

Gear units, motors, and variable frequency drives



## Complete drive solutions from a single source



### NORD delivers

NORD offers first-class customer service and support along with full-featured drive solutions that can tackle the toughest requirements. All components are carefully selected and precisely configured to meet your exact specifications. In the rare case that standard components won't meet your needs, our in-house engineering team will work with you to design custom components or a complete customized system.





## Reduce lead times and decrease inventory

- ▶ Fastest lead times in the industry with NO expedite fees
- Over 20,000,000 standard configurations to reduce or elminate the need for custom components
- Modular drives, motors, and electronic controlsminimize inventory of replacement units and parts





## Global product designs, standards, and support

- Innovative, industry-standard products to support a wide range of applications
- Global sales and support network
- ▶ Dedicated mechanical and electrical application engineers ready to assist you
- Online resources available to you any time
- ▶ 24/7/365 emergency breakdown service





## Increase efficiency and reduce operation costs

- myNORD online tools for fast selection, configuration, ordering, and tracking of your drive units
- Drive systems that are perfectly matched to your application for optimum performance and energy efficiency
- Program personalization, such as weekly shipment schedules and custom nameplates
- Partner with a company that is easy to do business with and wants to see you succeed!







NORD allows you to customize gear units with a wide range of standard options. Most custom options either do not impact our delivery or do so very minimally.

### Standard:

- Autovent breather
- ▶ QUADRILIP™ sealing
- ▶ High-quality gearing
- ▶ High strength gear case

### Optional:

- Customer-specific shaft designs
- Stainless steel output shafts and bores
- ▶ Long-term storage options
- ▶ High/low temperature sealing solutions
- Back stops
- Housing modifications
- Oil level and oil temperature monitoring
- ► Extensive lubrication options, including synthetic, food grade, and low temp.



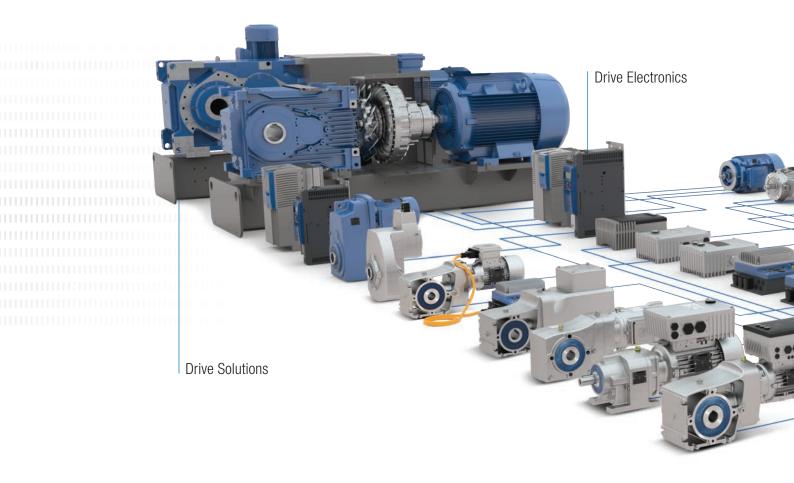
## World-class service and support

NORD's customer-first approach means we take extra care to support our customers throughout the entire buying process and beyond. We also offer services such as myNORD online tools and live phone support from 7:00 a.m. to 7:00 p.m. Central Time.

In the rare case of a breakdown, NORD also provides a 24/7/365 emergency hotline for expedited replacement products and parts. At NORD, we do everything possible to keep you moving!









Reliable gear units with one-piece  $UNICASE^{TM}$  housing can cater to any load.

- ▶ High power density
- ▶ Long service life
- ▶ High axial and radial load capacity



Powerful motors up to IE5+ efficiency keep drive systems in motion in all operating situations.

