COMPLETE DRIVE SYSTEMS FROM A SINGLE SOURCE

US

TECHNICAL HANDBOOK

March 2020

NORD®

DRIVESYSTEMS

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ABOUT NORD
DRIVESYSTEMS

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 shipments and custom nameplates
- Partner with a company that is easy to do business with and wants to see you succeed!

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.

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. 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!

About NORD

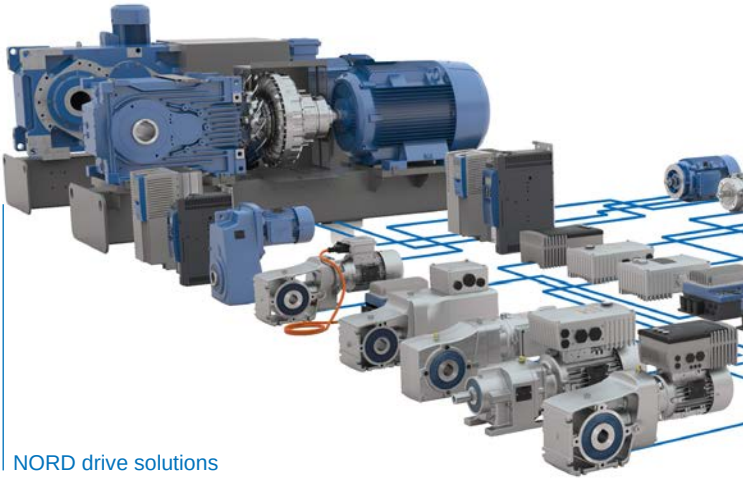
50 Years of Service
Founded in 1965, NORD has grown to a global company of more than 4,000 employees.

Innovative Drive Solutions
NORD designs, engineers, and manufactures products for more than 100 demanding industries.

State-of-the-art Production
Plants Specialized facilities produce gear units, motors, and VFDs for complete drive solutions from a single source.

Global Support Network
NORD's worldwide partners provide local stock, assembly, production, technical support, and customer service.

COMPLETE DRIVE SOLUTIONS FROM A SINGLE SOURCE

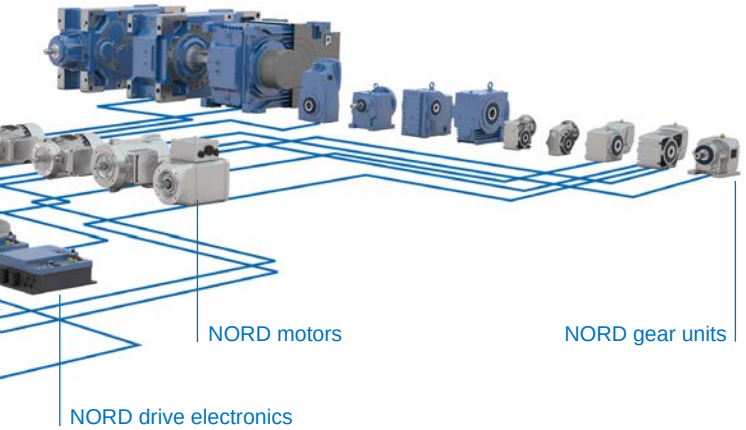


NORD drive solutions

NORD's modular design lets users create customized solutions that match their requirements. From gear units to motors to drive electronics, each of the variants combines the highest product quality, short lead times, rapid delivery, and a strong price/performance ratio.

RELIABLE

- Superior dependability
- Long service life
- High load capacity
- In-house development and production
- UNICASE housing
- Quality engineering



FLEXIBLE

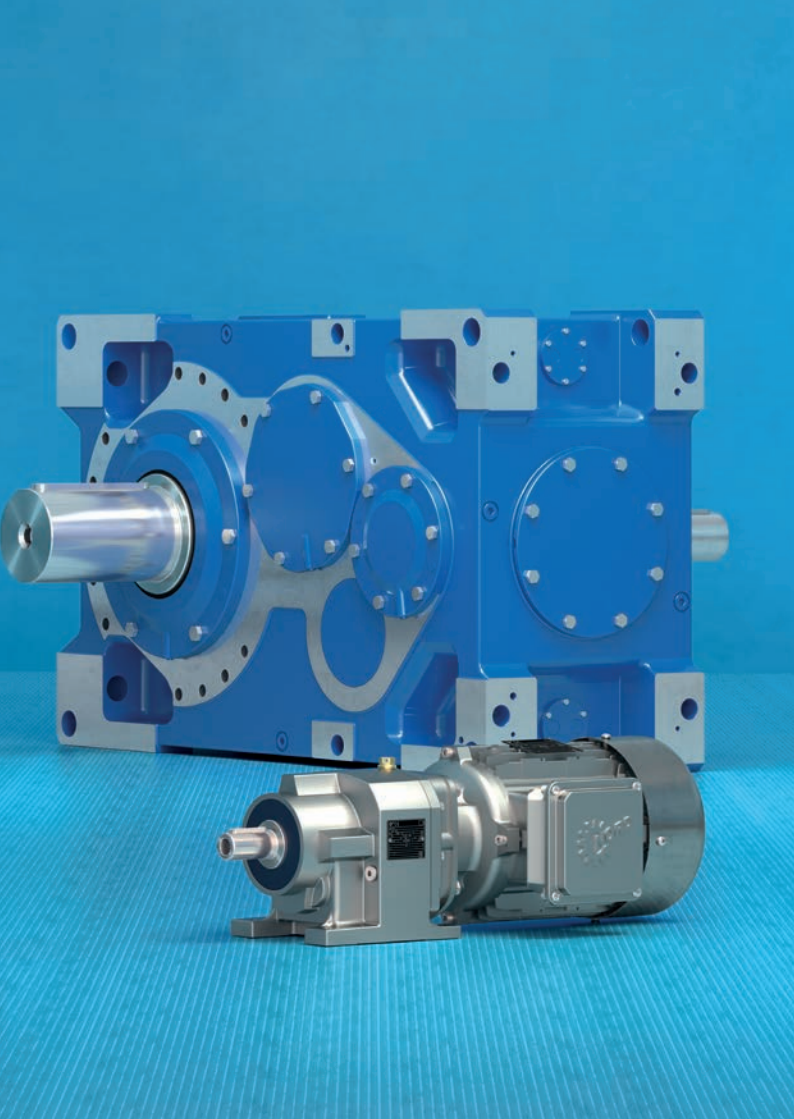
- Modular products
- Scalable functions
- Large range of drive units
- Complete drive solutions
- Short lead times

INTERNATIONAL

- Worldwide presence
- Local engineering support, assembly, and service

GEAR UNITS

HELICAL, CLINCHER™ PARALLEL SHAFT, BEVEL, AND WORM GEAR UNITS



HELICAL INLINE GEAR UNITS

Robust and reliable

Helical Inline Gear Units

- Foot or flange mounted
- Long service life, low-maintenance
- Closely stepped ratios
- Versatile input designs

Sizes	11
Power	0.16 – 200 HP
Torque	Up to 205,000 lb-in
Speed Ratio	1.35 – 14,340.31:1
Gear Efficiency	Up to 98%

Helical Inline Gear Units

SK 7 2

- 7 — Housing size
- 2 — Gear stages
- (blank) — No options (solid shaft, foot mounting)

Special nomenclature:

- SK 33 = Standard series
- SK 33N = UNICASE™ series

NORDBLOC.1® HELICAL GEAR UNITS

The innovative performer

NORDBLOC.1® Single Stage Helical Gear Units

- ✓ Foot or flange mounted
- ✓ Corrosion-resistant aluminum alloy housing *(cast iron SK 871.1 and up)*
- ✓ Suitable for high-speed applications
- ✓ High permissible radial and axial forces
- ✓ NEMA standard output flange and shafts
- ✓ Innovative hollow-socket output options

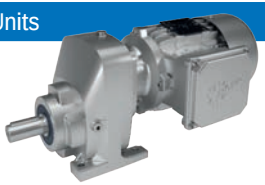
Sizes	8
Power	0.16 – 60 HP
Torque	Up to 8,851 lb-in
Ratio	1.07 – 13.1:1
Efficiency	Up to 98%

NORDBLOC.1® Two-stage Helical Gear Units

- ✓ Foot or flange mounted
- ✓ Corrosion-resistant aluminum alloy housing *(cast iron SK 772.1 and up)*
- ✓ High permissible radial and axial forces
- ✓ Smooth surface; long bearing life
- ✓ Comparable to standard European models

Sizes	8
Power	0.16 – 60 HP
Torque	Up to 29,205 lb-in
Ratio	2.1 – 456.77:1
Efficiency	Up to 97%

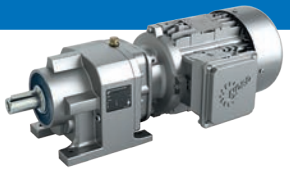
NORDBLOC.1® Single Stage Helical Gear Units



SK 8 7 1 .1 ___

- ___ No options (solid shaft, foot mounting)
- .1 New design
- 1 Gear stages
- 7 NORDBLOC design
- 8 Housing size

NORDBLOC.1® Helical Gear Units



SK 8 7 2 .1 F

- F B5 flange
- .1 New design
- 2 Gear stages
- 7 NORDBLOC design
- 8 Housing size

PARALLEL SHAFT GEAR UNITS

Slim and powerful

CLINCHER™ Parallel Shaft Gear Units

- Foot, flange, or shaft mounted
- Hollow or solid shaft
- Compact design
- Long service life, low maintenance
- Keyless shaft designs with Shrink Disc and GRIPMAXX™
- Quiet operation
- nsd tupH™ available on aluminum versions (SK 0182.1 - 1382.1)

Sizes	15
Power	0.16 – 200 HP
Torque	Up to 638,000 lb-in
Speed Ratio	4.03 – 15,685.03:1
Efficiency	Up to 97%

CLINCHER™ Parallel Shaft Gear Units

SK 9 3 82 AZ SH

- SH – Shrink disc / cover
- AZ – Hollow shaft / B14 flange
- 82 – Parallel shaft gear units
- 3 – Gear stages
- 9 – Housing size

NORDBLOC.1® Parallel Shaft Gear Units

SK 1 2 82 .1 VX

- VX – Solid shaft / foot mounting
- .1 – New design
- 82 – Parallel shaft gear units
- 2 – Gear stages
- 1 – Housing size

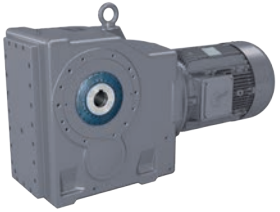
Special nomenclature (NORDBLOC.1®):

- For SK 1282.1 and SK 1382.1 the number of stages can be obtained from the nomenclature (2-stage and 3-stage versions are available)

HELICAL BEVEL GEAR UNITS

Powerful and proven

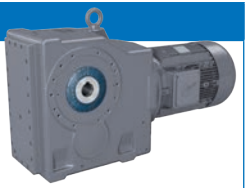
Helical Bevel Gear Units



- Foot, flange, or shaft mounted
- Hollow or solid shaft, keyless bore options
- Keyless shaft designs with Shrink Disc and GRIPMAXX™
- High efficiency
- Long service life, low maintenance
- Cast iron housing
- Various bearing concepts for high axial and radial load capacities
- Quiet operation

Sizes	11
Power	0.16 – 200 HP
Torque	Up to 442,500 lb-in
Speed Ratio	8.04 – 13,432.68:1
Efficiency	Up to 95%

Helical Bevel Gear Units



SK 90 4 2 .1 AZ

- 90 — Series 90
- 4 — Housing size
- 2 — Gear stages: 2 helical gear stages, 1 bevel gear stage
- .1 — New design
- AZ — Hollow shaft/B14 flange

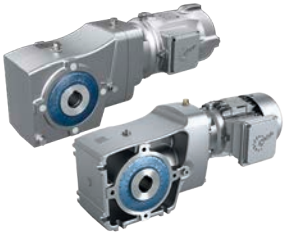
Special nomenclature:

- A 6 at the designation end indicates a reinforced version, 3-stage (e.g. SK 9016.1)
- A 7 at the designation end indicates a reinforced version, 4-stage (e.g. SK 9017.1)

