The NORD GRIPMAXX™
Keyless Bushing System

Concept Overview

The NORD Gripmaxx™ Bushing System offers keyless interchangeable bushings for mounting NORD hollow shaft reducers onto a large range of driven solid machine shaft sizes. The Gripmaxx™ system was developed using the latest in Finite Element Modeling (FEM) technology in order to best optimize material selection, mechanical design, & performance. Gripmaxx™ provides a high-capacity, zero-backlash, interference fit to the driven machine shaft thus minimizing the possibility of fretting corrosion. Gripmaxx™ also eliminates the typical assembly and disassembly challenges of using interference fits by providing generous assembly and disassembly clearances to help ensure easy installation and removal of the gearbox. Torque is transmitted via the tried and tested NORD Shrink Disc, which in turn produces high compressive forces and friction between the reducer hollow shaft, split-bushing and solid machine shaft.

Principles of Operation

The NORD Gripmaxx™ Bushing System uses the NORD shrink disc locking collar, an oversized gear reducer hollow bore, and a wide range of possible split-bushing inserts intended to accommodate a variety of final bore sizes. The NORD shrink disc has a larger capacity and an increased clamping force capability than your typical commodity shrink disc clamping rings. Through tightening of shrink disc “locking screws,” large radial clamping forces are exerted upon the walls of the NORD hollow shaft. The NORD hollow shaft is uniquely designed to remain elastic, while providing considerable compressive forces. These high forces are in turn transmitted through the split bushing, producing the desired clamping forces on the driven solid machine shaft.
Applying the NORD Gripmaxx™ Solution

The NORD Gripmaxx™ Bushing System is a keyless design that utilizes standard cold finished shaft stock and eliminates the cost of keying the shaft. Initial assembly of the Gripmaxx system is a keyless interference fit which minimizes the possibilities of fretting corrosion. The disassembly of the Gripmaxx™ system is done from the outside of the machine without the worry of an abundance of moving parts. Therefore the Gripmaxx™ will reduce installation and maintenance time and significantly lower operational costs. The Gripmaxx™ system is ideal to use with gear reducer retrofits because of the excess of customer solid shaft requirements. The equipment builder can also save cost with the Gripmaxx™ system by standardizing on just a few reducer sizes while continuing to be able to provide a wide range of available bore sizes.
Advantages of the GRIPMAXX™ Keyless Bushing System

- Designed using FEM technology.
- The Gripmaxx fits tightly against a shouldered shaft.
- A shrink disc helps in the assembly or disassembly process.
- Easy installation and removal.
- The use of standard shaft stock means that there is no need for additional shaft machining or shaft keys.
- Gripmaxx bushings are corrosion resistant.
Gripmaxx™ Advantages

- **Optimal Design** - Developed using the latest in Finite Element Modeling (FEM) technology to optimize material selection, mechanical design, and performance. The NORD Shrink Disc combined with a unique hollow shaft design provide high compressive forces that are transmitted through the split bushing to produce clamping forces on the driven machine shaft. The torque and support bushings are identical and fully interchangeable.

- **Shaft Size Flexibility** - The NORD Gripmaxx™ offers keyless interchangeable bushings for mounting NORD hollow shaft reducers onto a large range of driven machine shaft sizes.

- **No Special Shaft Tolerance Required** - This allows the machine builder to utilize standard cold finished shaft stock, without the need for additional shaft machining or shaft keys.

- **Consistent Mounting Location** - Unlike the typical conical or tapered bushing kits, the Gripmaxx™ allows for a tight fit against a shouldered machine shaft, ensuring a consistent mounting location on the driven shaft.

- **Easy Installation and Removal** - Gripmaxx™ allows for loose tolerance requirements of the customer solid shaft. The generous clearances between the customer shaft and the bushing system help ensure easy installation and removal of the gearbox.

- **High-Capacity / Zero-Backlash Fit** - Gripmaxx™ uses a NORD shrink disc design to apply a high-capacity, zero-backlash interference fit to the driven machine shaft. This eliminates the assembly and disassembly challenges of traditional interference fits and minimizes the possibility of fretting corrosion.

- **Ideal for Reversing & Start/Stop Loads** - Gripmaxx™ does not transmit torque using keys or keyways, which may become loose when subjected to reversing or start and stop load conditions, resulting in key or keyway deformation or damage to shaft components.

- **Corrosion Resistant** - Gripmaxx™ bushings are a hardened steel manufactured by combining the heat-treatment processes of conventional gas-nitriding and plasma-nitriding within a controlled oxidation environment. The resultant bushing surface treatment is extremely hard, low-wear, and corrosion-resistant and it will help minimize the formation of shaft fretting corrosion. Additionally, shrink disc flanges are treated in a chemical process to produce a protective ferrous oxide (Fe₃O₄) finish. This oxide coating is gun metal black in color and it provides additional abrasion resistance, heat resistance and corrosion protection for the base metal.
Advantages of the GRIPMAXX™ Keyless Bushing System

- Radial Force Towards Hub & Shaft
- Customer Shaft
- Taper Ring
- Gearbox Hollow Shaft
- Bushing
- Shrink Disc

- Cold Rolled Shaft Stock
- No Keyway
- No Machining Required
Gripmaxx™ versus a Shrink-Disc

- Gripmaxx™ provides generous assembly tolerances and allows the equipment builder to utilize standard cold finished machine-shaft stock, without the need for precise shaft machining or shaft keys. The shrink disc requires very precise tolerances on the machine shaft. One must avoid using larger than specified shrink disc shaft clearance to avoid a reduction in both the transmissible torque and a reduction in gripping capacity, otherwise permanent deformation of the shrink disc’s inner ring and the reducer’s hollow shaft can make subsequent removal of the gear reducer extremely difficult.

