. Support the motor shaft in V-blocks. Place the key with the staked surface down over the key slot. Place a sheet of copper shimstock, or equivalent, on the drive key and tap it into the keyway using a hammer.
 - e. Check the key to make sure it is fully seated and securely retained.
- 2) Install and Loctite the drive key as follows:
 - a. Make sure the keyway is clean of old Loctite and is free of oil film.
 - b. Apply Loctite primer and medium strength (blue) Loctite to the surface of the key and keyway according to the Loctite instructions.

CAUTION: IF THE DRIVE KEY IS TO BE LOCTITED IN PLACE, CLEAN ALL THE LOCTITE FROM THE SURFACE OF THE DRIVE KEY AND THE MOTOR SHAFT TO PREVENT POSSIBLE BONDING OF THE COUPLING AND SPLINE SHAFT TO THE DRIVE KEY.

- c. Install the drive key and center it in the keyway. Cure the Loctite according to Loctite instructions.

- F. Clean all contamination and corrosion from the mating flanges.
 - G. Support the motor and mount it to the adapter.
 - H. Apply a medium strength thread locking compound such as blue Loctite to the bolt threads according to the instructions. Install the bolts and tighten them securely.
 - I. Reconnect the wiring to the motor. Refer to Figure 2 for the motor and options connection diagrams.
5. Removing and Replacing Integral Motors
- A. Shut off the power to the motor and post the shutoff with OUT OF SERVICE. Disconnect the wiring to the motor. Tag each wire as it is disconnected.
 - B. Support the motor and remove the bolts securing the motor to the gearbox.
- NOTE: Most integral motor installations have mounting bolts accessible from the motor exterior. If the bolts are not visible, unbolt the input flange from the gearbox. Remove four bolts that mount the motor. Remove and discard the Dubo gaskets from the bolts.
- C. Remove the motor from the gearbox.
 - D. Clean the gasket faces on the motor and gearbox, making sure no cleaning debris enters the gearbox.
 - E. Check the replacement motor to make sure the motor flange, motor shaft, and motor pinion are identical to the motor that was removed.
 - F. Place a new gasket between the gearbox and new motor.
 - G. Position the motor on the gearbox, making sure the input pinion meshes with the input gear. Rotate the motor as necessary to align the bolt holes and seat the motor flange. Make sure the gasket remains properly aligned and seated.
 - H. Apply a medium strength thread locking compound such as blue Loctite to the bolt threads according to the instructions. Install the bolts and tighten them securely.
- NOTE: If the motor/gearbox installation uses an input flange, mount the input flange to the motor using four mounting bolts and new Dubo gasket. Tighten the bolts securely.
- CAUTION: DO NOT TO MIX TYPES OF OIL.**
- I. Check the gearbox oil level. If necessary fill the gearbox or add oil to bring the gearbox oil to the correct level. Check the installation and maintenance manual for your gearbox to find the correct oil for the gearbox.
 - J. Reconnect the wiring to the motor. Refer to Figure 2 for the motor and options connection diagrams.
6. Handling and Lifting
- A. Before lifting any motor, disconnect all electrical connections. Tag each wire as it is disconnected.
 - B. Disconnect the motor from the gearbox. Do not lift the motor while it has other equipment attached to it.
 - C. If the motor has provisions for a lifting eye, turn in an appropriately sized lifting eye and lock it in place with the locking nut. Lift the motor by the lifting eye using an appropriate lifting device.
 - D. If the motor does not have provisions for a lifting eye, seek assistance or use appropriate lifting devices as necessary.
7. Storage

If the motor is not in service, store it according to the following conditions:

- A. Cover the motor and store it in a clean warehouse environment protected from dust and fluids.
- B. If the motor has internal heaters, power the heaters during storage if the storage environment is extremely humid. The heaters will prevent moisture buildup in the motor interior.
- C. Before placing the motor in service, visually inspect the motor exterior for evidence of deterioration during storage. Turn the motor shaft by hand to make sure the shaft turns smoothly and freely.