TWO-STAGE HELICAL BEVEL GEAR UNITS

Powerful by design

Two-stage Helical Bevel Gear Units



- Foot, flange, or shaft mounted
- Hollow or solid shaft
- Aluminium alloy housing
- Wash-down with nsd tupH™ (optional)
- Keyless shaft designs with Shrink Disc and GRIPMAXX™
- High power density
- Compact design

Sizes	6
Power	0.16 – 12 HP
Torque	Up to 5,800 lb-in
Speed Ratio	3.03 – 70:1
Efficiency	Up to 97%

Two-stage Helical Bevel Gear Units

SK 92 3 7 2 .1 VZ

- VZ – Solid shaft/B14 flange
- .1 – New design
- 2 – Gear stages: 1 helical gear stage, 1 bevel gear stage
- 7 – NORDBLOC design
- 3 – Housing size
- 92 – Series 92

SK 93 6 7 2 .1 AZ

- AZ – Hollow shaft/B14 flange
- .1 – New design
- 2 – Gear stages: 1 helical gear stage, 1 bevel gear stage
- 7 – NORDBLOC design
- 6 – Housing size
- 93 – Series 93

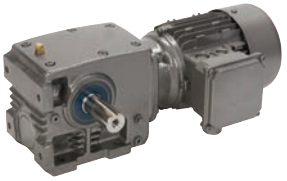
Special nomenclature:

- SK 920072.1/SK 930072.1 have the smallest available housing (Size 00)

HELICAL WORM GEAR UNITS

Quiet yet powerful

Helical Worm Gear Units

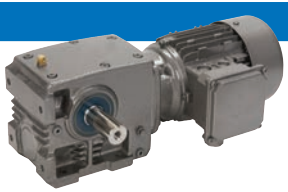


- Foot, flange or shaft mounted
- Hollow or solid shaft
- Keyless shaft designs with Shrink Disc and GRIPMAXX™
- Quiet operation
- High overload capacity
- High axial and radial load capacity
- Cast iron housing (Size SK 02040.1 aluminum alloy)

Sizes	6
Power	0.16 – 20 HP
Torque	407 - 27,350 lb-in
Speed Ratio	4.40 – 7,095.12:1
Efficiency	Up to 94%

Helical Worm Gear Units

SK 1 2 080



- 080 — Worm gear size (Center distance between gear and pinion 80 mm)
- 2 — Gear stages: 1 helical gear stage, 1 worm gear stage
- 1 — Housing size (in combination with worm gear size)

SK 4 2 125 AZ B H

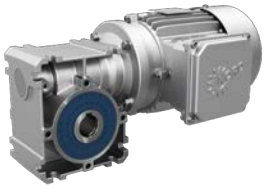
- H — Hollow shaft cover
- B — Fastening element
- AZ — Hollow shaft/B14 flange
- 125 — Worm gear size (125 mm)
- 2 — Gear stages: 1 helical gear stage, 1 worm gear stage
- 4 — Housing size (in combination with worm gear size)

- This nomenclature can also be used for the SK 02040.1

FLEXBLOC® WORM GEAR UNITS

Engineered for flexibility

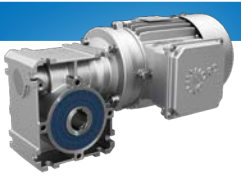
FLEXBLOC® Worm Gear Units



- Modular
- Universal mounting
- Lubricated for life
- NEMA and IEC versions
- Aluminium alloy housing

Sizes	5
Power	0.16 – 5 HP
Torque	186 - 4,683 lb-in
Speed Ratio	5 – 3,000:1
Efficiency	Up to 94%

FLEXBLOC® Worm Gear Units



SK 1 SI 75 / H10

- 1 — Gear stages
- SI — SI design
- 75 — Worm gear size (Center distance between gear and pinion 75 mm)
- H10 — Helical gear pre-stage 10:1

MINICASE™ WORM GEAR UNITS

Versatility in a compact footprint

MINICASE™ Worm Gear Units

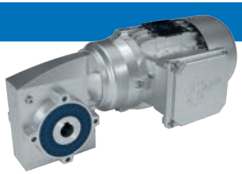
- Smooth surfaces
- Lubricated for life
- NEMA and IEC versions
- Aluminium alloy housing
- Wash-down with nsd tupH™ (optional)

Sizes	5
Power	0.16 – 5 HP
Torque	186 - 4,683 lb-in
Speed Ratio	5.00 – 3,000:1
Efficiency	Up to 94%

MINICASE™ Worm Gear Units

SK 1 SMI 31 AZ

- Hollow shaft / B14 flange
- Worm center distance (31 mm)
- SMI design
- Gear stages



OVERHEAD CONVEYOR DRIVES

Space-saving design

Overhead Conveyor — SK 9055, 9105, and 9155

Designed with mounting and output shafts that easily drop into industry-standard footprints.

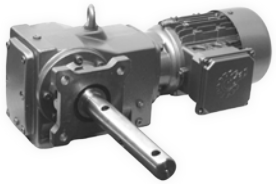
- High overhung load capacity
- QUADRALIP™ sealing system
- Spread bearing design with dry cavity for optimized oil leakage protection
- Low maintenance, long service life

Sizes	3
Power	0.33 – 60 HP
Torque	Up to 75,230 lb-in
Speed Ratio	8.10 – 3735.92:1
Efficiency	Up to 96%

SCREW CONVEYOR PACKAGE

Rugged reliability

Screw Conveyor Package (SCP)



Available for both CLINCHER™ parallel shaft and helical-bevel right angle gear units. SCP eliminates the need for costly separate V-belt drives by providing integral gearmotors or direct coupled motors to a NEMA C-face reducer.

- Direct coupling input design
- Optimized sealing system
- Closely stepped speed reduction ratios
- Compact and cost effective
- Increased reliability, simplified maintenance
- Standard CEMA mounting
- CEMA shaft sizes: 1-1/2”, 2”, 2-7/16”, 3”, and 3-7/16”
- For use with cast-iron gear units

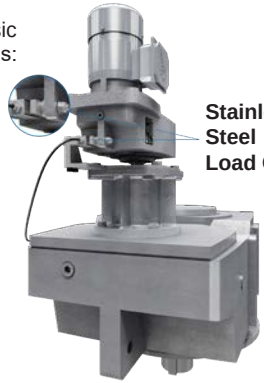
Sizes	Clincher (12) Helical-Bevel (10)
Power	0.16 – 60 HP
Torque	Up to 53,100 lb-in
Speed Ratio	4.32 – 4,246.38:1
Efficiency	Up to 97%

TORQUEPROTECT™ TORQUE MONITORING SYSTEM

Torque and load monitoring system for wastewater treatment facilities, power generation plants and other industries that require extreme low-speed, high-torque drives.

TORQUEPROTECT™ is available in basic and advanced configurations and includes:

- One NORD gearbox
- NEMA 4X control panel using Avery Weigh-Tronix scale head with proprietary NORD firmware
- An IP67 sealed stainless steel load cell to continuously monitor torque
- A digital display, which provides continuous torque monitoring feedback displayed as a percentage of maximum acceptable load – as defined by the customer
- Three user-adjusted relay set points and corresponding indicator lights, plus a fourth light to ensure system is fully functioning, wiring is correct, and load cell is active
- Compatibility with user-supplied devices (e.g. stack lights, buzzers, warning beacons)
- A 4-20mA analog output module that allows remote monitoring (advanced package only)

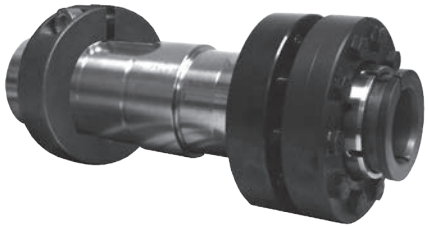


GRIPMAXX™ KEYLESS BUSHING SYSTEM

GRIPMAXX™ is a keyless bushing system that can accommodate a wide range of solid shaft sizes while providing a high-capacity, zero-backlash fit. GRIPMAXX also eliminates the typical assembly and disassembly challenges by providing generous clearances for easy installation and removal of the gearbox.

Featuring a NORD shrink disc locking collar, an oversized gear reducer hollow bore, and a wide range of possible split-bushing inserts, GRIPMAXX is ideal for retrofits.

- Extensive bore flexibility*
- No special shaft tolerances – use readily available cold-finished shaft stock*
- Simplified installation and removal
- Busings are corrosion resistant
- Optimally designed for shaft or torque-arm mounted gear units
- Symmetrical versions available for right angle gear products



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

GEAR UNIT OPTIONS

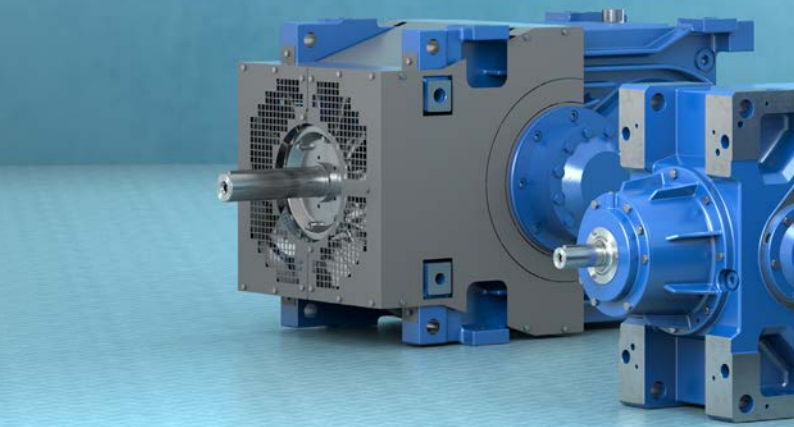
Designation	Meaning
A	Hollow shaft
AF	Hollow shaft, flange B5
AX	Hollow shaft, foot mounting
AXF	Hollow shaft, foot mounting, flange B5
AXZ	Hollow shaft, foot mounting, flange B14
AZ	Hollow shaft, flange B14
AZD	Hollow shaft, flange B14 with torque arm
AZK	Hollow shaft, flange B14 with torque bracket
B	Fixing element for hollow shaft
D	Torque arm
EA	Splined hollow shaft, DIN 5480
G	Rubber buffer for torque arm
H	Cover as a touch guard
H66	IP66 hollow shaft cover
IEC	Adapter for fitting IEC standard motors
LX	Solid shaft - both sides, foot mounting
M	Keyless hollow shaft with GRIPMAXX™ bushing
MK	Motor bracket
NEMA	Adapter for fitting NEMA standard motors
R	Integrated backstop
RLS	Backstop in W adapter
S	Hollow shaft with shrink disc
SCP	Screw Conveyor Package