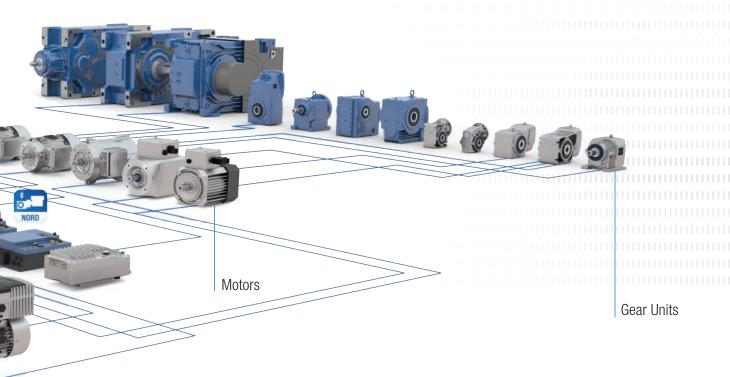
- Designed in compliance with international standards
- High overload capacity
- ▶ Energy-efficient



Intelligent drive electronics provide the exact control options you need.

- Scalable functions
- ▶ Full field bus connection facilities
- Wide power range
- Integrated PLC at no extra cost





Specialized drive solutions can be created using the modular NORD system consisting of a gear unit, motor, and drive electronics. Each of the variants combine the highest product quality, short planning and assembly times, short lead times, and a good price-to-performance ratio.



Extensive communication options enable access to drives from all levels to enable a wide variety of setting options.

- Compatible with common industrial Ethernet and fieldbus networks
- Quick, simple commissioning with a handheld keypad, NORDCON software, or bluetooth adapter and NORDCON mobile app
- Intralogistics options available



Power disconnects and control switches are located directly on the drives and enable direct starting and stopping as well as fast mode switching.

- AC line switch
- Selector switch for local or remote control
- Start/Stop and Forward/Reverse switch
- ▶ Energy-efficient



All interfaces are designed for ease of use for easy configuration and installation.

- Simple Plug-and-Play with all common connection plugs
- ▶ Plug-in supply cable and motor output
- ▶ Plug-in sensors and encoders
- Pre-assembled cables
- Integrated PLC at no extra cost

## Complete drive solutions from a single source

In the early 1980's, NORD DRIVESYSTEMS developed the revolutionary UNICASE housing - an enclosed, single-piece housing that is produced from a single piece of material.

- Housing block integrates all bearing points
- ▶ High output torques
- ▶ High axial and radial load capacity
- Ultimate reliability
- ▶ Long service life
- Quiet operation

## **DuoDrive (Flyer S5010)**



- ✓ Integrated gear unit and motor
- ✓ Extremely high system efficiency
- ✓ Compact, space saving design
- ✓ High power density

Power: 0.5 – 2 HP Torque: Up to 700 lb-in Ratio: 3.24:1 – 16.2:1

Sizes: 1

## UNICASE™ helical gear units (Catalog G1000)



- ✓ Foot or flange mounted
- ✓ Long life, low maintenance
- ✓ Closely stepped ratios
- ✓ Cast-iron UNICASE housing

Size: 11

Power: 0.16 – 200 HP Torque: Up to 205,000 lb-in Ratio: 2.76:1 – 14,340.31:1

## CLINCHER™ parallel shaft gear units (Catalog G1000)



- ✓ Foot, flange, or shaft mounted
- ✓ Hollow or solid shaft

- ✓ Compact design
- ✓ Cast-iron or aluminum UNICASE housing

Sizes: 15

Power: 0.16 – 200 HP Torque: Up to 680,000 lb-in Ratio: 4.03:1 – 15,685.03:1

## UNICASE™ bevel gear units (Catalog G1000)



- ✓ Foot, flange, or shaft mounted
- ✓ Hollow or solid shaft

- ✓ Cast-iron UNICASE housing
- ✓ Closely-stepped ratios

Sizes: 11

Power: 0.16 – 200 HP Torque: Up to 442,500 lb-in Ratio: 8.04:1 – 13,432.68:1



## NORDBLOC.1® helical gear units (Catalog G1000)



- ✓ Foot or flange-mounted
- ✓ Die-cast iron or aluminum housing
- ✓ UNICASE housing
- ✓ Available in single, double, or triple reduction

