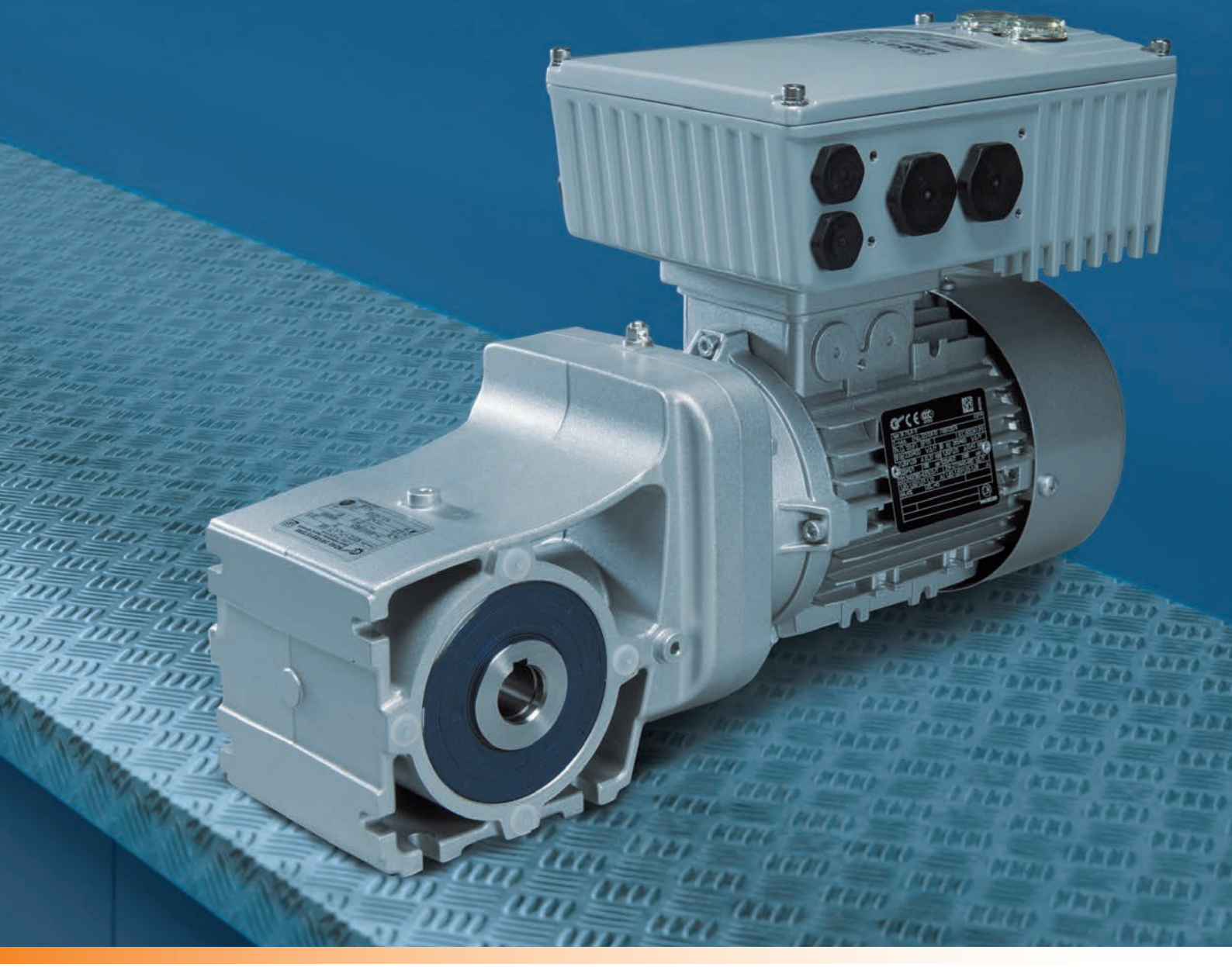
Intelligent Drivesystems, Worldwide Services

MOTOR STARTER WITH REVERSING FUNCTION



US

NORDAC® *START*

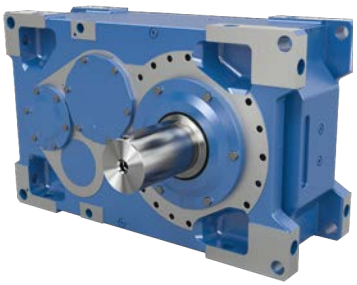
MOTOR STARTER SK 135E

NORD® DRIVESYSTEMS

NORD DELIVERS COMPLETE DRIVE SOLUTIONS
FROM A SINGLE SOURCE

NORD Delivers

NORD offers 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.

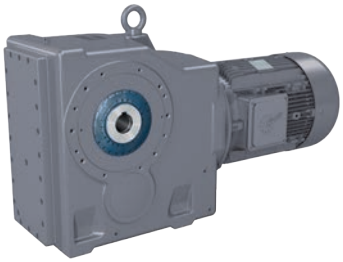


Reduce Lead Times and Decrease Inventory

- 25% of orders ship same day or next day with NO expedite fees
- 47% of orders ship within 5 working days
- 81% of orders ship in 2-3 weeks

Global Product Designs, Standards, and Support

- Innovative product range (one-stop shop)
- Global connected presence
- Mechanical and electrical application engineers ready to assist you
- Online resources



Increase Efficiency and Reduce Operation Costs

- First-class customer service and support, plus myNORD online tools
- Product flexibility through standard components and customizations
- 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 DRIVESYSTEMS

High-performance Solutions

NORD's extensive product portfolio is continuously evolving to meet the needs of today's fast-changing markets, but NORD does far more than manufacture the world's finest drive components. We provide our customers with optimum drive configurations for their specific purposes, providing each and every one of them with complete and efficient systems at a price/quality ratio that's unmatched.