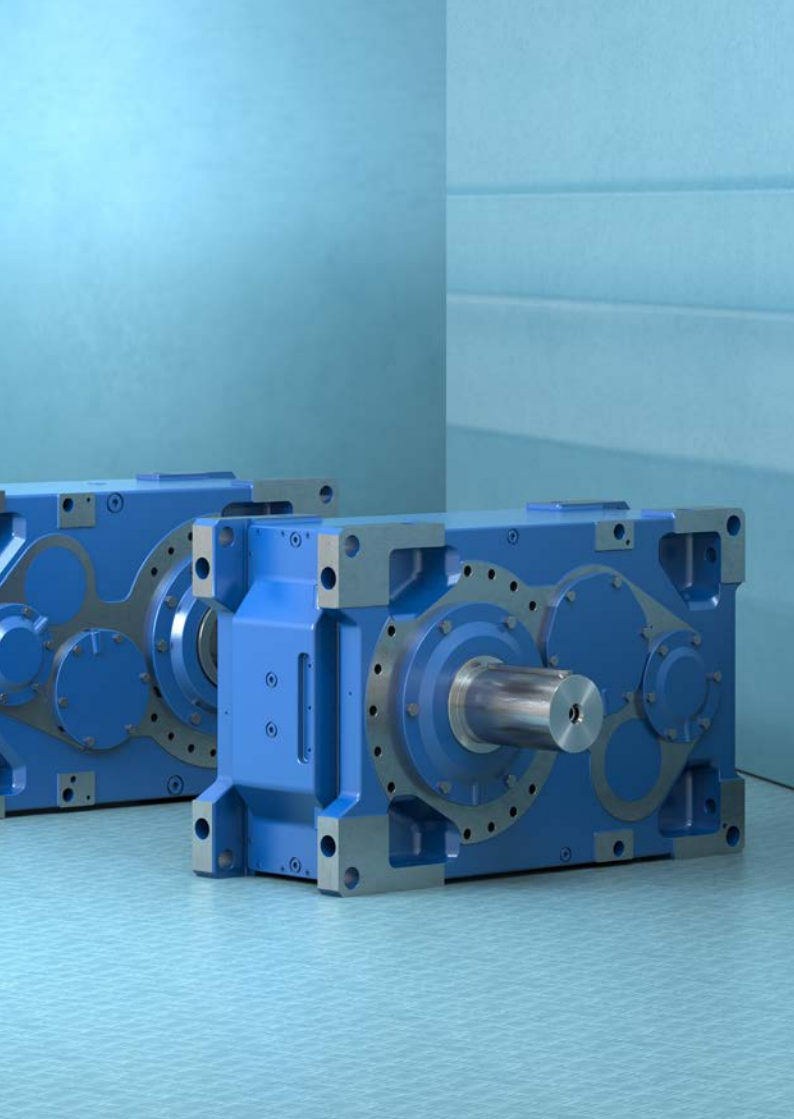
Designation	Meaning
SEK	Servo adapter with clamp coupling
SEP	Servo adapter with parallel key coupling
V	Solid shaft
VF	Full shaft, flange B5
VL	Reinforced bearings
VL2	Agitator version
VL3	Agitator design with drywell
VL4	Agitator design with true drywell
VS	Heavy-duty hollow shrink disc shaft
VX	Solid shaft, foot mounting
VXF	Solid shaft, foot mounting, flange B5
VXZ	Solid shaft, foot mounting, flange B14
VZ	Solid shaft, flange B14
W	Drive cylinder with free input shaft
XF	Foot mounting, flange B5
XZ	Foot mounting, flange B14

- Not all options are available for all gear units
- Additional options available. See product-specific catalog.
- Further options in the cited catalogs or on request (e.g. belt drives)
- Multiple options are stated in succession, e.g.: SK 2282ASHG (hollow shaft with shrink disk, cover, rubber buffer)

INDUSTRIAL GEAR UNITS

MAXXDRIVE® HELICAL GEAR UNITS
MAXXDRIVE® BEVEL GEAR UNITS
MAXXDRIVE® XT BEVEL GEAR UNITS





MAXXDRIVE® INDUSTRIAL GEAR UNITS

MAXXDRIVE® Industrial Gear Units

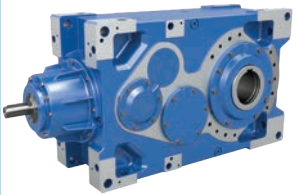
- No separating joints in the housing, no sealing surfaces subject to torque
- All bearing and sealing surfaces are machined in a single process (promoting quieter operation and a long service life)
- High-precision axis alignment
- Low maintenance
- Gear ratio range 5.54 to 400:1 with the same foot dimensions
- Parallel shaft and right-angle options

MAXXDRIVE® Helical Gear Units

- Universal gear units
- 2- and 3-stage
- Multiple mounting and cooling options
- Modified bearing options for high radial and axial load capacity
- Compact design
- All installation positions

Sizes	11
Power	50 – 2,000 HP
Torque	130,000 - 2,250,000 lb-in
Speed Ratio	5.54 – 30,000:1

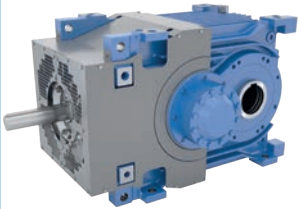
MAXXDRIVE® Helical Bevel Gear Units



- Universal gear units
- 3- and 4-stage
- Multiple mounting and cooling options
- Modified bearing options for high radial and axial load capacity
- Compact design
- All installation positions

Sizes	11
Power	50 – 2,000 HP
Torque	130,000 – 2,250,000 lb-in
Speed Ratio	12.61 – 30,000:1

MAXXDRIVE® XT Industrial Gear Units



- 2-stage
- Optimized housing and surface design for highest thermal performance limit
- Integrated high power axial fan
- High power ratings, low speed ratios
- Optimized for horizontal installation orientation
- Ideal for applications such as belt or bucket conveyors

Sizes	7
Power	50 - 1,500 HP
Torque	130,000 – 660,000 lb-in
Speed Ratio	6.14 – 22.91:1

MAXXDRIVE® INDUSTRIAL GEAR UNITS

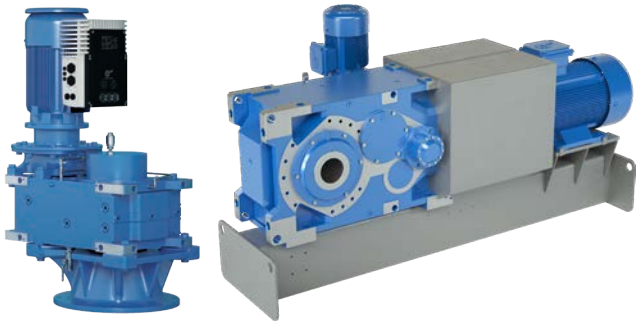
MAXXDRIVE® Industrial Gear Units

SK 11 2 17 AS H MS FAN 355LP/4

- 355LP/4 — Motor designation
- FAN — Additional options (FAN, CC …)
- MS — Motor adapters (IEC, NEMA, MST, MSF ...)
- H — Additional options (D, H, B …)
- AS — Shaft and mounting options (A, AF, AS, V, L …)
- 17 — Designation of type
- 2 — Stages
- 11 — Sizes (5 – 15)

Stages	07	17	07
	Helical gear units	Helical bevel gear units	
	MAXXDRIVE®	MAXXDRIVE® XT	MAXXDRIVE®
2-stage	2	2	–
3-stage	3	–	4
4-stage	–	–	5

MAXXDRIVE® Drive System



- Complete drive systems consisting of the gear unit, motor, and drive electronics
- Wide selection of other components, e.g. couplings, brakes, etc.
- Standardized solutions for swing bases and base frames e.g. for belt conveyors, bucket elevators, etc.
- Systems tailored to applications, e.g. agitators, extruders, etc.
- Individually adaptable

INDUSTRIAL GEAR UNIT OPTIONS

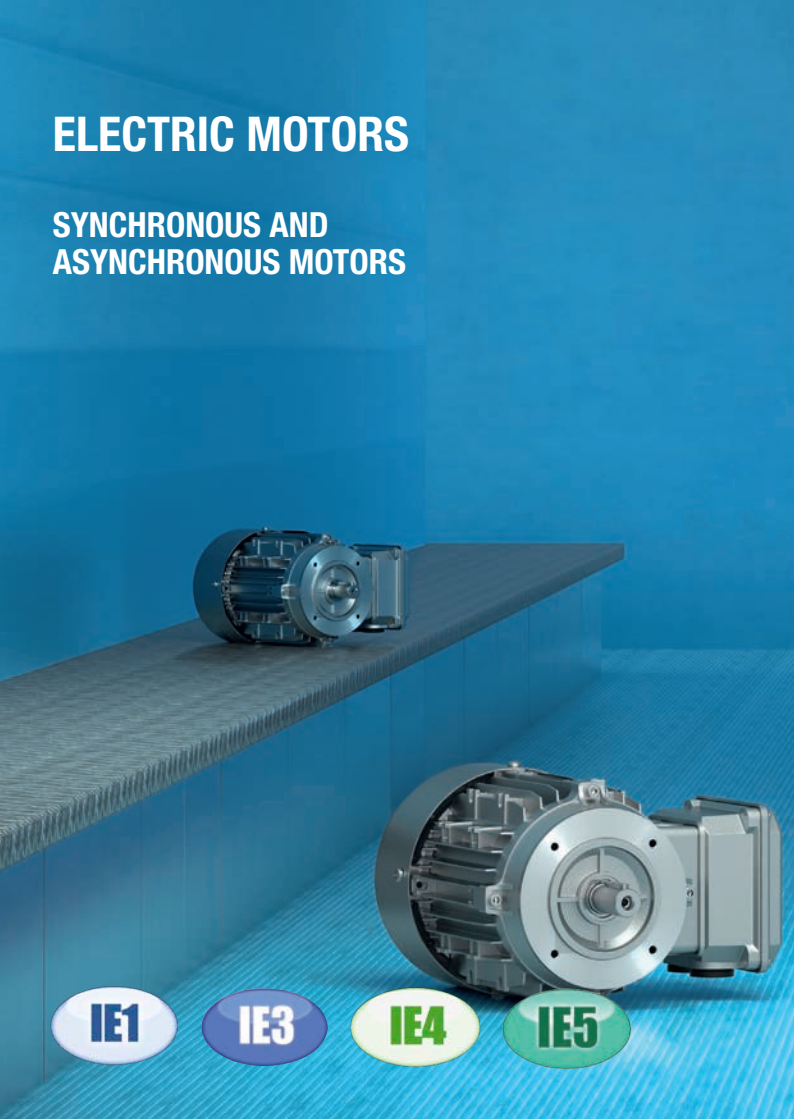
Designation	Meaning
A	Hollow output shaft
AS	Hollow output shaft for shrink disc
B	Fastening element for hollow shaft
CC	Internal water cooling system
CS1	External oil cooling system
CS2	External oil-air cooling system
D	Torque support
DRY	“Drywell” agitator version with standard bearings
EA	Splined hollow DIN 5480 output shaft
ED	Elastic torque arm
EV	Splined solid 5480 output shaft
F	Flat output flange (B14 with threaded holes)
FAN	Fan
FK	High output flange (B5 with through holes)
F1	Drive flange (SK..207 / SK..307)
H/H66	Cover (contact guard) / IP66 cover
IEC	Adapter for B5 mounting, IEC standard motors
L	Double solid drive shaft
LC	Pressurised oil lubrication (bearings)
LCX	Pressurised oil lubrication (bearings and gears)
MC	Motor bracket
MF	Motor base frame
MFB	Motor base frame with brake
MS	Motor swing base
MSB	Motor swing base with brake
MFK	Motor base frame with elastic coupling

Designation	Meaning
MFT	Motor base frame with turbo coupling
MSK	Motor rocker with elastic coupling
MST	Motor rocker with turbo coupling
MFKB	Motor base frame with elastic coupling and brake
MFTB	Motor base frame with turbo coupling and brake
MSKB	Motor rocker with elastic coupling and brake
MSTB	Motor rocker with turbo coupling and brake
NEMA	Adapter for fitting B5 NEMA C flange and standard motors
OT	Oil expansion tank
OH	Oil heater
R	Backstop
TAC	Taconite sealing system
V	Solid output shaft
VL2/KL2	Agitator version
VL3/KL3	Agitator version with "Drywell"
VL4/KL4	Agitator version with "True Drywell"
VL5	Extruder flange
VL6/KL6	Agitator version with “Drywell”, without flange
WG	First stage gear unit
WX	Auxiliary drive unit

- Not all options/combinations are available for all gear units
- Detailed descriptions and diagrams can be found in the relevant catalogs
- Further options can be found in the cited catalogs or on request
- Multiple options are stated consecutively, e.g. SK 11217 AS H ED (hollow output shaft with shrink disc, cover and elastic torque arm)

ELECTRIC MOTORS

SYNCHRONOUS AND ASYNCHRONOUS MOTORS

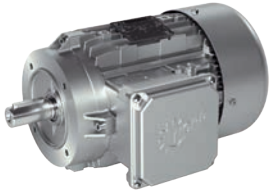



NORD
NORD

ASYNCHRONOUS MOTORS

Robust motors for all applications

Standard Motors



- Complies with international regulations and directives
- Extensive options available
- ISO F used according to Class B temperature rise (ISO H optional)
- Suited for inverter duty
- High overload capacity

Sizes	63 – 250
Power	0.16 – 75 HP
Number of Poles	2, 4, 6, 8
Protection Class	IP55, optional IP66
Efficiency Class	IE1, IE3