Size: 16

Power: 0.16 – 60 HP Torque: Up to 29,205 lb-in Ratio: 1.07:1 – 456.77:1

## NORDBLOC.1® 2-stage bevel gear units (Catalog G1014)



- ✓ Foot, flange, or shaft mounted
- ✓ Hollow or solid shaft

✓ Aluminum housing

✓ Compact design

Sizes: 6

Power: 0.16 – 10 HP Torque: Up to 5,800 lb-in Ratio: 3.03:1 – 70:1

## UNICASE™ worm gear units (Catalog G1000)



- ✓ Foot, flange, or shaft mounted
- ✓ Hollow or solid shaft

✓ Cast-iron or aluminum UNICASE housing

✓ Closely-stepped ratios

Size: 6

Power: 0.16 – 20 HP Torque: Up to 27,350 lb-in Ratio: 4.40:1 – 7,095.12:1

## FLEXBLOC® worm gear units (Catalog G1035)



- ✓ Modular aluminum housing
- ✓ Universal mounting design

✓ Life-long lubrication

✓ NEMA or IEC input versions

Sizes: 5

Power: 0.16 – 5.0 HP Torque: Up to 4,683 lb-in Ratio: 5.00:1 – 3,000.00:1

## UNIVERSAL SMI worm gear units (Catalog G1035)



- ✓ Smooth surface aluminum housing
- ✓ Universal mounting design
- ✓ Life-long lubrication
- ✓ NEMA, IEC, or direct motor mount options

Size: 5

Power: 0.16 – 5.0 HP Torque: Up to 4,683 lb-in Ratio: 5.00:1 – 3,000.00:1

## Screw conveyor package (Catalog G1129)



- ✓ Direct coupled input design
- ✓ Closely stepped ratios

- ✓ Standard CEMA mounting
- ✓ Compact and cost-effective

Sizes: 11

Size: 3

Power: 0.16 – 60 HP Torque: Up to 53,100 lb-in Ratio: 4.32:1 – 4,246.38:1

## Overhead conveyors (Catalog G1043)



- ✓ High overhung load capacity
- ✓ QUADRILIP™ sealing system
- ✓ Low maintenance, long service life
- ✓ Industry standard mounting and shaft designs

Power: 0.33 – 60 HP Torque: Up to 75,225 lb-in

Ratio: 8.10:1 - 3,735.92:1

## Flexible input options

There are many available input options for our smallest gear boxes to our powerful MAXXDRIVE units.

- NEMA
- ▶ IEC
- Integral gearmotors
- Solid input shafts
- Servo adapters
- Custom inputs

## **Cut-pinions**

NORD offers precisely machined, single-piece pinions that do not require a seperate gear to be pressed into the input shaft. This provides a number of benefits, inlcuding:

- ▶ High gear ratios per stage
- Smaller ratio steps
- More ratio options in each case size
- Various inputs available
  - NEMA adapters
  - IEC adapters
  - W-inputs

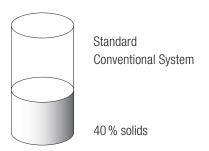




## Surface protection

The paint systems used by NORD DRIVESYSTEMS® are resistant to chemicals and have been tested for their resistance to all common substances which could have a negative affect on the environment. Once fully dry, NORD® paints are food-safe and fulfil the NSF/ANSI 51-2009e test criteria. No further top coats are required. NORD®'s protective properties extend beyond paint coatings and surface treatments for its products. All NORD® motors and speed reducers are constructed to provide a high degree of protection against wet and severe conditions. A variety of standard and optional features are available to help your NORD® gear unit endure the harshest environmental conditions year after year.

### Solvent reduction

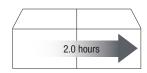




## **Process optimization**







MANKIEWICZ System high-solid

### **GRIPMAXX**<sup>TM</sup>

A keyless bushing system for shaft-mounting drives that can accomodate a wide range of solid shaft sizes while ensuring high-capacity, zero-backlash fit. Eliminates assembly and disassembly challenges by offering generous clearances for easy installation and removal of the gearbox.

- Extensive bore flexibility\*
- ▶ No special shaft tolerances: utilize readily available cold-finished shaft stock\*
- Simplified install and removal
- ▶ Bushings are corrosion resistant
- Optimally designed for shaft mounted or torque arm mounted units
- Available with UNICASE helical bevels, two-stage bevels, UNICASE parallel shaft, and UNICASE helical worm units

\*Shrink disc keyless bore offering available for non-stock bore sizes. Assembly tolerances require more precision than shafts connected with GRIPMAXX bushing kit.











## Complete drive solutions from a single source

## Torque up to 2,495,900 lb-in

NORD DRIVESYSTEMS is the only manufacturer which produces modular industrial gear units with an output torque of up to 2,495,900 lb-in in a one-piece UNICASE housing.