CONNECTION DIAGRAMS

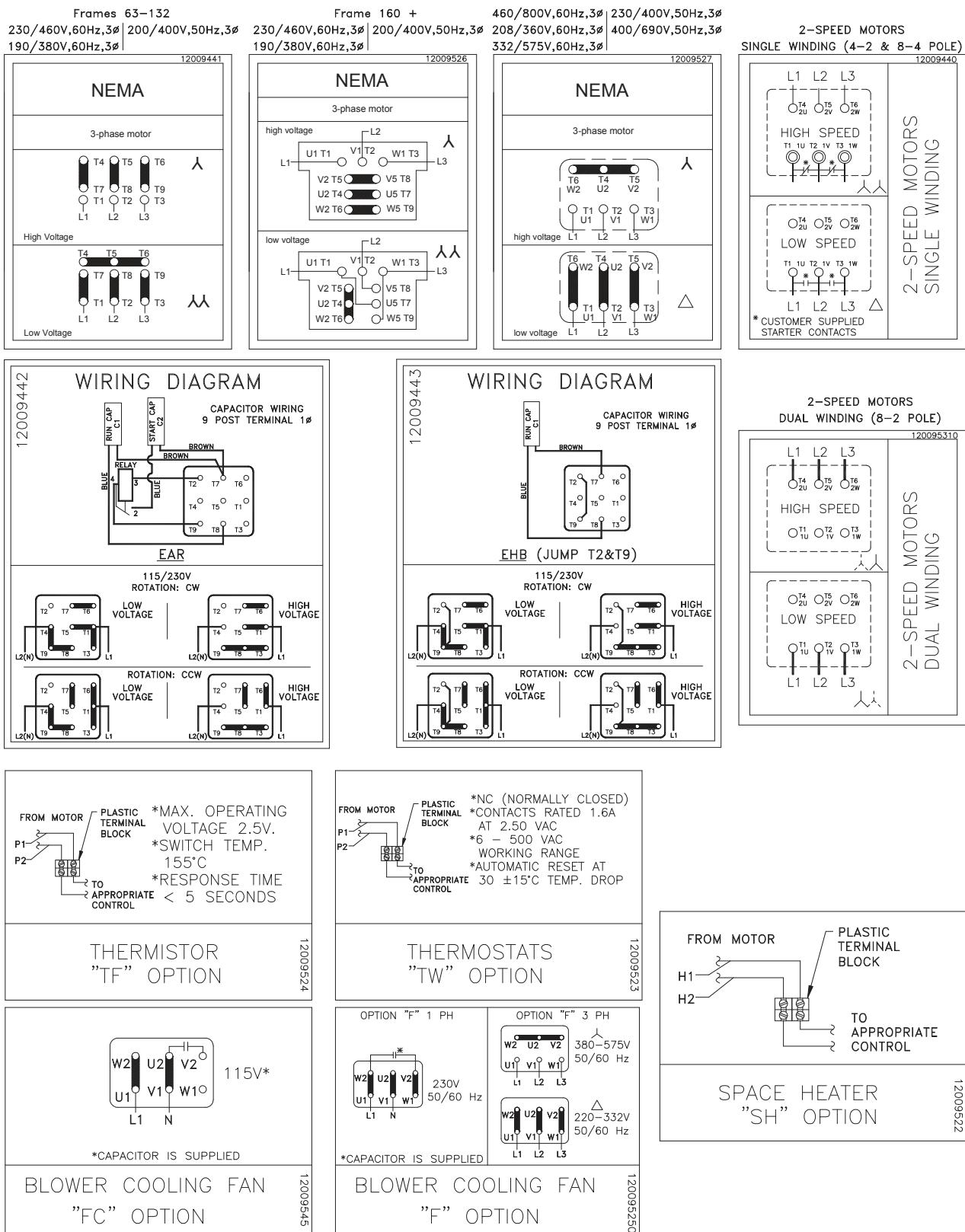


Figure 2. Motor Connection and Wiring Diagrams

REPAIR

1. General

These instructions can be generally applied to NORD motor applications. The exploded view provided in the PARTS INFORMATION section shows the parts orientation for NORD motors.