By continuing to invest in the latest research, manufacturing, and automation technology, we are able to deliver innovative drive systems with the highest quality, reliability, and value found in the marketplace today. In short, we never stop improving.

On-time Delivery

NORD's linked global network of assembly and manufacturing operations gives you the best of both worlds – a world leader with local representatives. NORD has subsidiaries and sales partners in 98 countries on five continents, ensuring local inventory, assembly centers, technical support, and customer service.

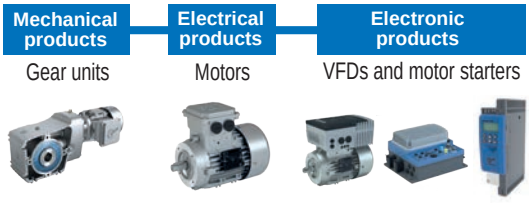
This approach also allows us to provide the shortest lead times in the industry. As a NORD customer, you can rest assured that your order will be delivered on time and on spec. We offer our customers:

- Fast, accurate, reliable service
- Unmatched product versatility and customizations
- Short lead times
- Technical guidance from experienced engineers
- MyNORD online tools (configure, price, quote, and track your order)
- 24/7/365 after hours emergency support via the NORD 911 hotline

Peace of Mind

NORD's customer-first approach means superior drive solutions and peace of mind are just a call or click away. Put NORD's global team of engineers, manufacturing, service and support technicians to work for you. Together, we'll build something great!

Headquarters and technology center in Bargteheide, near Hamburg



Innovative drive solutions for more than 100 branches of industry

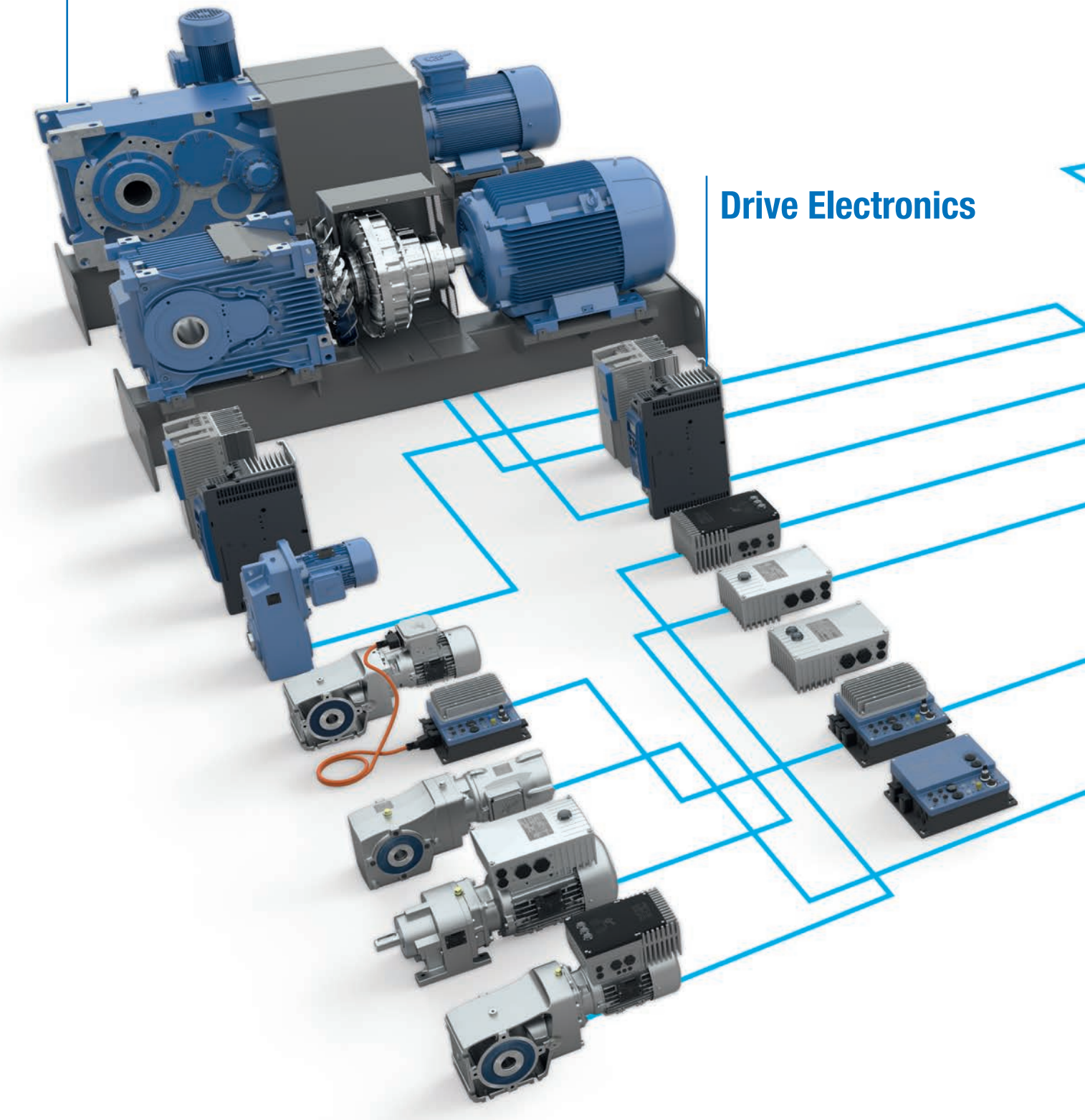
7 production locations with cutting-edge technology produce gear units, motors, VFDs, and more to provide complete drive systems from a single source.