Two-speed Motors

- ISO F used according to class B temperature rise (ISO H optional)

Sizes	63 – 160
Power	0.13 – 22 HP
Number of Poles	4-2, 8-2, 8-4 further on request
Protection Class	IP55, optional IP66
Efficiency Class	IE1

Single-phase Motor

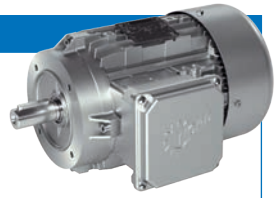
- ISO F used according to class B temperature rise (ISO H optional)
- With operating and starting capacitors

Sizes	63 – 90
Power	0.16 – 2 HP
Number of Poles	4
Protection Class	IP55, optional IP66
Efficiency Class	IE1

ASYNCHRONOUS MOTORS

Robust motors for all applications

IEC Motors

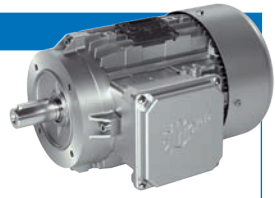


SK 100 L P / 4 SH

- SH — Space heater
- 4 — Number of poles
- P — Efficiency class (P = premium, H = high, blank = standard)
- L — Power range
- 100 — Size (frame size)

- X or W in the nomenclature indicates a smaller size
  Example: SK 250WP is a 75 HP motor in a size 225 housing

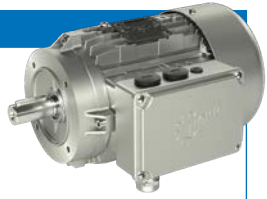
NEMA C-FACE Motors



SK 100 L P / 4 182 TC TW

- TW — Motor option (TW = thermostat)
- TC — NEMA C-flange
- 182 — Housing size
- 4 — Number of poles
- P — Efficiency class (P = premium, blank = standard)
- L — Power range
- 100 — Size (frame size)

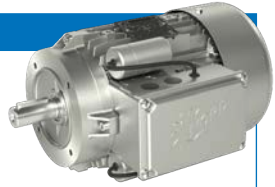
Two-speed Motors



SK 132 M 8 / 2 WU

- WU – Silumin rotor
- 2 – Number of poles – high speed
- 8 – Number of poles – low speed
- M – Power code
- 132 – Size (frame size)

Single-phase motors



SK 90 LB / 4 ECR

- ECR – EHB1 – with capacitor
  EAR1 – with operational and start-up capacitor
  EST – with Steinmetz circuit
  ECR – operational and start-up capacitor, UL/CSA
- 4 – Number of poles
- LB – Power code
- 90 – Size (frame size)

ASYNCHRONOUS MOTORS

Robust motors for all applications

Smooth Body Motors

- ISO F or ISO H
- Suited for inverter operation
- Wash-down design
- Optional wash-down with nsd tupH™ surface conversion
- Smooth-surfaces that are especially suitable for food industry applications

Sizes	71 – 100
Power	0.16 – 1.5 HP
Number of Poles	4
Protection Class	IP66, optional IP69K in combination with the gear unit
Efficiency Class	IE3

Smooth Body Motors

SK 100 L H / 4 HM

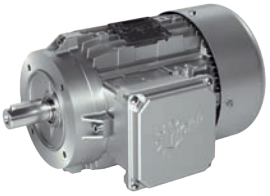
- HM — Motor type: Smooth
- 4 — Number of poles
- H — Efficiency class
- L — Power range
- 100 — Size (frame size)

- In case of unventilated smooth motors, the efficiency letter H and P stands for premium (IE3) efficiency
- If nsd tupH™ is added, the motor type is HMT

SYNCHRONOUS MOTORS

High performance for your application

Standard Motors



- ISO F according to Class B temperature rise (ISO H optional)
- Only for inverter operation
- Open or closed loop operation with NORD variable frequency drives
- High overload capacity

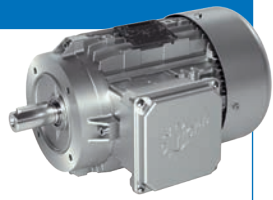
Sizes	80 – 100
Power	1.5 – 7.5 HP
Number of Poles	4
Protection Class	IP55, optional IP66
Efficiency Class	IE4

Smooth Body Motors

- ISO F according to Class B temperature rise (ISO H optional)
- Only for inverter operation
- Open or closed loop operation with NORD variable frequency drives
- Wash-down design
- nsd tupH™ (optional)

Sizes	80 – 100
Power	1 – 3 HP
Number of Poles	4
Protection Class	IP66, optional IP69K in combination with the gear unit
Efficiency Class	IE4

Standard Motors



SK 100 T 2 / 4 Δ

- Design speed (Δ = 3000 rpm, without = 2100 rpm)
- Number of poles
- Stator code (depends on the motor size)
- Synchronous motors
- Size (frame size)

Smooth Body Motors

SK 80 T 1 / 4 HM

- Motor type: smooth
- Number of poles
- Stator code (depends on the motor size)
- Synchronous motors
- Size (frame size)

- If nsd tupH™ is added, the motor type is HMT

IE5+ SYNCHRONOUS MOTORS

Efficient, hygienic, and compact

IE5+ Synchronous Motors

IE5

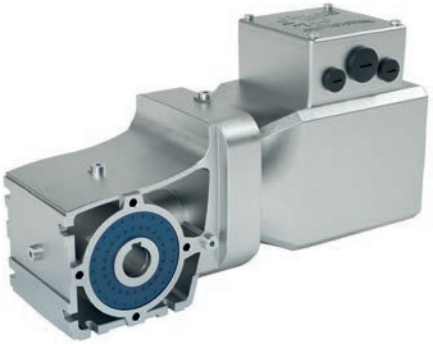
- Ultimate operational efficiency with IE5 technology
- Reduced TCO and fast ROI
- Reduced number of versions through constant torque over a wide speed range
- Motor can be operated worldwide
- Flexible motor mounting: direct mounting, NEMA, IEC
- Smooth body, fanless design is especially easy to clean, corrosion-proof, and ideal for wash-down environtments
- Motor-integrated encoder
- Optional integrated mechanical brake

Sizes	71
Power	0.47 – 1.5 HP
Number of Poles	8
Protection Class	IP55, optional IP66, IP69K is possible in combination with a gear unit
Efficiency Class	In many instances, IE5 is clearly exceeded

IE5+ Synchronous Motors

SK 71 N 1 / 8

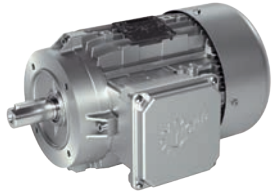
- 71 — Size
- N — IE5+ series (non-ventilated)
- 1 — Rotor length (size)
- 8 — Number of poles



EXPLOSION-PROTECTED MOTORS

Rating levels for dust and gas

Dust Explosion-proof Motors



- Zone 21, device category 2D, Ex tb 125° C
- Zone 22, device category 3D, Ex tb 125° C
- Direct and IEC mounting

Sizes	63 – 180
Power	0.16 – 30 HP
Number of Poles	4
Protection Class	IP55, optional IP66
Efficiency Class	IE2 (80SH and higher)

Gas Explosion-proof Motors

- Zone 1, device category 2G, Exe T3
- Zone 2, device category 3G, Exn T3
- Direct and IEC mounting

Sizes	63 – 180
Power	0.16 – 30 HP
Number of Poles	4
Protection Class	IP55, optional IP66
Efficiency Class	IE2 (80SH and higher)

- Motors according to NEC explosion protection HazLoc and IECEX are available
- Additional information about ATEX can be found in the ATEX Information Part No. 6091601

Hazardous Locations

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

Drive systems for explosion hazard Zones 1, 2, 21, and 22

- Versions and equipment according to individual requirements
- Configuration processes validated according to ISO 9001
- Safe, SAP-supported modular system

Motors - Dust Explosion
Categories 2D and 3D
For Zones 21 and 22
According to EN 60079-31
Ignition Protection Class EX T
(protection with housing)

Gear Units - Dust Explosion
Categories 2D and 3D
For Zones 21 and 22
According to EN 13463
Ignition Protection Class C
(constructional safety)

UNIVERSAL MOTORS

Global market compatible

Universal motor (DS1005)

- International certification
  - CE
  - UL standard 1004
  - CSA
  - CCC
  - EAC
  - ISI
- International energy standards
  - IEC 60034-30
  - EISA 2007
  - EER 2010
  - CEL/GB 18613
  - MEPS AS/NZ 1359.5
- Dual-Mode: 50 Hz and 60 Hz
- Four different operating points

Sizes	63 – 225
Power	0.16 – 60 HP
Number of Poles	4
Protection Class	IP55, optional IP66
Efficiency Class	IE3/Premium

**Universal motors are assembled at our facilities in Italy and Poland.*

MOTOR OPTIONS

Designation	Meaning
BRE +	Brake / brake torque + sub-options
DBR +	Double brake + sub-options
RG *	Corrosion protected version
SR *	Dust and corrosion protected version
IR *	Current relay
FHL *	Lockable manual release
HL	Manual brake release
MIK	Micro switch
AS55 *	Outdoor installation
BRB	Standstill heater / Brake
NRB1/2	Noise-reduced brake
ERD	External earthing terminal
TF	Thermistor, PTC resistor
TW	Temperature sensor, bi-metal
SH	Anti-condensation heating
WU	Silumin rotor
Z	Additional flywheel, cast iron fan
WE +	Second shaft end
HR	Handwheel
RD	Protective shield
RDT	Protective shield, textile fan cowl
RDD	Double fan cowl
AS66	Outdoor installation
OL	Without fan
OL/H	Without fan, without cover
KB	Closable condensation hole

Designation	Meaning
MS	Motor plug connection
EKK	One-piece terminal box
KKV	Encapsulated terminal box
AICM	Additional insulation coating inside motor
EP	Encapsulating motor windings
ID2	Class I, Div 2, Groups A, B, C and D
IID2	Class II, Div 2, Groups F & G, Temp T3B
FEU	Humidity protection insulation
TRO	Tropical protection insulation
MOL	Dairy version
VIK	Regulation – Vereinigung Industrieller Kraftwirtschaft [Association of the Industrial Power Industry]
F	External fan
FC	External Blower Fan - 115V
RLS	Backstop
MG	Magnetic incremental encoder
SL	Sensor bearing
IG	Incremental encoder
IG.P	Incremental encoder with plug connector
IG.K	Incremental encoder with terminal box
AG	Absolute encoder
GAN	Preparation for encoder
RS	Turck Round Motor Connector

**not for DBR*

- Not all options are available for all motors
- Catalog M7000 offers detailed descriptions and drawings for the options
- Further options (e.g. motor plug connection, 2xTF etc.) on request

DRIVE ELECTRONICS

VARIABLE FREQUENCY DRIVES AND MOTOR STARTERS


NORDAC pro

NORDAC® *PRO* SK 500P

Ultimate process control

NORDAC® *PRO* Panel Mount VFDs

- A high-performance universal drive suitable for a wide range of drive applications
- Precise current vector control with high overload reserves for operating asynchronous and synchronous motors
- HTL encoder interface for closed-loop speed control and POSICON positioning function available for all configurations
- Universal interface for real-time Ethernet PROFINET, ETHERCAT, ETHERNET IP and POWERLINK
- CANopen as series equipment
- Drive profile DS402 for CANopen, ETHERCAT and POWERLINK
- Integrated PLC for drive-related functions
- Comparable with a wide variety of encoders
- TTL encoder interface and optional universal encoder interface
- Optional: Safe Stop with Safe Torque Off (STO) and Safe Stop 1 (SS1) according to EN 61800-5-2
- MicroSD card slot for parameter backup and simple transfer
- USB interface for connection to NORDCON may also be used without a power supply
- Compact design ensure space-saving installation
- Frame size 1 and 2 VFDs feature all terminals as plug connections, including power connections for AC voltage motor

Sizes	3
Voltage	1~ 200 – 240 V 3~ 380 – 480 V
Power	0.33 - 7.5 HP (0.25 – 5.5 kW)