To procure replacement parts from NORD, contact NORD's customer service department (refer to INTRODUCTION). Provide NORD with the motor part number and serial number, and the item reference number and nomenclature from the parts information figure, which will identify the part for your motor application.

A. The following parts must be replaced if they are removed:

- Oil seal (904), Oil seal (933)
- Gasket (909), Gasket (910), Gasket (921)
- Gasket on plug (961)
- Self-locking screws (907-1, 908-1, 923, 932-1, 940-1)

B. If the following parts are removed, inspect them, and replace them if they are deformed:

- Retaining ring (919), Retaining ring (947), Retaining ring (948)
- Fan clip (952)

C. Disassemble the motor according to the general exploded view in PARTS INFORMATION. Disassemble only as far as necessary to replace the failed parts.

D. Whenever the motor is disassembled, clean all dust and contamination from the motor interior using a vacuum cleaner and a soft-bristled nylon brush.

PARTS LIST

1. General

Refer to Figure 4 for parts information. If you are ordering a part, provide the model and serial number of your motor. This will determine the part number you need.

Part Number	Part Description	Qty per Assembly
900	Rotor Assembly	1
902	A-Endbell	1
904	Oil Seal	1
905	Bearing	1
906	Preload Spring	1
907	T-Box Frame	1
907-1	Screw	4
908	T-Box Cover	1
908-1	Screw	4
909	T-Box Frame Gasket	1
910	T-Box Cover Gasket	1
916	Stator Assembly	1
918	Drive Key	1
919	Retaining Ring	1
920	Oil Plug	1
921	Gasket	1
923	Screw	4
929	Bearing	1
932	B-Endbell	1
932-1	Screw	4
933	Oil Seal	1
939	Fan	1
940	Fan Cowl	1
940-1	Screw	4
947	Retaining Ring	1
948	Retaining Ring	1
952	Fan Clip	1
960	NPT Thread Adapter	1
961	Plug (includes O-ring)	1
***	Spur Drive Gear (alternate to integral bevel gear)	AR
TBLK	Terminal Block	1
TBLK-1	Screw, Terminal Block Mounting	2
ø ø ø	Jumper Bar (not illustrated)	AR