The map shown above is for information only and does not claim to be created for or applicable to any legal purpose. For this reason, we do not assume any liability for legality, correctness and completeness.

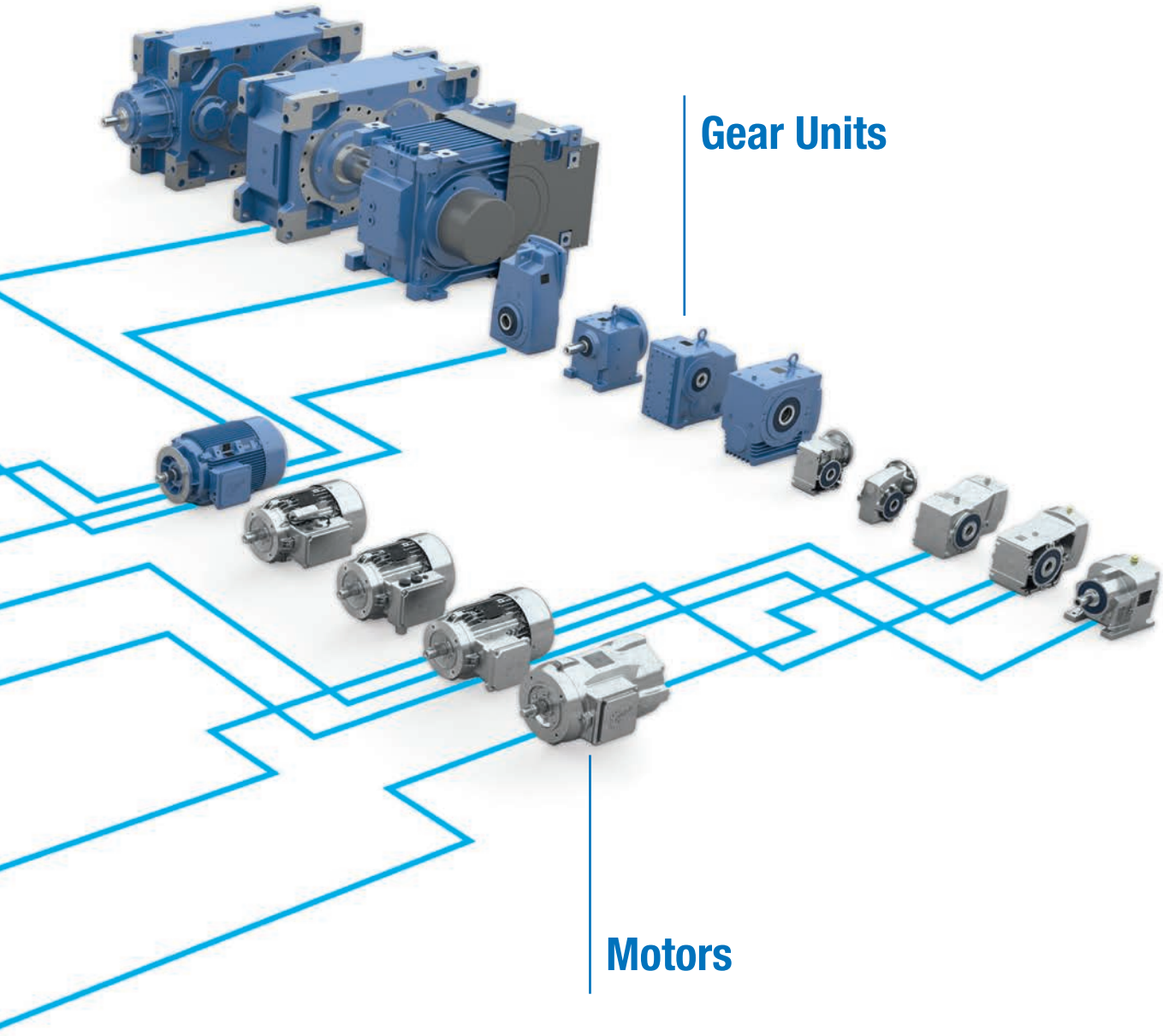
Subsidiaries and sales partners in 98 countries on 5 continents provide local inventory, assembly, technical support, and industry-leading customer service.

More than 4,000 employees throughout the world create customized solutions.

Drive Solutions



Drive Electronics



Our products are available in ATEX certified versions.

An optimum and individual drive solution can therefore be created using the modular NORD system consisting of the gear unit, motor and drive electronics. The modular products are perfectly matched and can be combined in many variants. In addition, we offer planning, project management, installation, and service from a single source.

If required, industry solutions can be configured as a complete logistics package, programmed and ready for use. Each modular NORD product combines: highest product quality, short planning and assembly times, high delivery availability, and a good price/performance ratio. Our products are also available in ATEX certified versions.

MOTOR STARTER WITH REVERSING FUNCTION
NORDAC® *START*

Electric motors are common, in part because they are easy to install and commission. On the other hand, they also come with a set of disadvantages including the high power consumption for the starting torque (up to 7 times the rated current for the motor), excessive mechanical loads on the gear unit and the system as well as the frequently uncontrolled starting and stopping behavior. Electronic starters are a simple and economical solution to these problems. However, NORD devices are far more than simple current limiting “starters” for electric motors.