## MAXXDRIVE® industrial gear units (Catalog G1050)





- ✓ All bearing points and sealing-surfaces are machined in a single operation
- No separating joints in the housing, no sealing surfaces subject to torque
- ✓ High-precision axis alignment for quiet operation
- ✓ Long life, low maintenance
- ✓ Gear ratio range 5.60 to 400:1 with the same footprint dimensions
- ✓ Parallel axis and right-angled gear units

Size: 11

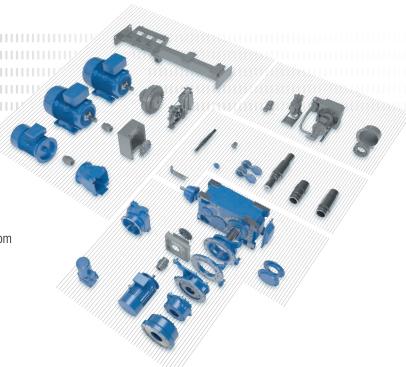
Power: 2.5 - 8,075 HP

Torque: 132,800-2,495,900 lb-in

Ratio: 5.60:1 - 30,000:1

## Industrial gear unit modules

Highly-configurable components allow NORD to provide a wide variety of system variants as well as great flexibility and short planning and assembly times without the need for costly custom components. This modular concept also enables drive solutions to be individually tailored to your requirements with short delivery times, even for large gear units.





## MAXXDRIVE® XT industrial gear units (Catalog G1050)



- ✓ Optimized housing and surface design for maximum power at high temperatures
- ✓ No separating joints in the housing, therefore no sealing-surfaces subject to torque
- ✓ All bearings and sealing-surfaces are machined in a single process (quieter operation and longer service life)
- ✓ High-precision axis alignment for quiet operation
- ✓ Long life, low maintenance
- ✓ Angled gear units

Size: 7

Power: 30 - 2,825 HP

Torque: 132,800 - 663,800 lb-in

Ratio: 6.2:1 - 22.9:1

With their symmetrical design, MAXXDRIVE® XT industrial gear units can be mounted in various installation orientations. Very high thermal limit powers are achieved through a strongly ribbed design in combination with an optimized axial fan and air guide covers.



## Complete drive solutions from a single source

NORD DRIVESYSTEMS develops its own motors and supplies them to all major markets throughout the world. These include IE1, IE3, IE4, and IE5+ high efficiency electric motors.

Our own developments ensure a high level of independence from external suppliers and therefore provides our customers with the decisive advantage of short and highly dependable delivery times.

In combination with motor and motor control systems in accordance with Ecodesign directive EN50598.

## International energy efficiency standards

- ► EU: IE1 IE4 as per IEC 60034-30
- US: ee labeling as per EISA 2007 (Dept. of Energy)
- CA: CSA energy verified as per EER 2010
- ▶ CN: CEL as per GB 18613
- ▶ KR: KEL as per REELS 2010

## Energy-saving motors (Catalog M7000)



Single-phase motors (Catalog M7000)



Explosion-protected motors Gas atmospheres (Catalog G2122)



IE5+ synchronous motors (Flyer S9012)





## Explosion protected drive solutions

Dust explosion protected motors

- Category 2D or 3D, Zone 21 or 22
- According to EN 60079-31
- Ignition protection type Ex t (protected by housing)

Gas explosion protected gear units

- Category 2D or 3D, Zone 21 or 22
- According to EN 13463
- Ignition protection Type C (design safety)

Two-speed motors (Catalog M7000)



Smooth motors (Catalog M7000)



Explosion-protected motors
Dust atmospheres (Catalog G2122)

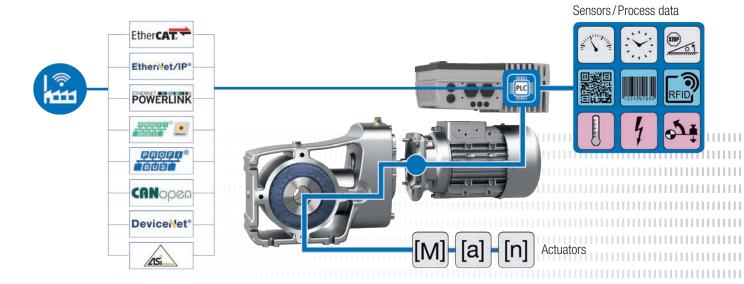


- Hazardous locations
- Class I, Division 2
  Groups A, B, C, D
- Class II, Division 2
  Groups F and G
  Temp Code T3B





Intelligent drives from NORD DRIVESYSTEMS play an important role in highly networked systems to advance the so-called fourth industrial revolution which is based on extensive exchange of information on all levels to increase efficiency and prevent costly downtime.