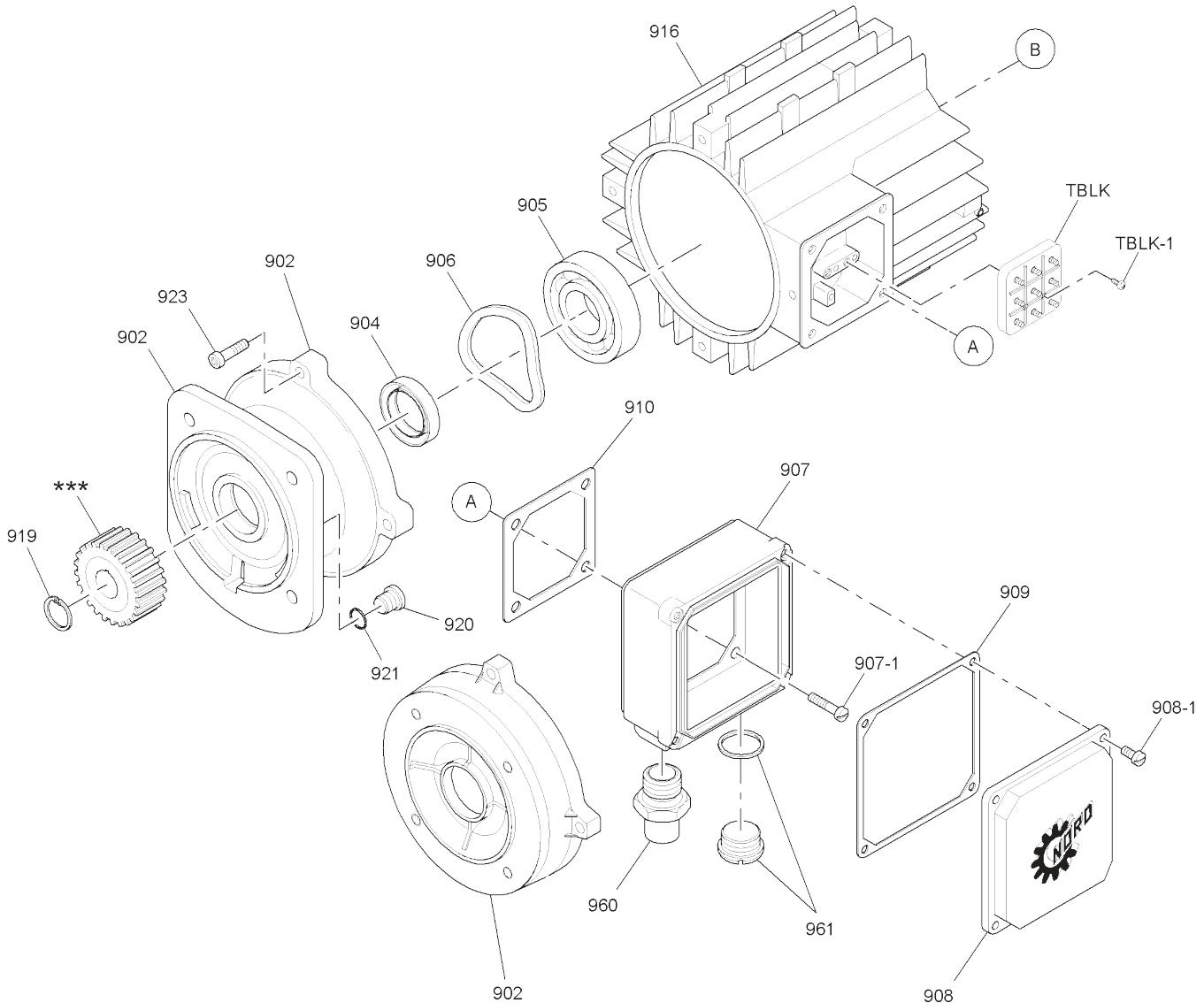


Figure 3. General Motor Exploded View and Generic Parts List (Sheet 1 of 2)