NORDAC® *START* combines the three functions of a typical electronic motor starter —starter, reversing starter and soft starter. In doing so, it:

- provides comprehensive monitoring and protective functions (AC line, motor, self-monitoring)
- eliminates the need for a motor protection switch
- enables adaptations to the operating characteristics (starting and shut-down behavior) and
- provides optional communication interfaces.

A special feature is the variable mounting of the device. In confined spaces the compact device can be easily used for operation close to the motor.

Many applications, including those in material handling, require electronic starting and stopping of the drive units. The NORDAC® *START* is ideally suited for this. Its versatility makes motor starting and soft starting or reversing mode possible.

Extensive monitoring functions provide protection from overheating. Due to the I^2t triggering characteristic, a motor protection switch is not required. Through the integrated line filter, the NORDAC® *START*, complies with even the most stringent EMC requirements when mounted on the motor.

- Configuration via DIP switches and potentiometers
- Integrated electronic brake rectifier
- Choice of different shut-down modes
- Leakage current <20 mA
- Consistent parameter structure
- 2 digital inputs and outputs

Optional

- Bus interface on board
  - AS-Interface (implemented as SK 175E-ASI)
  - PROFIBUS DP (implemented as SK 175E-PBR)
- System plug connectors (e.g. Harting HAN 10E)
- Variant for ATEX Zone 22 - 3D
- Various control options (switches, Parameter Box)
- 24V AC line unit

Variable operating characteristics

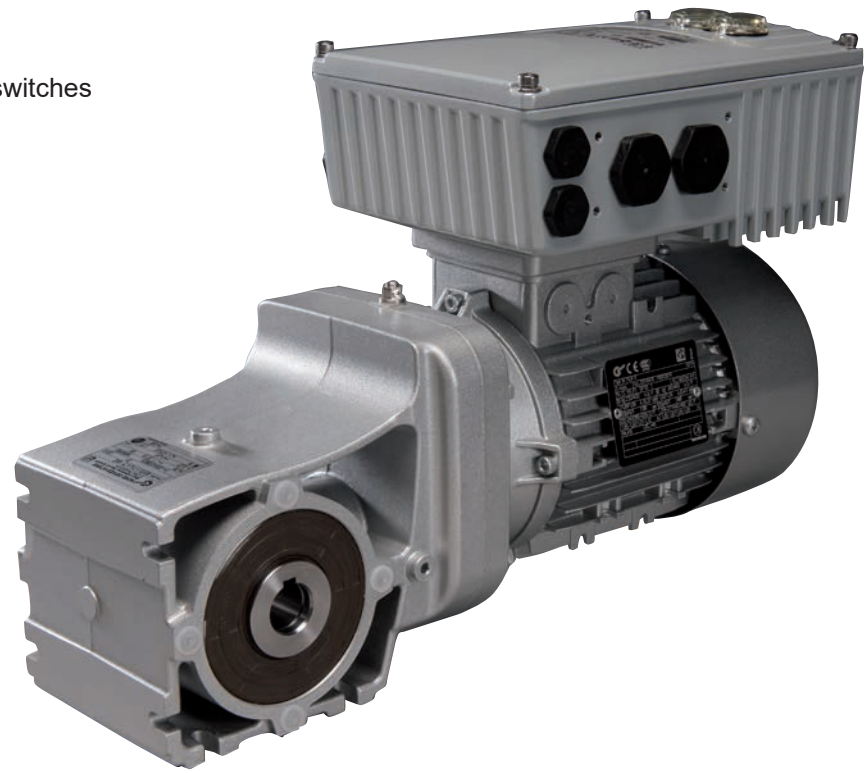
- Pre-defined shut-down modes
- Variable starting and shut-down ramps
- Boost function

EMC line filter - Class B

- Integrated line filter
- Also ideal for applications in a domestic environment, due to compliance with Class B (for motor-mounting or motor cables up to 10 m), or Class A, for wall mounting with motor cable up to 100 m long
- Suitable for personal protection due to low leakage current (< 20 mA) for operation with universal fault current FI circuit breakers

Commissioning

- Commissioning via integrated DIP switches and potentiometer
- No programming skills required



VERSATILE AND SUSTAINABLE
COMMUNICATION AND MORE

Modern automation systems have a wide range of requirements, so that a suitable bus system and drive components must be selected in order to ensure efficient implementation.

AS-Interface

For the lower field level, the **AS-Interface** is a cost-effective solution that enables the networking of binary sensors and actuators. Special versions of the NORDAC *START* product series, which provide an appropriate solution by means of an AS-Interface, are available for this price-sensitive area.

The supply voltage (power) is connected separately via the corresponding terminals. Depending on the device configuration (with jumpers), the control voltage of the motor starter is supplied via the yellow AS-Interface cable, or separately via the black (AUX) cable.

Available in all SK 175E ... ASI devices

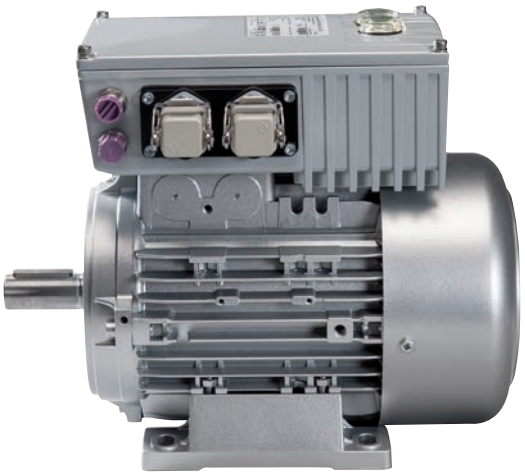
Power (230 V / 400 V)

AS-Interface including 24 V supply (configurable)

PROFIBUS DP

This bus system allows for cyclic exchange of 4 control or 4 status bits via a process data object (with up to 12 Mbps). Addressing is performed via a rotary encoding switch. The PROFIBUS terminator can be enabled with a jumper. Connection is possible with terminal strips or M12 plug connectors.