### NORD DRIVESYSTEMS - INDUSTRY 4.0 READY!

"NORD 4.0 READY!" means that NORD drives are networked, autonomous, and scalable. The key to this are NORD's variable frequency drives with their powerful processors, comprehensive equipment, interfaces, and functions. They not only monitor the VFD and motor conditions, but also the driven load. The integrated PLC processes data from sensors and actuators and if necessary, initiates a control sequence to communicate high quality drive and application data to the control center and other networked components.

For example, intelligent sequence controls can enable the drive unit to locally determine what actions are required. The drive units can also coordinate with each other: "Attention, I am sending a package in your direction. Start your conveyor belt." A follower drive can synchronize to a master for a particular task and then return to normal operation. Hundreds of typical functions are saved as unique parameter sets and can be easily adopted.

As a result, the variable frequency drive can coordinate both simple and complex applications independently from the plant control system, and can respond to changes to the process or remedy many process faults without external intervention.

NORD DRIVESYSTEMS manufactures variable frequency drives and motor starters for precise control of drive systems. VFD solutions are available for conventional control cabinet installations as well as for decentralized, fully-integrated gear units.

## SK 135E NORDAC® START motor starters (Catalog E3000)



- ✓ Integrated electronic brake rectifier
- ✓ Consistent parameter structure

Sizes: 2

Voltage: 3~ 200 − 240 V, 3~ 380 − 500 V Power: 0.16 - 4 HP or up to 10 HP

✓ Reversing starter with soft start function

## SK 180E NORDAC® BASE variable frequency drives (Catalog E3000)



- ✓ Stand-alone operation
- ✓ 4 parameter sets

- ✓ Sensorless current vector control (ISD control)
- ✓ Integrated PLC

Sizes: 2

Voltage:  $1 \sim 110 - 120 \text{ V}$ ,  $1 \sim 200 - 240 \text{ V}$ ,  $3 \sim 200 - 240 \text{ V}$ ,  $3 \sim 380 - 500 \text{ V}$ 

Power: 0.33 - 3 HP

## SK 200E NORDAC® FLEX variable frequency drives (Catalog E3000)



- ✓ Energy saving function
- ✓ Integrated POSICON positioning control

✓ Integrated PLC

Voltage: 1~ 110 - 120 V, 1~ 200 - 240 V, 3~ 200 - 240 V, 3~ 380 - 500 V

Power: 0.33 - 30 HP

## SK 250E NORDAC® LINK field distributors (Catalog E3000)



- ✓ Variable frequency drive or motor starter
- ✓ PLC functionality for drive-integrated functions
- ✓ All connections in plug-in version for easy commissioning and maintenance

Sizes: 2

Voltage: 3~ 380 − 500 V

Power: VFD 0.75 - 10 HP; Motor starter 0.16 - 4 HP



## NORDAC® *ON/ON+* variable frequency drives (Flyer 9013)





- ✓ Wall or motor mounted
- ✓ Ethernet communication
- ✓ Compact design
- ✓ Plug-and-Play solution

Sizes: 3

Voltage: 3~ 400V Power: 0.25 - 1 HP

## SK 500E NORDAC® *PRO* variable frequency drives (Catalog E3000)



- ✓ Stand-alone operation
- ✓ 4 parameter sets
- ✓ Sensorless current vector control (ISD control)
- ✓ Integrated PLC

Size: 11

Voltage: 1~ 110 - 120 V, 1~ 200 - 240 V, 3~ 200 - 240 V, 3~ 380 - 480 V

Power: 0.33 - 200 HP

## SK 500P NORDAC® PRO variable frequency drives (Catalog E3000)



- ✓ Precise current vector control with high overload reserves for operating asynchronous and synchronous motors
- ✓ Universal interface for real time Ethernet
- ✓ Integrated PLC for drive-related functions even in the basic device