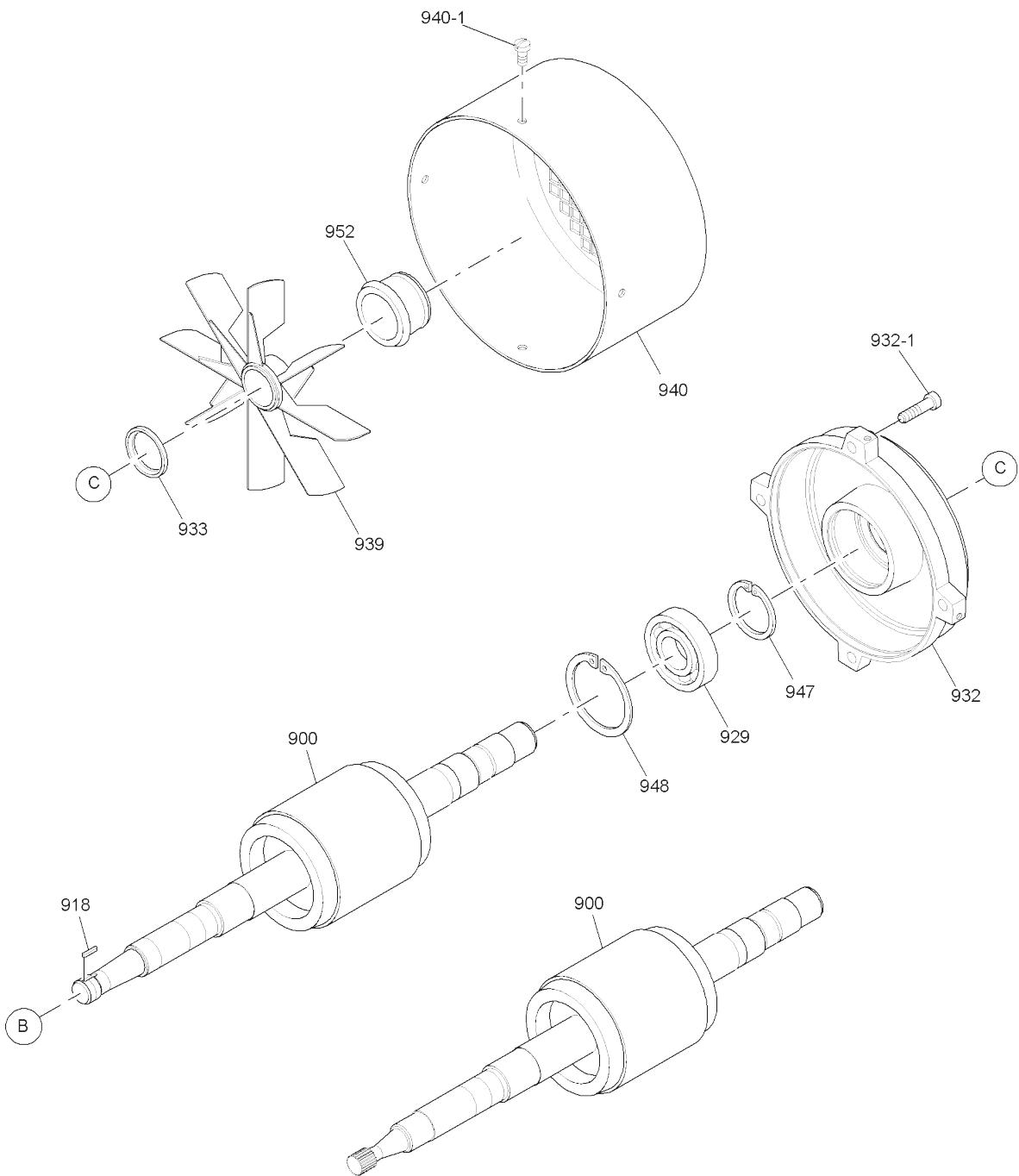


Figure 3. General Motor Exploded View and Generic Parts List (Sheet 2 of 2)

MOTOR OPTIONS & NOMENCLATURE

1. General

NORD offers many options for its motors. The option code will be shown in the motor nomenclature. Below are the available options

Code	Description			Code	Description
BRE	See Brake BIM1090	With Brake		OL	TENV Motor – Without Fan
RG		Brake – Corrosion Protected		OL/H	TENV Motor - Without Fan & Cover
SR		Brake – Dust Protected		RD	Canopy Cover
HL		Brake – Manual Hand Release		RDD	Double Canopy Cover
FHL		Brake – Lockable Manual Release		RLS	Backstop
MIK		Brake – Microswitch		SH	Motor Space Heater
IR		Brake – Current Sensing Relay		TF	Thermistor
KD	Condensation Holes			TW	Thermostat
KB	Condensation Holes - Plugged			WE	2 nd Motor Shaft End
MS	Power Plug Connector			WU	High Slip Rotor
NSD+	NORD Severe Duty Plus Protection			Z	High Inertia Motor Ran
EHBU	Single Phase, Run Capacitor			H	Energy Efficient
EARU	Single Phase, Start Cap/Run Cap			IP66	IP66 Environmental Protection
F	Blower Cooling Fan - 3ph & 1ph			ISO H	Class H Insulation
FC	Blower Cooling Fan - 1ph			EP	Epoxy Dipped Windings
IG	Incremental Encoder			FK	Over Running Clutch
VR	5:1 Constant Torque Rated Motor			VN	10:1 Constant Torque Rated Motor
VW	20:1 Constant Torque Rated Motor			VZ-F	1000+:1 Constant Torque Rated Motor