NORDAC® *PRO* Panel Mount VFDs

SK 500P 551 340 A

- A: EMC line filters: A = Class C2
- 340: AC line voltage: x23 = 230 V; x40 = 400 V
- 340: Number of AC line phases: 1xx = 1-phase; 3xx = 3-phase
- 340: Digits before decimal point for power: 0 = 0.xx; 1 = 0x.x0; 2 = 0xx.0; 3 = 0xx0.0
- 551: Rated power (xx): 250 = 0.25 kW … 551 = 5.5 kW etc.
- 500P: Device type: SK 500P, SK 510P, SK 530P, SK 550P

NORDAC® *PRO* SK 500E

Versatile, reliable control

NORDAC® *PRO* Panel Mount VFDs

- Maximum functionality in compact size
- Sensorless current vector control (ISD control)
- Multi-encoder interface
- PLC functionality for drive-integrated functions, SK 520E and higher
- Optional: POSICON positioning (SK 530E and above)
- Optional: Safe stop with Safe Torque Off (STO) and Safe Stop 1 (SS1) as per EN 61800-5-2 (for SK 510E and SK 530E)
- ASM and PMSM motor operation
- Energy-saving function
- High overload capacity (200 %) for all power ratings up to 200 HP
- Many communication modules for field bus and Industrial Ethernet networks
- Optional: CAN Open integrated for SK 511E and above
- Integrated Class C1 line filter
- IP20 control cabinet installation

Sizes	11
Voltage	1~ 110 – 120 V 1~ 200 – 240 V 3~ 200 – 240 V 3~ 380 – 480 V
Power	0.33 - 200 HP (0.25 – 160 kW)

NORDAC® *PRO* Panel Mount VFDs

SK 500E 113 340 A

- A — EMC line filters:
  O = without, A = Class C2
- 340 — AC line voltage:
  x12 = 115 V; x23 = 230 V; x40 = 400 V
- 3 — Number of AC line phases:
  1xx = 1-phase; 3xx = 3-phase
- 1 — Digits before decimal point for power:
  0 = 0.xx; 1 = 0x.x0; 2 = 0xx.0; 3 = 0xx0.0
- 13 — Rated power (xx):
  751 = 7.5 kW; 113 = 110 kW
- SK 500E — Device type: SK 500E ... SK 545E

NORDAC® *LINK* SK 250E

Robust functionality for any application

NORDAC® *LINK* VFDs

- Protection class IP65 (up to 4 HP), IP55 (all devices with fan)
- Simple commissioning and installation in the field
- All I/O, bus interface, and power connections accessible via quick disconnect plugs to provide easy commissioning, installation and maintenance
- Extensive options e.g. key switch maintenance switch, push buttons, potentiometers
- PLC functionality for drive-integrated functions
- Functions and operation comparable to modular NORDAC® *FLEX*
- AS Interface
- Safe stop with Safe Torque Off (STO) and Safe Stop 1 (SS1) as per EN 61800-5-2
- Many communication modules for field bus and Industrial Ethernet networks
- ASM and PMSM motor operation
- Local or remote control

Sizes	3
Voltage	3~ 380 – 500 V
Power	1 - 10 HP (0.37 – 7.5 kW)

NORDAC® *LINK* VFDs

SK 250E FDS 301 340 A

- A: EMC line filters: A = Class C2
- 340: AC line voltage: x40 = 400 V
- 3: Number of AC line phases: 3xx = 3-phase
- 0: Digits before decimal point for power: 0 = 0.xx; 1 = 0x.x0
- 301: Rated power (xx): 301 = 3 kW
- FDS: NORDAC® *LINK* FDS
- SK 250E: Device type: SK 250E ... SK 280E

■ FDS = **F**ield **D**istribution **S**ystem

NORDAC® *FLEX* SK 200E

Precise, sensorless control

NORDAC® *FLEX* VFDs

- Sensorless current vector control (ISD)
- PLC functionality for drive-integrated functions
- Integrated POSICON positioning control
- Safe stop with Safe Torque Off (STO) and Safe Stop 1 (SS1) as per EN 61800-5-2
- ASM and PMSM motor operation
- Motor or wall mounting
- IP55 (optional IP66)
- AS-Interface integrated in SK 22xE and SK 23xE
- Many communication modules for field bus and Industrial Ethernet networks
- Decentralized modules combined as a system
- Extendable per customer specifications
- Extensive selection of plug connectors for control and power cable connections
- ATEX Zone 22, Category 3D (Sizes 1 – 3)
- POSICON with absolute encoder

Sizes	4
Voltage	1~ 110 – 120 V 1~ 200 – 240 V 3~ 200 – 240 V 3~ 380 – 500 V
Power	0.33 - 30 HP (0.25 – 22 kW)

NORDAC® *FLEX* VFDs

SK 200E 550 340 A (-C)

- (-C) Protection class:
  without = IP55 (standard)
  C = IP66
- A EMC line filters:
  A = Class C2
- 340 AC line voltage:
  x12 = 115 V; x23 = 230 V;
  x40 = 400 V
- 3 Number of AC line phases:
  1xx = 1-phase; 3xx = 3-phase
- 5 Digits before decimal point for power:
  0 = 0.xx; 1 = 0x.x0; 2 = 0xx.0
- 50 Rated power (xx):
  550 = 0.55 kW ... 222 = 22 kW etc.
- SK 200E Device type: SK 200E ... SK 230E and SK 205E ... SK 235E

NORDAC® *BASE* SK 180E

Integrated functionality, compact design

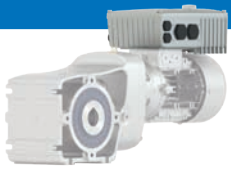
NORDAC® *BASE VFDs*

- Sensorless current vector control (ISD)
- PLC functionality for drive-integrated functions
- Operation on standard RCD possible, leakage current <16 mA
- AS Interface integrated in SK 190E
- Energy-saving function
- Compact design for motor or wall mounting
- IP55 (optional IP66 or IP69K)
- Wash-down with nsd tupH™ (optional)
- Integrated line filter (EMC Class C1/C2)
- Inputs: 2 analog, 3 digital
- Outputs: 2 digital
- Temperature sensor input (TF+/TF-)
- RS485 (System bus/RS232 interface)
- ATEX Zone 22, Category 3D
- Decentralized modules combined as a system
- Extendable per customer specifications

Sizes	2
Voltage	1~ 110 – 120 V 1~ 200 – 240 V 3~ 200 – 240 V 3~ 380 – 500 V
Power	0.33 - 3 HP (0.25 – 2.2 kW)

NORDAC® *BASE VFDs*

SK 180E 750 340 B (-C) XXX



- XXX: NSD (nsd tupH)
  without = Standard
  BRI (internal brake resistor)
- (-C): Protection class:
  without = IP55 (standard)
  C = IP66
- B: EMC line filters:
  Class C1, B = C1
- 340: AC line voltage:
  x12 = 115 V; x23 = 230 V; x40 = 400 V
- 340: Number of AC line phases:
  1xx = 1-phase; 3xx = 3-phase
- 750: Digits before decimal point for power:
  0 = 0.xx; 1 = 0x.x0
- 750: Rated power (xx):
  250 = 0.25 kW ... 221 = 2.2 kW
- SK 180E: Frequency inverter type: SK 180E or SK 190E

NORDAC® *LINK* SK 155E

Motor starters for economical operation

NORDAC® *LINK* Motor Starters

- All I/O, bus interface and power connections accessible via quick disconnect plugs provide easy commissioning and maintenance
- Extensive options e.g. key switch/ maintenance switch
- PLC functionality for drive-integrated functions
- Wear-free fully electronic starting with reversing function
- Functions compatible with modular NORDAC® *START*
- Power range up to 4 HP
- IP65 rated enclosure
- Simple commissioning and installation
- AS Interface or PROFIBUS options available
- Field installation

Sizes	1
Voltage	3~ 380 – 500 V
Power	0.16 – 4 HP (0.12 – 3 kW)

NORDAC® *LINK* Motor Starters

SK 175E FDS 301 340 A

- A: EMC line filters: A = Class C2
- 340: AC line voltage: x40 = 400 V
- 3: Number of AC line phases: 3xx = 3-phase
- 1: Digits before decimal point for power: 1 = 0x.x0
- 01: Rated power (xx): 301 = 3 kW
- FDS: NORDAC® *LINK* FDS
- SK 175E: Device type: SK 155E (unidirectional), SK 175E (bidirectional)

- FDS = **F**ield **D**istribution **S**ystem

NORDAC® *START* SK 135E

Smooth starts, stops, and reversing

NORDAC® *START* Motor Starters

- Motor starter with soft start and reverse function
- Integrated brake rectifier
- AS Interface and PROFIBUS options available
- Wall or motor installation
- IP55 (optional IP66 and IP69K)
- Wash-down with nsd tupH™ (optional)
- Integrated line filter (EMC Class B)
- Inputs: 2 digital
- Outputs: 2 digital
- Temperature sensor input (TF+/TF-)
- RS232 interface
- ATEX Zone 22, Category 3D
- Electronic starter switches without wear
- Reduced mechanical wear due to low start-up torque

Sizes	2
Voltage	3~ 200 – 240 V 3~ 380 – 500 V
Power	0.16 - 4 HP (0.12 – 3 kW or up to 7.5 kW)

NORDAC® *START* Motor Starters

SK 135E 301 340 B ASI C(-NSD) for IP69K

- C(-NSD) for IP69K: Protection class: Standard = IP55; C = IP66
- ASI: Communication: ASI = AS Interface; PBR = PROFIBUS Interface
- B: EMC line filters: Class B = Class C1
- 340: AC line voltage: x23 = 230 V; x40 = 400 V
- 340: Number of AC line phases: 3xx = 3-phase
- 301: Rated power (xx): 301 = 3.0 kW or 751 = 7.5 kW
- 135E: Device type: SK 135E or SK 175E

NORDAC® *ACCESS BT* / NORDCON *APP*

NORDAC® *ACCESS BT*

- Stand-alone VFD parameter storage
- Bluetooth stick for NORDCON *APP*
- Data transfer to PC via USB communication interface
- Can be plugged in or disconnected during operation

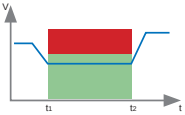
NORDCON *APP*

- 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

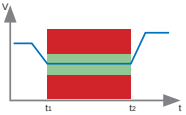
PROFIsafe SK TU4-PNS

Safe Motion PROFIsafe over PROFINET with SK TU4-PNS

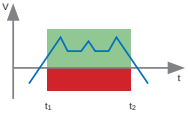
Safety functions for drives according to IEC 61800-5-2



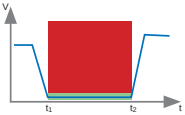
Safely Limited Speed (SLS)



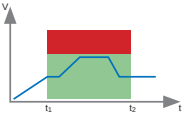
Safe Speed Range (SSR)



Safe Direction (SDI)



Safe Operation Stop (SOS)



Safe Speed Measurement (SSM)

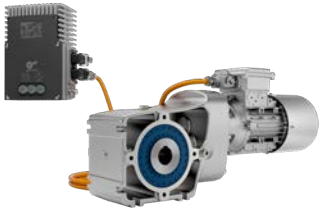
- PL_e (Performance Level) Cat. 4 according to ISO 13849-1
- SIL 3 (Safety Integrity Level) as per IEC 62061

+ User-defined safe I/O configuration

- Simple implementation of safe responses via PROFIsafe for the NORDAC® *FLEX* decentralized variable frequency drive
- Comprehensive safety for the reliable operation of plant and machinery
- Functional security through one network cable
- Minimum wiring effort
- Global availability of the security-related machine data

SPECIAL OPTIONS FOR DECENTRALIZED VFDS

Plug Connections



Connection design simplifies drive configuration and installation

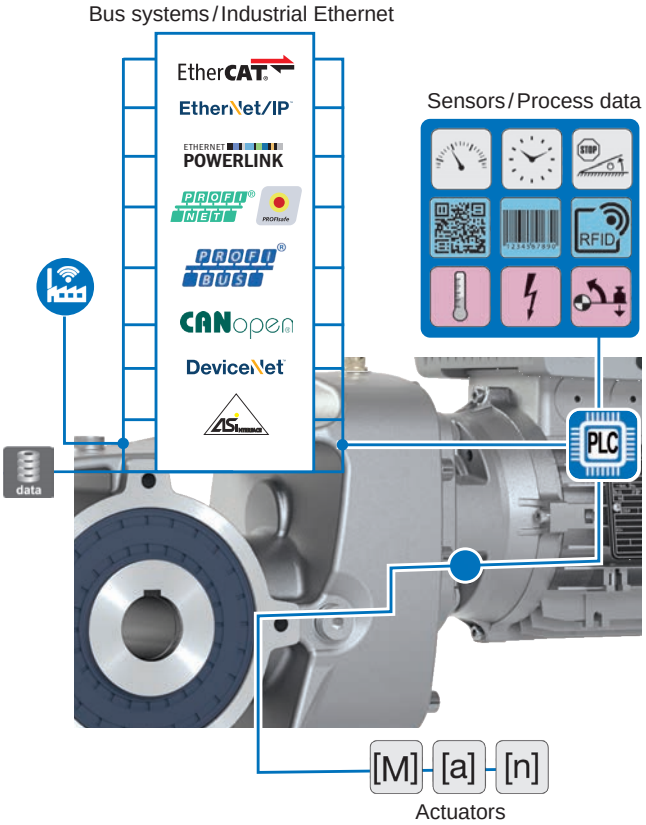
- Multiple quick disconnect plug options available for simple plug-and-play operation
- AC line and motor output plugs
- M12 plugs for sensors and encoders
- Pre-assembled cables

Local Control

Switches and buttons are located directly on the drive units to enable direct starting, stopping, and operating mode changes.