Size: 3

Voltage: 1~ 200 - 240 V, 3~ 380 - 480 V

Power: 0.33 - 7.5 HP

## NORDAC® ACCESS BT (Flyer S9090)



- ✓ Stand-alone parameter memory
- ✓ Bluetooth interface for VFDs and NORDCON APP
- ✓ Data transfer to PC via USB
- ✓ Can be plugged in or disconnected during operation

## NORDCON® APP (Flyer S9090)



- ✓ Dashboard-based visualization for drive monitoring and fault diagnosis
- ✓ Parameterization with Help-function and rapid access to parameters
- ✓ Individually configurable oscilloscope function for drive analysis
- ✓ Backup and recovery function for simple handling of drive parameters



The NORDCON APP and NORDAC ACCESS BT – a mobile commissioning and service solution for all NORD drives.



## The ideal solution for intralogistics technology

- ▶ Highly efficient 2-stage bevel gear unit
- ▶ IE4 or IE5+ PMSM synchronous motor
- Power plug connector
- Signal connector
- Incremental encoder
- High overload capacity



## IE5+ synchronous motors

The use of IE5+ synchronous motors minimizes overall costs during service life, achieves considerably greater efficiency, and provides a faster return on investment (ROI). The graphs to the right outline the efficency of IE5+ motors compared to IE4 and IE3 at low speeds and partial loads.

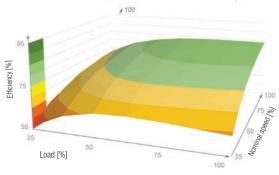
### Wall-mounted variable frequency drives

VFDs	Motors	Motor power [HP]
NORDAC <i>LINK</i>	PMSM - IE5+	0.5 - 5.5
NORDAC FLEX	PMSM - IE5+	0.5 - 5.5

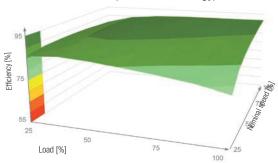
### NORDAC LINK FDS\* SK 250 \*field distribution system

- Internal or external braking resistor
- External 24 V DC supply for the control board, this ensures the same potential for all drive units. The drive units can be accessed via the bus even without the 400 V AC mains voltage, as the control board remains active due to the 24V DC supply.
- Decentralized installation
- ▶ Plug-in VFD
- ▶ Plug-in EEPROM, data can be transferred if servicing is required.

## IE3 drive units (Asynchronous Technology)



## IE5+ drive units (PMSM Technology)





**Products available** with nsd tupH:

DuoDrive

## T tupH

## NORD gear motors with nsd tupH™ are the ideal choice for use in challenging environmental conditions:

- ▶ Easy-to-clean surfaces
- ▶ Resistant to acids and alkalis (wide pH range)
- ▶ Won't blister or flake
- Corrosion-resistant
- Cost-effective alternative to stainless steel
- Free from chromates
- ▶ Complies with FDA Title 21 CFR 175.300

## The complete solution for heavy wash-down conditions:

- Surface-treated housing components
- ▶ DIN and standard components made from stainless steel
- ▶ Wash-down housing (for gear unit and motor)
- Stainless steel shafts
- Special shaft sealing rings
- ▶ Food grade oil

## Sealed surface conversion system

## requirements:

- ▶ Food and Beverage industry
- Dairies
- Pharmaceutical industry
- Water and sewage plants
- Car washes
- Offshore and coastal areas
- Chemical cleaning

## Tests performed on surface-treated aluminum housing components:

- ▶ ASTM D610-08 Corrosion
- ▶ ASTM D1654-08 Scratching
- ▶ ASTM B117-09 Salt Spray Test
- ▶ ASTM D3170 Gravelometer Test
- DIN EN ISO 9227 Salt Spray Mist Test
- ▶ DIN EN ISO 2409 Cross-cut Test

## nsd tupHTM for extreme environmental

- (wash-down, wide PH range)



- ▶ ASTM D714 Blister Formation



NORDBLOC.1®

Helical Gear Units (2 & 3 Stage up to Size 6

CLINCHER™ 0182.1 - 1382.1



NORDBLOC.1® 2-stage Bevel Gear Units



UNIVERSAL SMI Worm Gear Units



Smooth body motors (IE3, IE4, & IE5+)