Available in all SK 175E ... ASI devices



Jumper position	AUX	ASI
ASI profile	S-7.A.	S-7.A.
ASI type	A/B	A/B
Control voltage	Black AS-I cable	Yellow AS-I cable
Inputs/ Outputs	4/4	4/4
Configuration via DIP switch	✔	✔
Configuration via parameters	✔	✔

ATEX-compliant drive systems, zone 22 3D

The NORDAC® *START* can be modified for operation in explosive environments. This allows the operation of the motor starter directly in a hazardous area (ATEX 22-3D).

The advantages:

- Compact drive unit
- No complex protective devices
- No motor cables
- Optimum EMC
- Permissible characteristic curves 50 Hz / 87 Hz
- Control range up to 100 Hz or 3000 rpm

Depending on the area of application (conductive or non-conductive dust) the modification also includes the replacement of the transparent diagnostic caps with a version made of aluminum and glass.

It must be noted that operation of the device within the hazardous area is only permitted with integrable modules (SK CU4 modules, internal brake resistors) or specially approved accessories (ATEX potentiometer "SK ATX-POT").

There are exceptions for SK TU4 modules, which are described in detail in the manual for the device. Other accessories (e.g. external brake resistors, plug connectors) are not approved for use within a hazardous area.

Approval

- According to 2014/34/EU
- ATEX Zone 22 - 3D
  - Version for non-conducting dust: IP55
  - Version for conducting dust: IP66

Available in all devices

PERFECT PROTECTION
PROTECTION CLASS IP69K

nsd tupH
Sealed Surface Conversion System

With **nsd tupH™**, NORD provides an alternative to stainless steel at a fraction of the price. Our special molecular conversion process ensures aluminum alloy drive equipment has all the surface protection that heavy wash-down applications require.

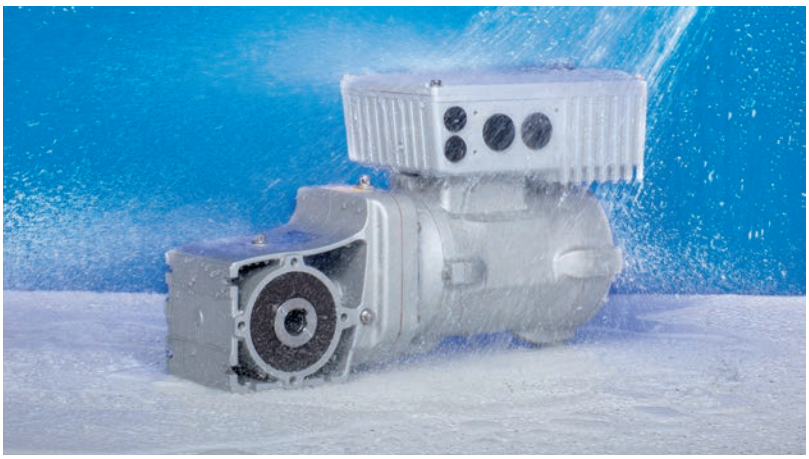
- Corrision-resistant and won't blister or flake
- Easy-to-clean surfaces
- Resistant to acids and alkalis (wide pH range)
- Cost-effective alternative to stainless steel
- Dissipates heat more effectively than stainless steel
- Free of chromates
- Conforms to FDA Title 21 CFR 175.300

nsd tupH™ provides the perfect solution for extreme conditions:

- Surface-treated housing components
- DIN and standard stainless steel components
- Wash-down housing (gear unit and motor)
- Stainless steel shafts; special shaft sealing rings

Products available with nsd tupH™:

- NORDAC® *START* and NORDAC® *BASE*
- Helical inline, helical bevel nd FLEXBLOC® gear units
- Smooth body motors