Table 5. Motor Option Codes

Motor Nomenclature					
Motor		Motor Options			
100L	/	4	BRE	40	...
Frame Size	No. of Poles	Brake	Brake size Nm	Other Options	

Examples

90SH/4 IG SH
Energy Efficient, 1 Speed, Encoder & Space Heater

100L/4-2 WE RDD
2 speed, 2nd Motor Shaft & Double Canopy Cover

132M/4 BRE100 HL IR TW
Brake, Hand Release, Current Sensor & Thermostat

Technical information follows for THERMISTORS, THERMOSTATS, SPACE HEATERS (Table 6), ENCODERS (Table 7) & BLOWER COOLING FAN (Table 8).

Thermistors (Option TF)

- Connection Diagram shown on Page 12
- Three PTC (Positive Temperature Coefficient) temperature sensitive resistors are wired in series
- One PTC on each phase of the stator winding
- The leads will be labeled P1 and P2 in the terminal box
- This unit must be connected to a Motor Control Protection module such as a Kriwan INT69 or a Variable Frequency Drive with PTC inputs

All wiring must be done by qualified personnel and adhere to all local codes.

WARNING: Thermistors will automatically reset.

Thermistor Ratings:

- Switching temperature 310°F(155°C)
- Maximum operating voltage 2.5 volts
- Resistance at 25°C less than or equal to 300 Ohms
- Response time < 5 seconds

Thermostats (Option TW)

- Connection Diagram shown on Page 12
- Three temperature sensitive, bimetallic switches with normally closed contacts wired in series
- One switch on each phase of the stator winding
- The leads will be labeled P1 and P2 in the terminal box

All wiring must be done by qualified personnel and adhere to all local codes.

WARNING: Thermistors will automatically reset.

Thermostat Ratings:

- Switching temperature 310°F (155°C)
- Switch contacts 1.6A at 250 VAC
- Permissible working 6 to 500 VAC
- Automatically resetting with $30 \pm 15^\circ\text{C}$ drop below switching temperature
- Resistance less than 50 mΩ
- Switch rebound less than 1 millisecond
- 10g shock in all directions
- 2,000 VAC Insulation rating
- 10,000 cycles
- Normally closed

Space Heaters (Option SH)

- Connection Diagram shown on Page 12
- Space Heaters are mounted directly on the motor winding
- The leads are brought into the terminal box and labeled H1 and H2
- They require a separate voltage supply and must not be energized when the motor is energized
- The heaters will keep the winding of the motor approximately 5°C above the surrounding ambient

FRAME SIZE	WATTAGE	VOLTAGES	HEATER P/N	HEATER STRIPS/MTR
63 & 71	18W	110V	18900770	1
		230V	18900780	
		460V	18900790	
80	25W	110V	18900820	1
		230V	18900800	
		460V	18900810	
90 – 112	50W	110V	18900820	2
		230V	18900800	
		460V	18900810	
132-180	100W	110V	18900830	2
		230V	18900840	
		460V	18900850	
200 & 225	120W	110V	18900860	2
		230V	18900870	
		460V	18900880	

Table 6. Space Heater Data

Encoder (Option IG)

- Standard encoder manufacturer is Heidenhain (www.heidenhain.com)
- All encoders will be enclosed inside the fan shroud
- Incremental, Quadrature, Differential, Marker Channel
- IP 64 Protection
- IG1 = 1024PPR, IG2 = 2048PPR, IG4 = 4096PPR
- RS422 & Push/Pull available
- 5V or 10-30V available