SK 180E Frequency inverters



SK 135E Motor starters

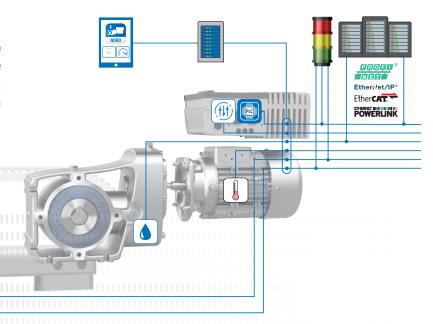


NORD smooth motor with nsd tupH

## Condition monitoring for predicitve maintenance

In condition monitoring, operating and status data are regularly or continuously recorded in order to optimize the reliability and efficiency of the plant and machinery. Important information for predictive maintenance can be derived from the data analysis.

The objective is to maintain machines and plants proactively, to reduce downtimes and to increase the efficiency of the entire plant.



System vibration sensor



- ▶ NORD qualified sensors
- Connection of customized sensors (analog / digital)

System temperature sensor



- ▶ PT1000-based motor temperature sensor
- ▶ Ambient or system temperature

Oil change



- ▶ Determination of the optimal time for oil change on the basis of virtual oil temperature
- ▶ The algorithm is executed in the internal PLC

Drive parameters



- Readout of drive system parameters
- Basis for virtual sensors

Integrated PLC



- Pre-processing of drive-specific parameters and sensors related to the drive
- Evaluation of drive conditions

Beacon signal



- Local display of drive conditions
- Scalable display

Local data management



- Processing of drive data for drive and system analysis
- Condition monitoring

Local dashboard



Display of drive and system data

Higher level PLC



- Processing of condition monitoring information by the customer
- ▶ Combination of the collected condition monitoring data with the process data



## Drive-based approach

Information from condition monitoring can be transferred to predictive maintenance.

- ▶ Sensorless determination of the optimal oil change time based on virtual oil temperature
- Pre-processing of drive data in the integrated PLC
- Provision of data to the customer via all common bus interfaces

## Temperature curve of the oil in the gear unit

- Gear unit parameters and specific operational parameters make it possible to precisely calculate the oil change time.
- ▶ The NORD solution is based on the fact that the oil temperature is a key factor for oil aging in gear units.
- ▶ No physical temperature sensor, as the virtual sensor continuously calculates the present oil temperature.
- ▶ The NORD VFD is used as an evaluation unit: the algorithm is executed in the internal PLC.

### NORD DRIVESYSTEMS modular service concept

With its modular service concept NORD DRIVESYSTEMS provides solutions for maintaining availability and conserving the value of the drive technology. It provides various services in the form of compact modules, which range from assistance in commissioning, specific maintenance packages, and from on-site analysis to estimate repair costs. In addition, there are modernization or optimization measures. Lastly, operators gain the ability to qualify their employees with various training sessions.

### NORD service modules

- Installation and commissioning
- Periodic maintenance and status monitoring
- ▶ Repair, maintenance or replacement
- Spare parts logistics
- Product instruction and training
- Individual contracts
- ▶ 24/7/365 emergency service
- Modernization and extension



# Ordering is Easy With myNORD Online Tools!

- Obtain drawing files direct from quote configuration
- Effortlessly select & configure customized drive solutions
- Create quotes with accountspecific net pricing
- Order-specific documentation
- ▶ 24/7/365 order tracking
- Select and order spare parts



## Register now at myNORD.com!









### US

NORD Gear Corporation Waunakee, WI 800 NORD Drive Waunakee, WI 53597 Tel. 888.314.6673 info.us@nord.com www.nord.com

Corona, CA 1180 Railroad St. Corona, CA 92882 Tel. 888.314.6673 info.us@nord.com

Charlotte, NC 300E Forsyth Hall Dr. Charlotte, NC 28273 Tel. 888.314.6673 info.us@nord.com

### CA

NORD Gear Limited Brampton, ON 41 West Drive Brampton, ON L6T4A1 Tel. 800.668.4378 info.ca@nord.com

### MX

NORD DRIVE SYSTEMS SA DE CV Queretaro, Mexico Av. Industria Textil B.6 Parque Industrial PYME, Huimilpan QRO - Mexico 76950 Tel. 52 442 688 7110 info.mx@nord.com