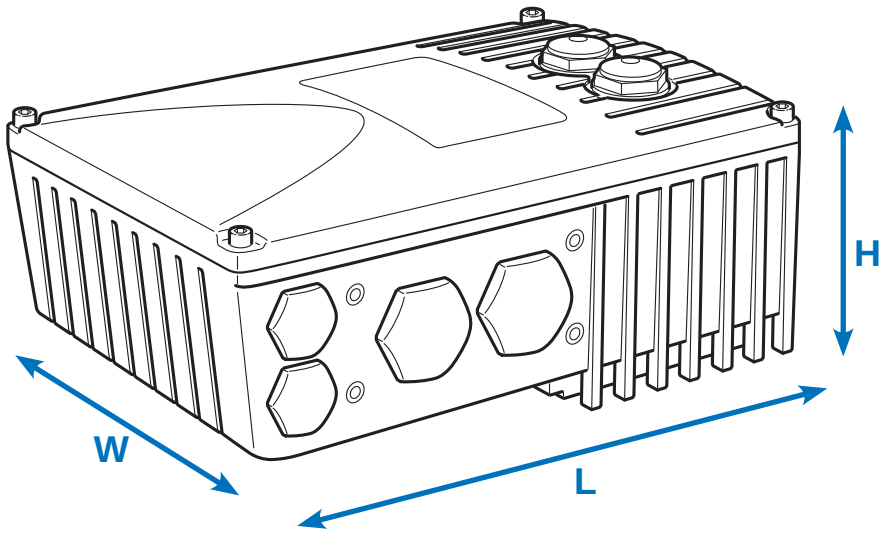


NORDAC® *START* MOTOR STARTER

3~ 200 ... 500 V

Typical overload capacity	150% for 120 s up to 360 s (adjustable)
Motor starter efficiency	> 98%
Ambient temperature	-25 °C...+50 °C (S1), -25 °C +60 °C (S3 - 70 % ED)
Protection class	IP55 optional IP66 optional IP69K
IP66 measures	■ Coated aluminum components ■ Coated circuit boards ■ Low-pressure test
IP69K measures	■ Like IP66 ■ **nsd tupH™** surface treatment
Protective measures against	■ AC line phase failure ■ Motor phase failure ■ Flux monitoring ■ Motor over temperature (PTC) ■ Motor overload ■ AC line over/under voltage
Motor temperature monitoring	I^2t Motor PTC / bi-metal switch
Integrated line filter	
Class B	for motor mounting or 10 m cable length for wall mounting
Class A	for wall mounting with motor cable length up to 100 m
Leakage current	< 20 mA

Motor starters SK 135 E... / SK 175 E...	Nominal motor power		Nominal output current rms [A]	AC line voltage / output voltage	Weight [kg / lbs]	Dimensions L x W x H
	[kW]	[hp]				
-301-340-B	up to 3.0	up to 4	7.5	3~ 200 V … 500 V, -10% / +10%, 47 ... 63 Hz	2.1 kg / 4.6 lbs	221 x 154 x approx. 101 mm 8.70 x 6.06 x approx 3.97 in
-751-340-B	up to 7.5	up to 10	16			



THE ENTIRE TEAM
ALL DEVICE VERSIONS AT A GLANCE

		SK 135E	SK 175E - ASI	SK 175E - PBR
		.33 – 10 HP / 0.25 –7.5 kW		
Basic functions	Soft start function	✓	✓	✓
	Reversing function	✓	✓	✓
	Motor and wall mounting possible [1]	✓	✓	✓
	Energy bus - loop-through of AC line supply cables [2]	✓	✓	✓
	RS-232 diagnostic interface	✓	✓	✓
	Parameters pre-set with standard values	✓	✓	✓
	Scalable display values	✓	✓	✓
	Line filter for limit curve B, for wall mounting with motor cable length up to 10 m and for motor mounting	✓	✓	✓
	Line filter for limit curve A, for wall-mounting with motor cable length up to 100 m	✓	✓	✓
	Extensive monitoring functions	✓	✓	✓
Options	Brake management for mechanical holding brake	✓	✓	✓
	AS-Interface on board	–	✓	–
	PROFIBUS DP on board	–	–	✓
	External 24 V power supply for the control board	❍	❍	❍
	Switch variants	❍	❍	❍
	Plug connectors for control, motor and AC line cables	❍	❍	❍

[1] Wall mounting: Wall mounting kit required
Motor mounting: an adapter for connection to the motor terminal box may be necessary.

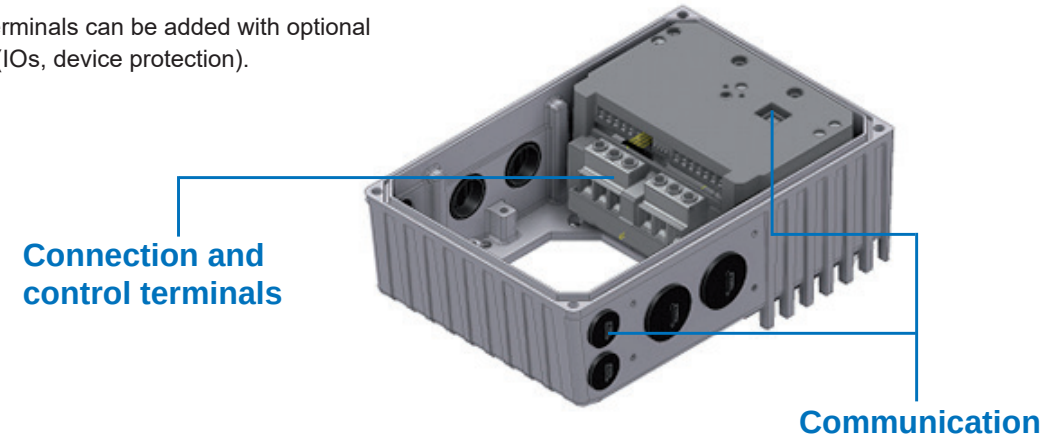
[2] Direct connection to the terminal bar or via system plug connectors