Color	Signal		Pin (optional mating plug)	Heidenhain Callouts	Explanation
	Push-pull	RS 422			
Pink	---	<u>B</u> (B-)	1	<u>U_{a2}</u>	Signal line
Blue	---	Sensor (+)	2	U _P	Sense Supply Voltage
Red	R (R+)	R (R+)	3	U _{a0}	Signal line (Marker)
Black	---	R-	4	<u>U_{a0}</u>	Signal line
Brown	A (A+)	A (A+)	5	U _{a1}	Signal line
Green	---	<u>A</u> (A-)	6	U _{a1}	Signal line
Violet	---	Spare	7	<u>U_{as}</u>	Spare
Gray	B (B+)	B (B+)	8	U _{a2}	Signal line
Yellow	---	---	9	Shield	Spare
White/Green	0 V	0 V	10	0 V / U _N	Common
White	0 V	Sensor (-)	11	0 V / Sensor	Sense Common
Brown/Green	V _S	V _S	12	U _P	Supply Voltage
Table 7. Encoder Wiring Designations					

BLOWER COOLING FAN (Option F & FC)

- Connection Diagram shown on Page 12
- Option FC is 1 phase 115V only
- Option F has capability of 1 phase or 3 phase by connecting a supplied capacitor

		60 Hz Ratings			50 Hz Ratings		
Motor Frame		Voltage [V]	Current [A]	Power [W]	Voltage [V]	Current [A]	Power [W]
Single Phase Connection - 1~Δ	FC63	100-135	0.23	42	100-135	0.30	42
	FC71	100-135	0.23	47	100-135	0.30	44
	FC80	100-135	0.27	57	100-135	0.30	43
	FC90	100-135	0.46	102	100-135	0.57	78
	FC100	100-135	0.53	105	100-135	0.54	78
	FC112	100-135	0.60	115	100-135	0.55	80
Single Phase Connection 1~Δ	F63	230-332	0.11	38	230-277	0.10	27
	F71	230-332	0.12	41	230-277	0.10	28
	F80	230-332	0.13	44	230-277	0.11	29
	F90	230-332	0.25	88	230-277	0.26	72
	F100	230-332	0.28	88	230-277	0.26	70
	F112	230-332	0.31	107	230-277	0.26	73
	F132	230-332	0.27	89	230-277	0.29	82
Three-Phase Low Voltage Connection 3~Δ	F63	230-332	0.08	23	230-290	0.10	27
	F71	230-332	0.08	24	230-290	0.10	28
	F80	230-332	0.08	25	230-290	0.10	29
	F90	230-332	0.21	64	230-290	0.28	86
	F100	230-332	0.21	66	230-290	0.27	86
	F112	230-332	0.23	70	230-290	0.27	85
	F132	230-332	0.25	74	230-290	0.32	96
	F160	230-332	0.49	165	230-290	0.53	155
	F180	230-332	0.49	165	230-290	0.53	155
	F200	230-332	0.49	165	230-290	0.53	155
Three-Phase High Voltage Connection 3~Y	F225	230-332	0.49	165	230-290	0.53	155
	F63	380-575	0.04	23	380-500	0.05	29
	F71	380-575	0.04	25	380-500	0.05	30
	F80	380-575	0.04	26	380-500	0.05	29
	F90	380-575	0.12	62	380-500	0.16	82
	F100	380-575	0.12	66	380-500	0.16	83
	F112	380-575	0.13	70	380-500	0.16	82
	F132	380-575	0.14	75	380-500	0.18	96
	F160	380-575	0.28	165	380-500	0.30	155
	F180	380-575	0.28	165	380-500	0.30	155
	F200	380-575	0.28	165	380-500	0.30	155
	F225	380-575	0.28	165	380-500	0.30	155

Table 8. Blower Cooling Fan Data

-NOTES-