- Maintenance disconnect switch
- Selector switch for local or remote control
- Start / Stop and Forward / Reverse switch

BUS SYSTEMS AND INDUSTRIAL ETHERNET



CORRECT CONNECTION TECHNOLOGY

Pre-assembled

NORD DRIVESYSTEMS supplies an extensive range of connection and control cables.

- Depending on the version, connecting cables include power connection cables (AC lines and motor) and if necessary cables for thermistors as well as 24 V DC control voltage
- Control cables are exclusively used for transmitting control signals (encoder, bus, I/O signals)
- Turck connection options also available

Connection and control cables are supplied pre-assembled. They are available in various lengths and can be optionally provided with open ends or plug connectors. Connection cables are certified for global use according to the relevant IEC and UL standards.

Power, Motor, and Signal Cables

Specified per order

- Cables for motor and frequency inverter connection
- Voltage connection and Daisy chain cables
- Signal and brake resistor cables

SK CE HQ8-K MA H10E-M1B 3_OM

Labeling for various combinations
3_OM = Length 3 m
S5UL = Special solution 3 m and UL certification, note: only permissible for plug connectors

Cable end side 2: version and material labeling
H10E = HAN 10E plug connector otherwise identical to cable end side 1
M1B = One metal lock
M2B = Two metal locks
Note: material labeling is only permissible for plug connectors

Cable category

LE	= Line connection
LA	= Daisy chain mains connection
MA	= Motor connection
BRE	= Brake resistor
BRW5	= Brake resistor
SYSM	= System bus
AG	= Absolute encoder
IG	= Encoder without zero track
... C	= Combination encoder (AG / IG)
IG0	= Encoder with zero track

Cable end side 1: version and material labeling

HQ8	= HAN Q8/0 plug connector
HQ4	= HAN Q4 plug connector (w/o = without)
HQ42	= HAN Q4/2 plug connector (24 V DC)
OE	= Open ends
A5F	= M12 A-coded 5-pin female
B4M	= M12 B-coded 4-pin male

K = Plug connector with plastic housing
M = Plug connector with metal housing
Note: material labeling is only permissible for plug connectors

Cable extension

CONDITION MONITORING FOR PREDICTIVE MAINTENANCE

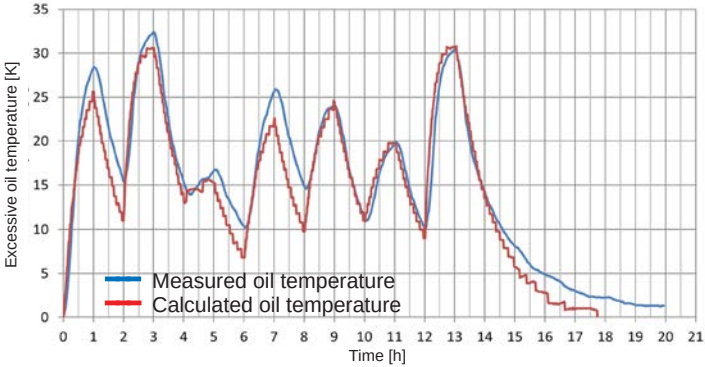
For condition monitoring, drive and status data are recorded periodically or continuously in order to optimize the operational safety and efficiency of machines and plants. The objective is to analyze this information in near or near-real time to maintain machines and plants proactively, reduce downtimes, and increase the efficiency of the entire plant.

The Industrial Internet of Things (IIoT) focuses on internet usage in industrial processes and procedures. IIoT aims at increasing the operational efficiency, reducing costs, and speeding up processes. Sensors and sensor data play a central role to provide the basis for condition monitoring and predictive maintenance.

- Condition monitoring for predictive maintenance uses the internal PLC of the variable frequency drive to capture, pre-process, and send data
- System is IIoT / Industry 4.0 ready!
- Available for decentralized and control cabinet solutions

See special flyer S9091 for more information.

Temperature curve of the oil in the gear unit



Sensors

- Virtual sensors – the PLC can calculate information such as the optimal oil change time
- Interface for digital and analog sensors

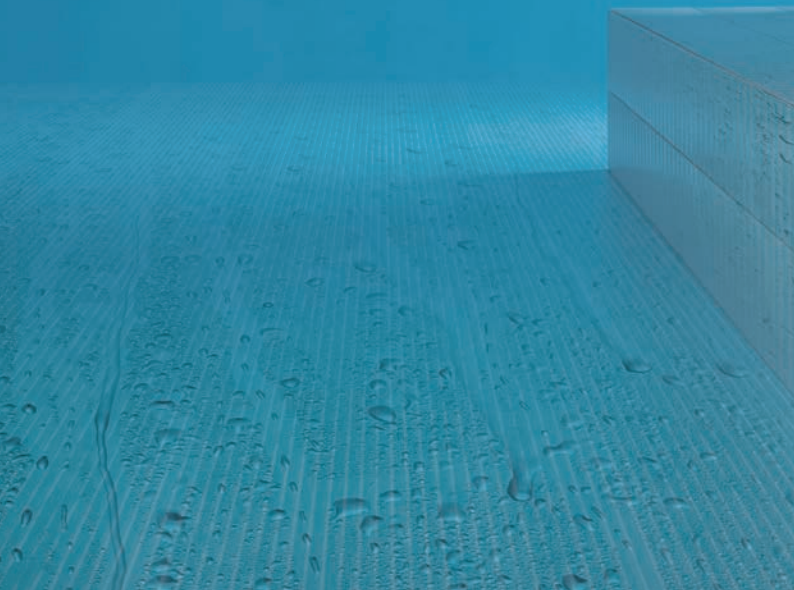
Communication Interfaces

- Threshold values or general status information can be communicated externally (via normal Industrial Ethernet dialects)

Integrated PLC

- Local pre-processing of data within the integrated PLC
- Pre-processing of threshold values

TECHNICAL INFORMATION



SURFACE PROTECTION
COATING SYSTEMS

NORD offers a wide variety of paint coatings and surface treatments. All are independently verified to resist chemicals and other substances that could have a negative environmental impact.

Coating / Field of Application	Class*
NORD Basic & NORD Basic+ Indoor installation. *Previously Stainless Steel (SS)*	C2
NORD Severe Duty 2 (NSD2) & Severe Duty 2+ (NSD2+) Indoor installation and protected outdoor installation (i.e. open, unheated halls). *Previously NORD Severe Duty+ and NORD Severe Duty x3*	C2
NORD Severe Duty 3 (NSD3) & Severe Duty 3+ (NSD3+) Outdoor installation, city, and industrial atmosphere with low contamination.	C3
NORD Severe Chem Duty 3 (NSDC3) Normal chemical contamination.	C3
NORD Severe Food Duty 3 (NSDF3) & Severe Food Duty 3+ (NSDF3+) Food packaging areas.	C3
NORD Severe Duty 4 (NSD4) & Severe Duty 4+ (NSD4+) Outdoor installation, city, and industrial atmosphere with moderate contamination.	C4
NORD Severe Duty 5 (NSD5) & Severe Duty 5+ (NSD5+) Outdoor installation, city, and industrial atmosphere with high contamination.	C5

Plus (+) notes an additional antimicrobial clear coating.

**Comparable to DIN EN ISO 12944-2 classification of ambient conditions.*

THE RIGHT FINISH
FOR ANY APPLICATION

All NORD paint coatings and surface treatments are independently verified to resist chemicals and other substances that could have a negative environmental impact. In addition, NORD paints are suitable for the food industry and meet NSF/ANSI 51-2009e requirements.

Standard stock colors are always available:

- RAL 9007C Gray Aluminum / Stainless Steel Gray (US)
- RAL 9003 Signal White (US)
- RAL 7031 Blue-Gray
- RAL 5010 Blue

Other options include:

- More than 100 additional color options
- Custom color matching to your specifications
- Antibacterial paints
- Anti-static powder coatings – ideal for electrical products and free of solvents
- Cost-effective stainless steel equivalent coatings (nsd tupH™)

Powder Coating

Because of their extremely robust and durable properties, powder coatings are highly suitable for the electrical industry. Surfaces treated in this way are resistant to impact, scratches, and wear. They are also resistant to weather and chemicals, making them even more robust than conventional NORD paints.

In the electrical industry, the anti-static properties of electrically conducting powder paints are relevant for the prevention of static charging of the drive units. Potential interference is eliminated and downtime probability is minimized.

Environmental protection is becoming increasingly important in the field of surface coatings. NORD offers powder coating options that do not use solvents, but rather dry powder, which is melted onto the unit in a kiln.

Powder coating is available in one color (RAL 9006 - White Aluminum).

SURFACE PROTECTION
nsd tupH™

Molecular conversion process ensures aluminum alloy products have the surface protection wash-down applications require.