✓ Standard
❍ Optional
– Not available

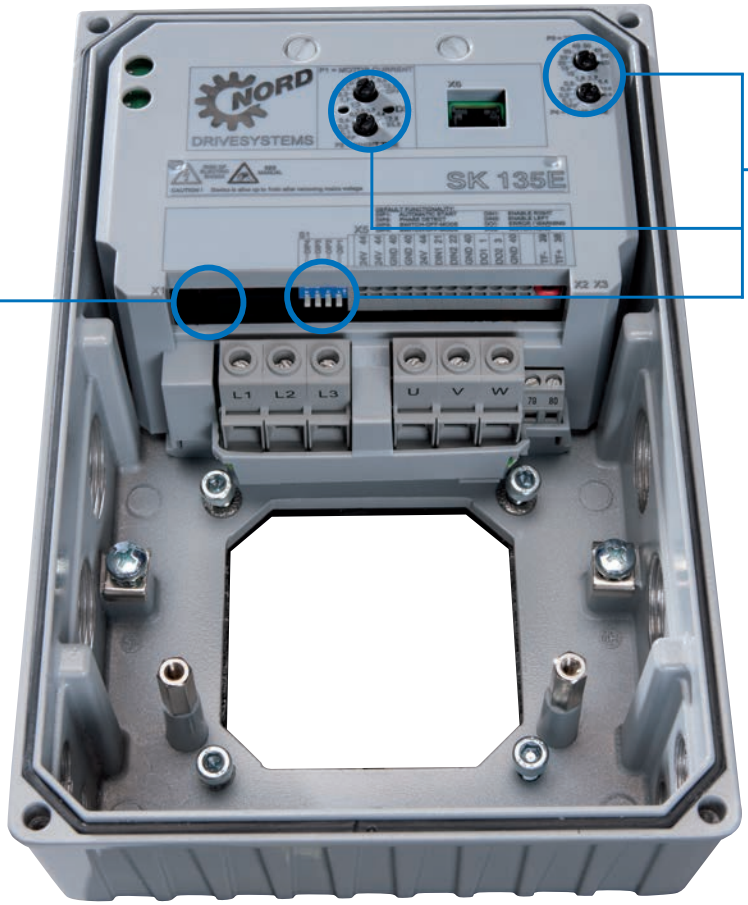
MOTOR STARTER CONTROL CONNECTIONS

		SK 135E	SK 175E - ASI	SK 175E - PBR
		.33 – 10 HP / 0.25 –7.5 kW		
Control terminals	Number of digital inputs (DIN)	4	3	4
	Number of digital outputs (DOUT)	2	2	2
	Brake control	✓	✓	✓
	Temperature sensor (PTC)	✓	✓	✓
Communication	RS-232 RJ12	✓	✓	✓
	AS-I terminal connection	–	✓	–
	PROFIBUS DP terminal connection	–	–	✓

Note
Control terminals can be added with optional modules (IOs, device protection).



CONFIGURATION AND MONITORING
INTEGRATED AIDS FOR SAFE OPERATION



Commissioning with a screwdriver

Commissioning of the device is possible without parameter adaptation, i.e. without programming aids. For this purpose, DIP switches and several 10 step potentiometers are available. These are accessible via the diagnostic opening in the center or by removing the cover. The status LEDs are also located behind this diagnostic opening.

The following parameters can be adjusted in this way:

- Rated motor current
- Dwell time
- Start-up torque
- Start-up and run-down time
- Switch-off mode
- Phase sequence detection
- Automatic start
- PROFIBUS DP addressing (only SK 175E-...-PBR)

Jumpers for configuration

The communication interface can be configured by changing the jumper position.

- SK 175E-...-ASI: Communication mode
  - ASI (supply for interface and device via yellow cable) or
  - AUX (supply for interface via yellow cable and for device via black cable)
- SK 175E-...-PBR: Interface terminator

Available in all SK 175E devices

Status and diagnostic cockpit

Depending on the type of device, various aids for monitoring and diagnostics are located behind two transparent cover caps. In addition, there are other elements (e.g. potentiometers or similar) which are useful for screwdriver-assisted commissioning.

1 Status LEDs and potentiometers

In addition to status and readiness indicators, the actual overload level, warnings and error messages of the integrated bus system (SK 175E) are indicated by the LEDs.

Operational settings of the motor starter can be set with the potentiometers.

2 Diagnostic interface, RS-232

RJ12 interface for connection of a diagnostic and parameterization tool (e.g. PC with NORDCON software, ParameterBox[1]). Analysis, diagnostics, parameterization and monitoring of the drive unit via software is possible during commissioning or service.

[1] Use of a parameterization unit also requires the use of a signal converter.
(SK TIE4-RS-485-RS-232, Part No. 275 274 603)

VARIED INSTALLATION POSSIBILITIES
MOTOR AND WALL MOUNTING

Motor Assembly

The motor starter can be mounted directly on the terminal box base of the gear motor, thus forming a perfect unit consisting of the drive and the control technology. This motor-mounted format makes full use of its unbeatable advantages: compact overall dimensions of the drive unit; near immediate readiness for use after connection to the AC line thanks to the pre-configuration of the drive unit at the factory; optimum EMC due to short cable lengths, or elimination of a motor cable.

Wall mounting

Alternatively, the device also can be mounted close to the motor using an optional wall mounting kit. You can select from different versions depending on the prevalent ambient conditions.

1. Standard version **SK TIE4-WMK-1-K**

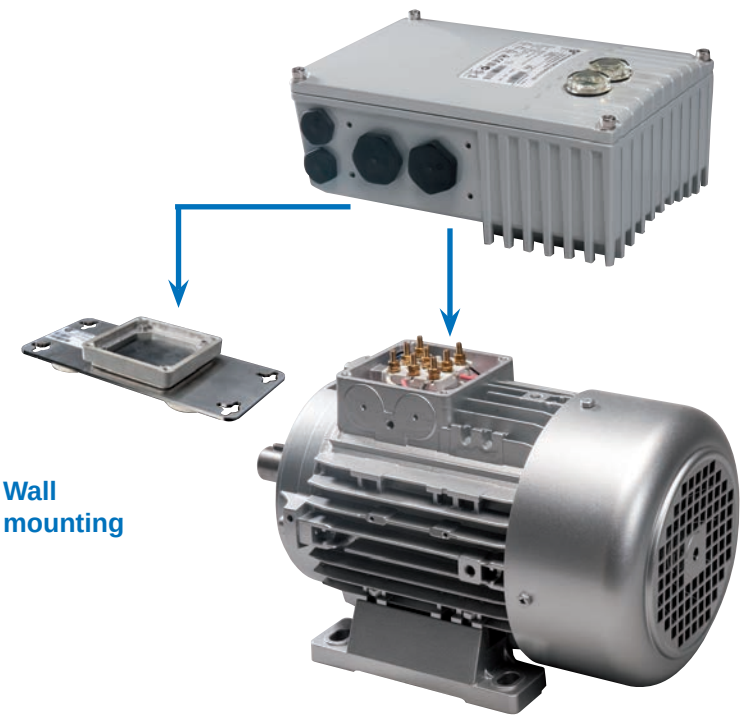
2. Version with **nsd tupH™** surface treatment **SK TIE4-WMK-1-NSD**
This version differs from the standard version due to the different material and **nsd tupH™** surface treatment. It is intended for heavy wash-down applications in which protection class IP69K is required.