- The shrink disc is normally offered in a single inch and a single metric bore size. Bore flexibility is limited without absorbing the cost of special hollow shaft and shrink disc designs. The Gripmaxx™ is available in a wide range of reducer sizes and shaft bore combinations. Please contact NORD for additional details.

Gripmaxx™ versus a Keyed Hollow-Shaft

- The Gripmaxx™ results in a high-capacity, interference fit whereas keyed connections require fit clearance between key and keyway and between shaft and hub, for proper assembly. In applications with frequent starts and stops, load reversals, or shock loads, the normal keyed-shaft design clearances can cause increased micro-movements at the shaft to hub interface and place high stress on keys and keyways, leading to possible component fatigue and shaft fretting corrosion.

- Gripmaxx™ provides a zero-backlash fit to the driven machine shaft whereas a keyed connection is designed with assembly clearance; the resultant Gripmaxx™ fit is better suited for motion control applications since keyed shaft connections have undesirable clearances and backlash, which can erode the accuracy of motion profiles over time.

Gripmaxx™ Saves Cost

- The NORD Gripmaxx™ Bushing System is a keyless design that utilizes standard cold finished shaft stock and eliminates the cost of machining keys and keyways or holding very precise machine shaft tolerances.

- Initial assembly of the Gripmaxx system is a keyless interference fit which minimizes the possibilities of fretting corrosion. The disassembly of the Gripmaxx™ system is done from the outside of the machine without the worry of an abundance of moving parts. Therefore the Gripmaxx™ will reduce installation and maintenance time and significantly reduce operational costs.

- Gripmaxx™ is ideal to use in gear reducer retrofits because of the undemanding customer solid shaft requirements. The equipment builder can also save cost with Gripmaxx™ by standardizing on just a few reducer sizes while continuing to provide a wide range of available bore sizes.
Product Overview

**UNICASE™ SPEED REDUCERS**

**HELICAL IN-LINE**
- Foot or Flange Mount
- Torque up to 205,000 lb-in
- Gear ratios – 1.82:1 to over 300,000:1

**NORDBLOC.1 HELICAL IN-LINE**
- Foot or Flange Mount
- Torque up to 26,550 lb-in
- Gear ratios – 1.88:1 to over 370:1

**PARALLEL HELICAL CLINCHER™**
- Shaft, Flange or Foot Mount
- Torque up to 797,000 lb-in
- Gear ratios – 4.26:1 to over 300,000:1

**SCP SCREW CONVEYOR PACKAGE**
- Shaft, or Flange Mount
- Torque up to 53,100 lb-in
- Gear ratios – 4.32:1 to over 1500:1

**RIGHT ANGLE**

**HELICAL-BEVEL 2-STAGE**
- Foot, Flange or Shaft Mount
- Torque up to 5,840 lb-in
- Gear ratios – 4.1:1 to 72:1

**RIGHT ANGLE HELICAL-BEVEL**
- Foot, Flange or Shaft Mount
- Torque up to 283,000 lb-in
- Gear ratios – 8.04:1 to over 300,000:1

**RIGHT ANGLE HELICAL-WORM**
- Foot, Flange or Shaft Mount
- Torque up to 27,585 lb-in
- Gear ratios – 4.40:1 to over 300,000:1

**HIGH PERFORMANCE MOTORS & BRAKEMOTORS**

**INVERTER/VECTOR DUTY**
- Standard or Energy Efficient
- Integral, NEMA or Metric IEC
- 1/6 to 250 hp

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**UNICASE™ SPEED REDUCERS**

**MINICASE™ RIGHT ANGLE WORM**
- Foot, Flange or Shaft Mount
- Torque up to 3,540 lb-in
- Gear ratios – 5:1 to 500:1

**FLEXBLOC™ WORM**
- Modular bolt-on options
- Torque up to 4,683 lb-in
- Gear ratios – 5:1 to 3,000:1

**MAXXDRIVE™ LARGE INDUSTRIAL GEAR UNITS PARALLEL HELICAL**
- Modular bolt-on options
- Torque up to 2,027,000 lb-in
- Gear ratios – 5:1 to 1,600:1

**MAXXDRIVE™ LARGE INDUSTRIAL GEAR UNITS HELICAL-BEVEL**
- Modular bolt-on options
- Torque up to 2,027,000 lb-in
- Gear ratios – 5:1 to 1,600:1

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**NORDAC AC VECTOR DRIVES**

**SK200E FAMILY**
- Decentralized, high performance
  - 380-480V, 3-phase to 10 hp
  - 200-240V, 3-phase to 5 hp
  - 200-240V, 1-phase to 1.5 hp
  - 100-120V, 1-phase to 1 hp

**SK500E FAMILY**
- Compact, high performance
  - 380-480V, 3-phase, to 50hp
  - 200-240V, 3-phase, to 15hp
  - 200-240V, 1-phase, to 3hp
  - 110-120V, 1-phase, to 1.5hp

**SK700E FAMILY**
- Flexible high performance
  - 380-460V, 3-phase, to 200hp