- Cost-effective alternative to stainless steel
- Corrosion-resistant and won't blister or flake
- Easy-to-clean surfaces
- Resistant to acids and alkalis (wide pH range)

The complete 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™:

- Aluminum Products - NORDBLOC.1 inline, Two-stage bevel, MINICASE Worm, 0182.1 - 1382.1 CLINCHER
- Smooth body motors
- Electronics NORDAC® *START* and NORDAC® *BASE*

Key Advantages	Paint	Stainless Steel	nsd tupH
No flaking possible	– –	++	++
Corrosion-resistant	+	++	++
Costs	+	– –	o
Weight	++	–	++
Available products	+	–	+
Thermal conductivity	+	–	+

++ very advantageous, + advantageous, o neutral,
– disadvantageous, – – very disadvantageous

ADDITIONAL OPTIONS FOR SURFACE PROTECTION

Standard Reducer Features

- UNICASE™ housing design
- Autovent breather
- Factory primer on all cast-iron components
- Corrosion-resistant nameplate
- QUADRILIP™ sealing

Optional Reducer Features

- Stainless steel output shafts
- Stainless steel hardware
- Custom venting solutions – stainless steel, filtered vents

Standard Motor Features

- Shaft lip seals on both ends of the motor shaft
- Sealed stator to endbell connections to exclude moisture
- Moisture-resistant varnish dipped windings
- Double coated magnetic wire insulation
- Conduit box sealed with gaskets
- Corrosion-resistant alloy materials
- Tropical protection – inorganic insulating components

Optional Motor Features

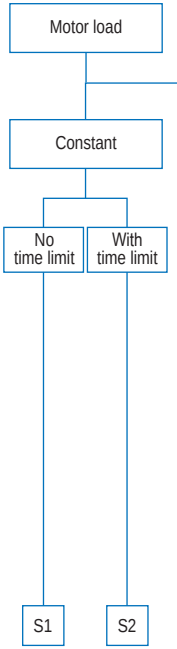
- IP66 enclosure protection (IP55 standard)
- Condensation drain holes (KB or KBO)
- Resin-sealed terminal box (KKV)
- Epoxy-dipped motor windings (EP)
- Drip covers – canopy cover or double fan cover (RD or RDD)
- Totally Enclosed Non-Ventilated (TENV)
- Space Heaters (SH)
- Brake protection options
    - Stainless steel brake plate (RG)
    - Rubber dust boot with stainless brake plate (SR)
    - IP66 Sealed Brake
    - Sealed brake rectifiers

OVERVIEW OF ENERGY SAVING DIRECTIVES FOR MOTORS

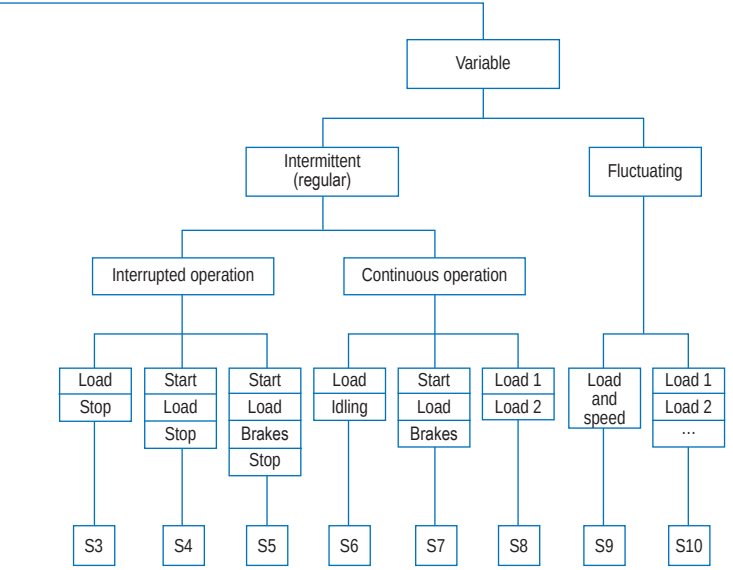
Country		Voltage / frequency	Power range	Number of poles
Europe, Switzerland and Turkey		50 – 1000 V 50 / 60 Hz	0.75 – 375 kW	2 – 6
USA		< 600 V 60 Hz	1 – 500 HP (0.75 – 375 kW)	2 – 8
Canada		< 600 V 50 / 60 Hz	1 – 500 HP (0.75 – 375 kW)	2 – 8
China		< 1000 V 50 Hz	0.75 – 375 kW	2 – 6
Brazil		< 1000V 50 / 60 Hz	0.75 – 185 kW	2 – 8
Mexico		< 600 V 60 Hz	1 – 500 HP (0.75 – 375 kW)	2 – 8
Columbia		< 600 V 60 Hz	0.18 – 373 kW	2 – 8
Chile		< 690 V 50 Hz	0.75 – 7.5 kW	2 – 6
Ecuador		< 1000 V 60 Hz	0.746 – 373 kW	2 – 8
Australia New Zealand		< 1100 V 50 Hz	0.73 – 185 kW	2 – 8
India		< 1000 V 50 Hz	0.12 – 375 kW	2 – 8
Soth Korea		< 600 V 60 Hz	0.75 – 375 kW	2 – 8
Singapore		< 1000 V 50 Hz	0.75 – 375 kW	2 – 6
Taiwan		< 600 V 60 Hz	0.75 – 200 kW	2 – 8
Japan		< 1000 V 50 / 60 Hz	0.75 – 375 kW	2 – 6
Saudi Arabia		50 – 1000 V 60 Hz	0.75 – 375 kW	2 – 8

Regulations / Directives	Regulation for **min. energy efficiency**	Planning / remarks
EG 640/2009 EG 4/2014 2009/125/EG Ecodesign Directive	IE3	New Ecodesign Directive for the EU as of 2021 or 2023, see page 85
EISA 2007 / EISA 2014	NEMA Premium (IE3)	Extension to sizes NEMA 42-48-56
EER 2017	NEMA Premium (IE3)	No update planned
GB 18613-2012 GB 25958-2010	Grade 3 (IE2)	IE3 introduction has been postponed
Lei No 10.295 Decreto No 4.508 Portaria Interministerial Nº 1, DE 29 DE JUNHO DE 2017	Alto Redimento Plus (IE3)	No update planned
NOM-016-ENER-2010	NEMA Premium (IE3)	No update planned
Resolution no. 1012:2015	IE2	IE3 > 7.5 kW from August 2020
NCh 3086 of 2008	IE2	No update planned
Resolucion No. 17 524:2017	IE2	No update planned
AS / NZS 1359.5 : 2004	MEPS 2 “E2”	IE2 requirements according to AS / NZS 1359.5 are to some extent more stringent than the IE2 regulations according to IEC!
Gazette of India No. 3144/2018	IE2	No update planned
MKE-2015-28	IE3	No update planned
Energy Conservation Act (ECA) 2013	IE3	No update planned
CNS 14400 (MEPS)	IE3	No update planned
JIS C 4213 (2014)	IE3	No update planned
SASO 2893:2018	IE3	No update planned

NOMINAL OPERATING MODES ACCORDING TO IEC 60034-1



- In case of S2 the operating time in minutes must be stated as follows: “S2 15 minutes”
- In case of S3, S4, S5 and S6 the operating time in minutes must be stated as follows: „S3 40 %“, i.e.: 40 % operating time on the basis of 10 minutes


Variable
Intermittent (regular)
Fluctuating
Interrupted operation
Continuous operation
Load
Stop
Start
Load
Stop
Start
Load
Brakes
Stop
Load
Idling
Start
Load
Brakes
Load 1
Load 2
Load and speed
Load 1
Load 2
…
S3
S4
S5
S6
S7
S8
S9
S10

INTERNATIONAL PROTECTION CODES IP PROTECTION CLASS IEC 60529

Digit 1	Protection against foreign bodies
0	No protection
1	Protected against solid foreign bodies with diameter above 50 mm
2	Protected against solid foreign bodies with diameter above 12.5 mm
3	Protected against solid foreign bodies with diameter above 2.5 mm
4	Protected against solid foreign bodies with diameter above 1.0 mm
5	Protected against damaging amounts of dust
6	Dust-proof

- If one of the numbers is not stated, this is indicated with an "X", e.g.: IP4X (protection against foreign bodies > 1.0 mm no details of protection against moisture)
- For IPX7 the immersion depth and the immersion time must also be stated
- Up to IPX6 the lower protection classes are included

Digit 2	Protection against water (humidity)
0	No protection
1	Protection against dripping water
2	Protection against dripping water if the housing is inclined by up to 15°
3	Protected against falling sprayed water up to 60° from vertical
4	Protected against splashed water from all sides
5	Protection against water jets (nozzle) from any angle
6	Protection against strong water jets
7	Protection against temporary immersion
8	Protection against permanent immersion
9K (according to ISO 20653)	Protection against water for high pressure water jet and steam cleaning, specifically for road vehicles

NEW EUROPEAN ECODESIGN DIRECTIVE

The European Union has continued to develop the existing Ecodesign Directive 2009/125/EG. In future, the present exceptions will be greatly restricted and motors for special ambient conditions, e.g. explosion protection areas will also have to comply with these new energy efficiency classes. Establishment of these increased requirements will take place in several stages:

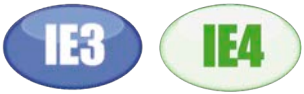
JULY 2021

- IE3 for 0.75 – 1,000 kW and IE2 for 0.12 – <0.75 kW including for brake motors, inverter operated motors and Ex motors (Ex eb is exempted)
- IE2 for frequency inverters from 0.12 – 1,000 kW

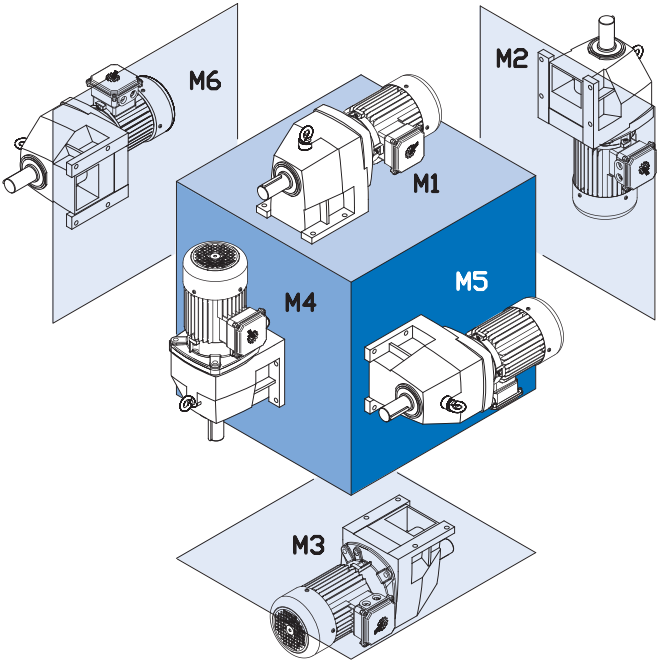
JULY 2023

- IE4 for 75 – 200 kW
- IE2 for Ex eb motors
- IE2 for single-phase motors

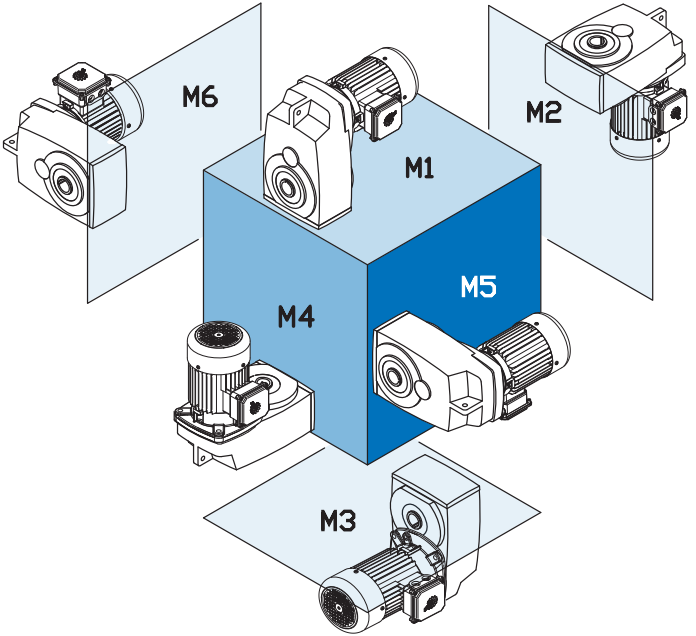
Further information can be found in S4700, S4750 and S4755.