3. ATEX version **SK TIE4-WMK-1-EX**
This version is functionally comparable to the standard version, however it is suitable for use in explosion hazard environments (ATEX Zone 22 3D).

Designation	Material No.	Starter Frame Size
SK TIE4-WMK-1-K	275 274 004	Size 1
SK TIE4-WMK-2-K	275 274 015	Size 2
SK TIE4-WMK-1-NSD	275 274 014	Size 1
SK TIE4-WMK-2-NSD	on request	Size 2
SK TIE4-WMK-1-EX	275 175 053	Size 1
SK TIE4-WMK-2-EX	275 175 054	Size 2
SK TIE4-WMK-TU	275 274 002	Type: SK TU4-

[1] Mounting of the WMK underneath the motor starter
[2] H = Increase in the total height of the device if mounted on the wall mounting kit
[3] Mounting of the WMK on the connection unit of the technology unit

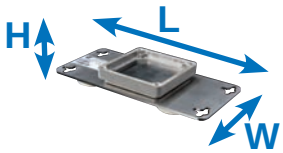
Motor-mounted or wall-mounted motor starters



Wall mounting

Motor Assembly

Designation	Version Material	Inte-grated fan	Achievable protection class	Weight	Dimensions L x W x H	Remarks
SK TIE4-WMK-1-K	Plastic	-	IP66	0.2 kg .44 lbs	205 x 95 x 5 mm 8.07 x 3.7 x .19 in	
SK TIE4-WMK-2-K	Plastic	-	IP66	0.3 kg .66 lbs	235 x 105 x 5 mm 9.25 x 4.13 x .19 in	
SK TIE4-WMK-1-NSD	Stainless steel	-	IP69K	0.6 kg 1.32 lbs	205 x 95 x 4 mm 8.07 x 3.7 x .15 in	**nsd tupH™** - Surface treat-ment of terminal box cover
SK TIE4-WMK-2-NSD	Stainless steel	-	IP69K	0.8 kg 1.76 lbs	235 x 105 x 10 mm 9.25 x 4.13 x .39 in	**nsd tupH™** - Surface treat-ment of terminal box cover
SK TIE4-WMK-1-EX	Stainless steel	-	IP66	0.6 kg 1.32 lbs	205 x 95 x 4 mm 8.07 x 3.7 x .15 in	
SK TIE4-WMK-2-EX	Stainless steel	-	IP66	0.8 kg 1.76 lbs	235 x 105 x 10 mm 9.25 x 4.13 x .39 in	
SK TIE4-WMK-TU	Stainless steel	-	IP66	0.4 kg .88 lbs	155 x 85 x 3 mm 6.10 x 3.34 x .11	



SK TIE4-WMK-1-EX

SK TIE4-WMK-L-1

SK TIE4-WMK-1-K

SK TIE4-WMK-TU

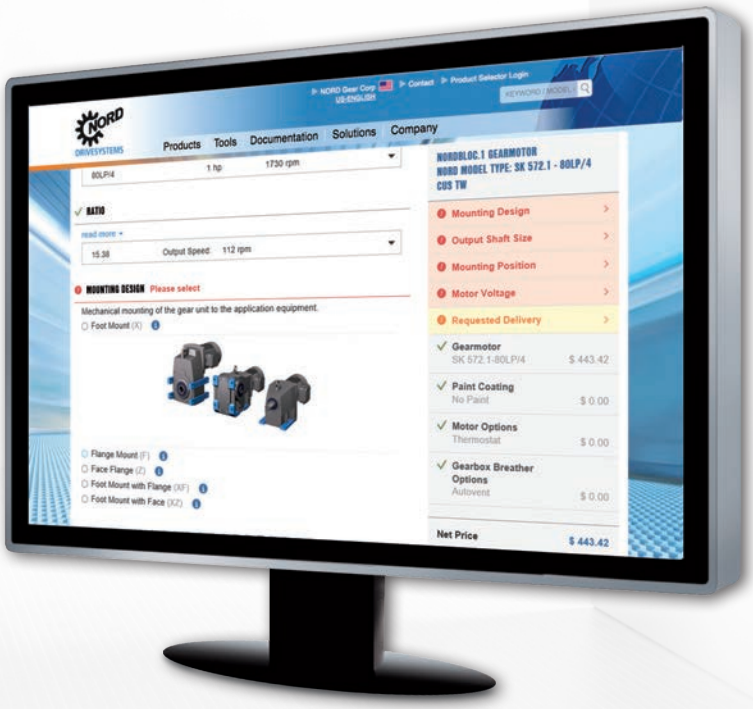
Technology unit on NORDAC® *START* or wall mounting

Wall mounting

Motor Assembly

Ordering is Easy With myNORD Online Tools!

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



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