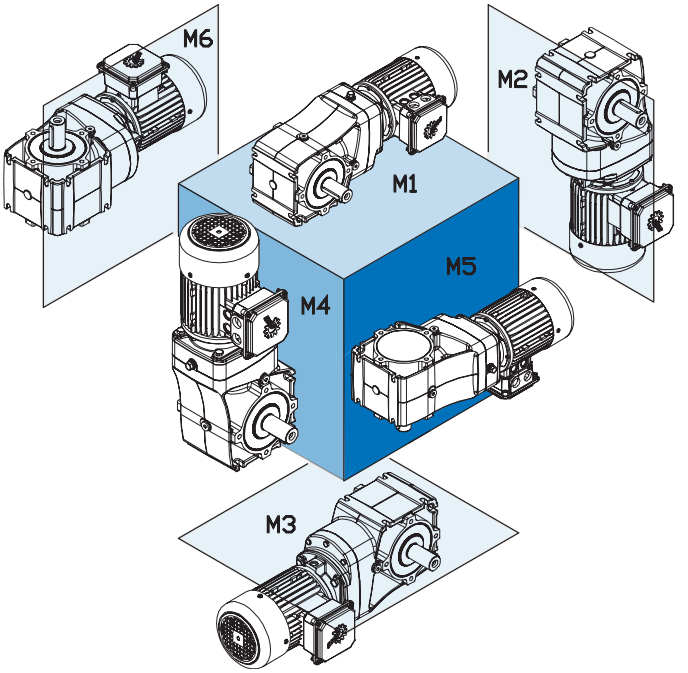
INSTALL ORIENTATIONS
HELICAL GEAR UNITS



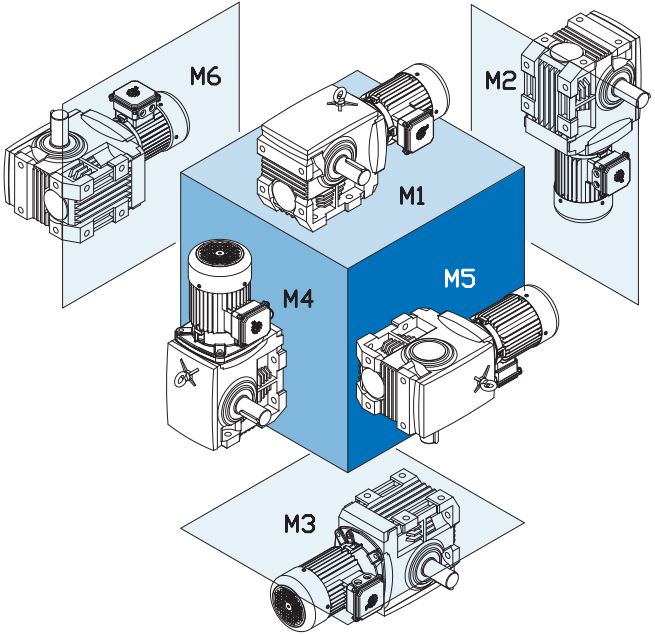
INSTALL ORIENTATIONS PARALLEL SHAFT GEAR UNITS



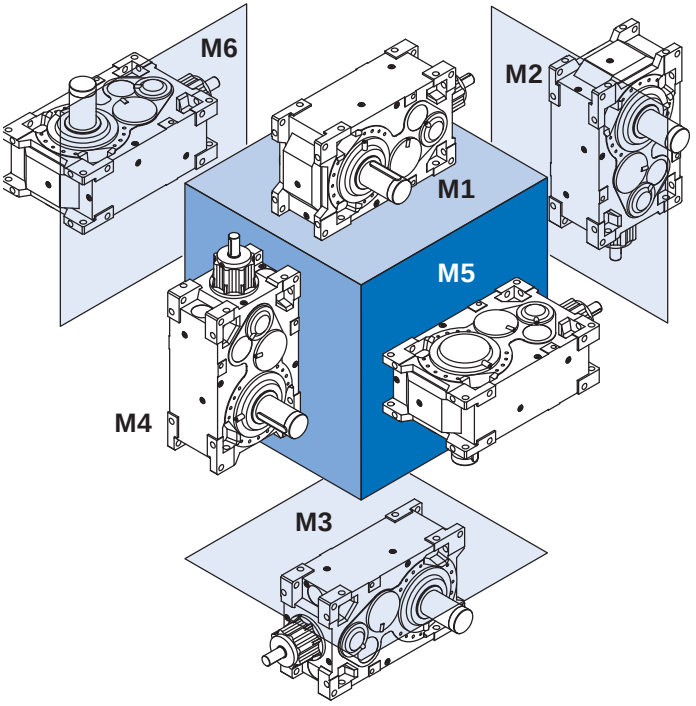
INSTALL ORIENTATIONS
HELICAL BEVEL GEAR UNITS

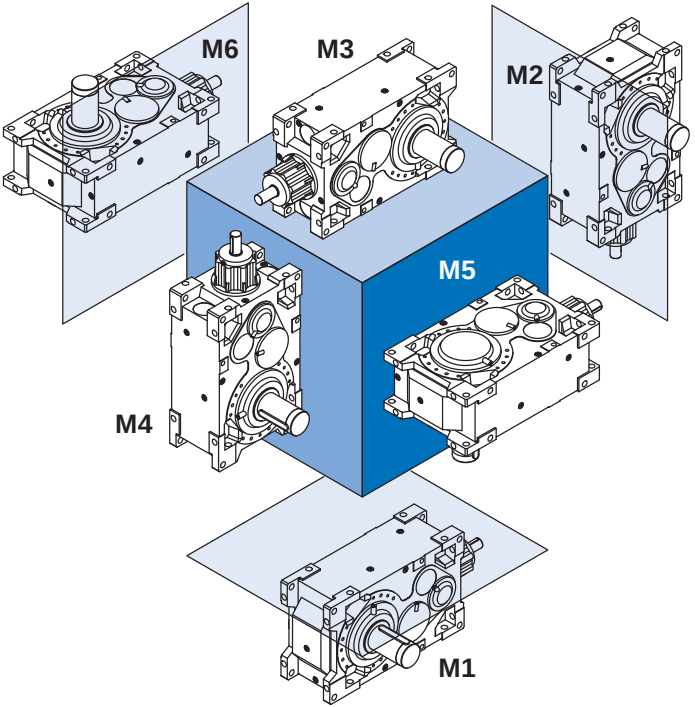


INSTALL ORIENTATIONS WORM GEAR UNITS

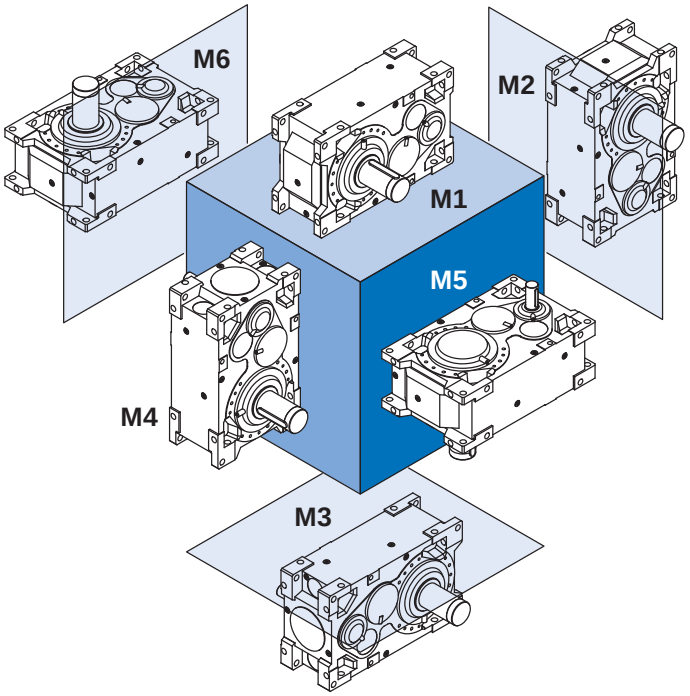


INSTALL ORIENTATIONS MAXXDRIVE® BEVEL GEAR UNITS

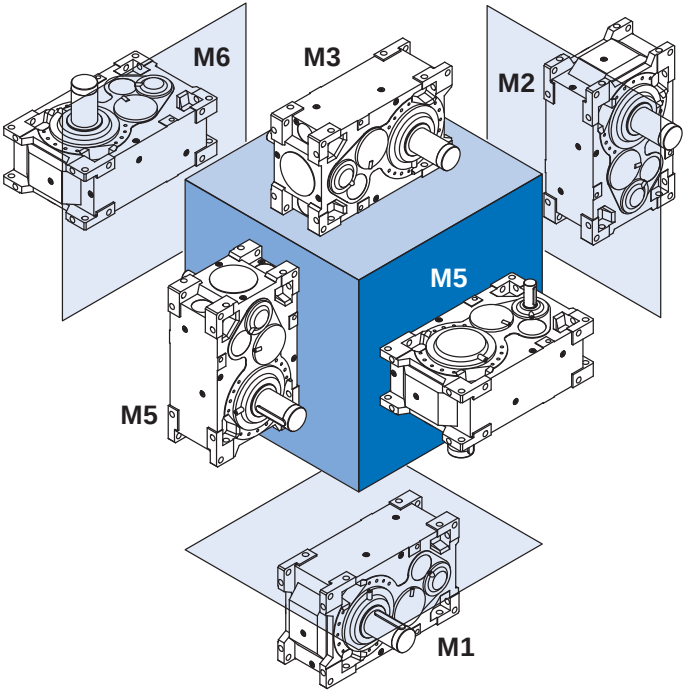



M6
M3
M2
M5
M4
M1

INSTALL ORIENTATIONS
MAXXDRIVE® PARALLEL SHAFT GEAR UNITS

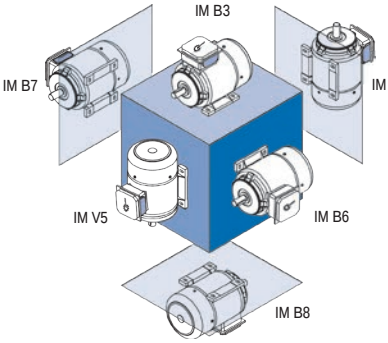


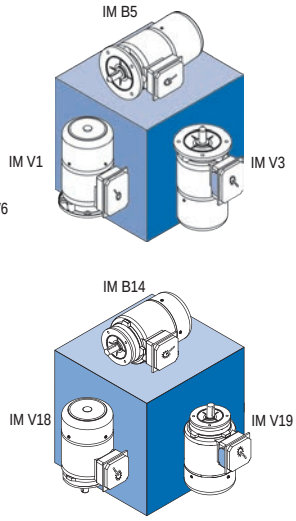
2-stage gear unit installation orientations

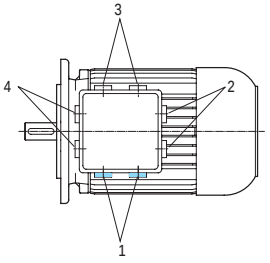


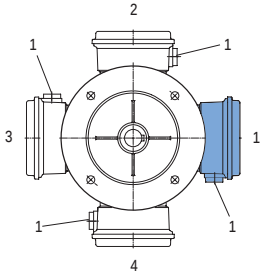
3-stage gear unit installation orientations

INSTALL ORIENTATIONS MOTORS AND TERMINAL BOXES

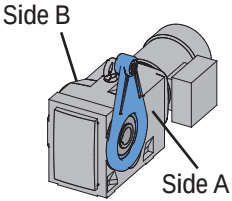


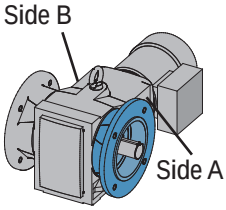


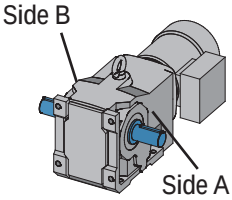




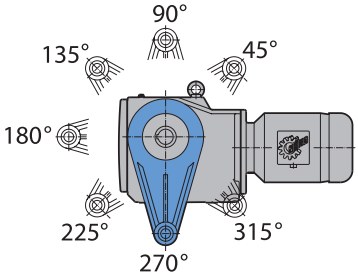
INSTALL ORIENTATIONS
ASSEMBLY LOCATIONS



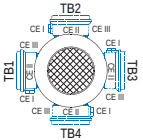




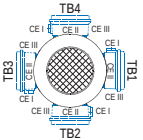
GRIPMAXX™ and shrink disc are mounted opposite the shaft entry.



Mounting positions
Terminal Box and Cable Entry



M1



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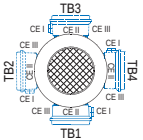

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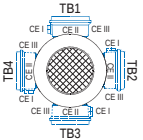

M6

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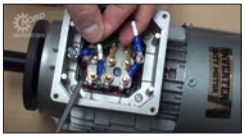

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NORD Gear Corporation - US
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Waunakee, WI
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Tel. 888.314.6673

Corona, CA
1180 Railroad St.
Corona, CA 92882
Tel. 888.314.6673

Charlotte, NC
300 Forsyth Hall Dr.
Charlotte, NC 28273
Tel. 888.314.6673

NORD Gear Limited - Canada
MEMBER OF THE NORD DRIVESYSTEMS GROUP
info.ca@nord.com

Brampton, ON
41 West Drive
Brampton, ON L6T4A1
Tel. 800.668.4378

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