COMPLETE DRIVE SYSTEMS FROM A SINGLE SOURCE

EN

TECHNICAL MANUAL

March 2020

NORD DRIVESYSTEMS

NORD DRIVESYSTEMS Group

Headquarters and technology centre
in Bargteheide near Hamburg

Innovative drive solutions
for more than 100 branches of industry

Mechanical products	Electrical products	Electronic products
Gear units	Motors	Frequency inverters and motor starters
		
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7 production locations with cutting-edge technology produce gear units, motors, inverters etc. for complete drive systems from a single source.

Gear unit production

Motor production

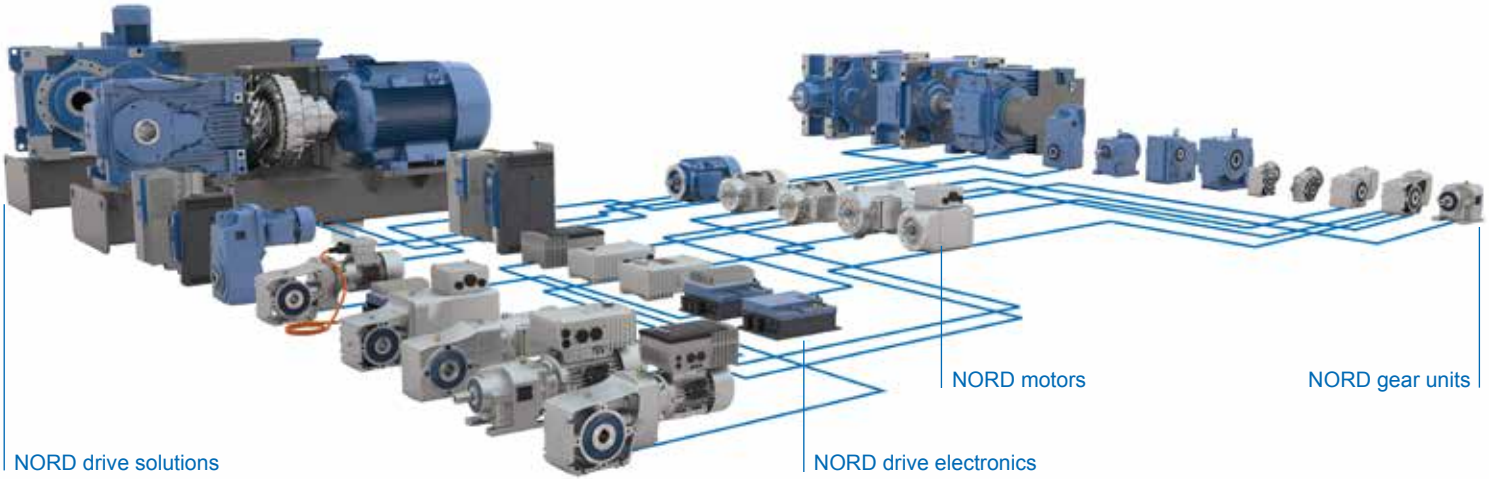
Inverter production

Subsidiaries and sales partners in 98 countries on 5 continents provide local stocks, assembly centres, technical support and customer service.

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.

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

COMPLETE DRIVE SOLUTIONS FROM A SINGLE SOURCE



An optimum and individual drive solution can be created using the modular NORD system consisting of the gear unit, motor and drive electronics. Each of the variants combine: the highest product quality, short planning and assembly times, high delivery availability, and a good price / performance ratio.

RELIABLE

- Reliable products
- Coordinated components
- Own development and production

FLEXIBLE

- Modular products
- Scalable functions
- Large range of drive units
- Complete drive solutions
- Integrated customer logistics

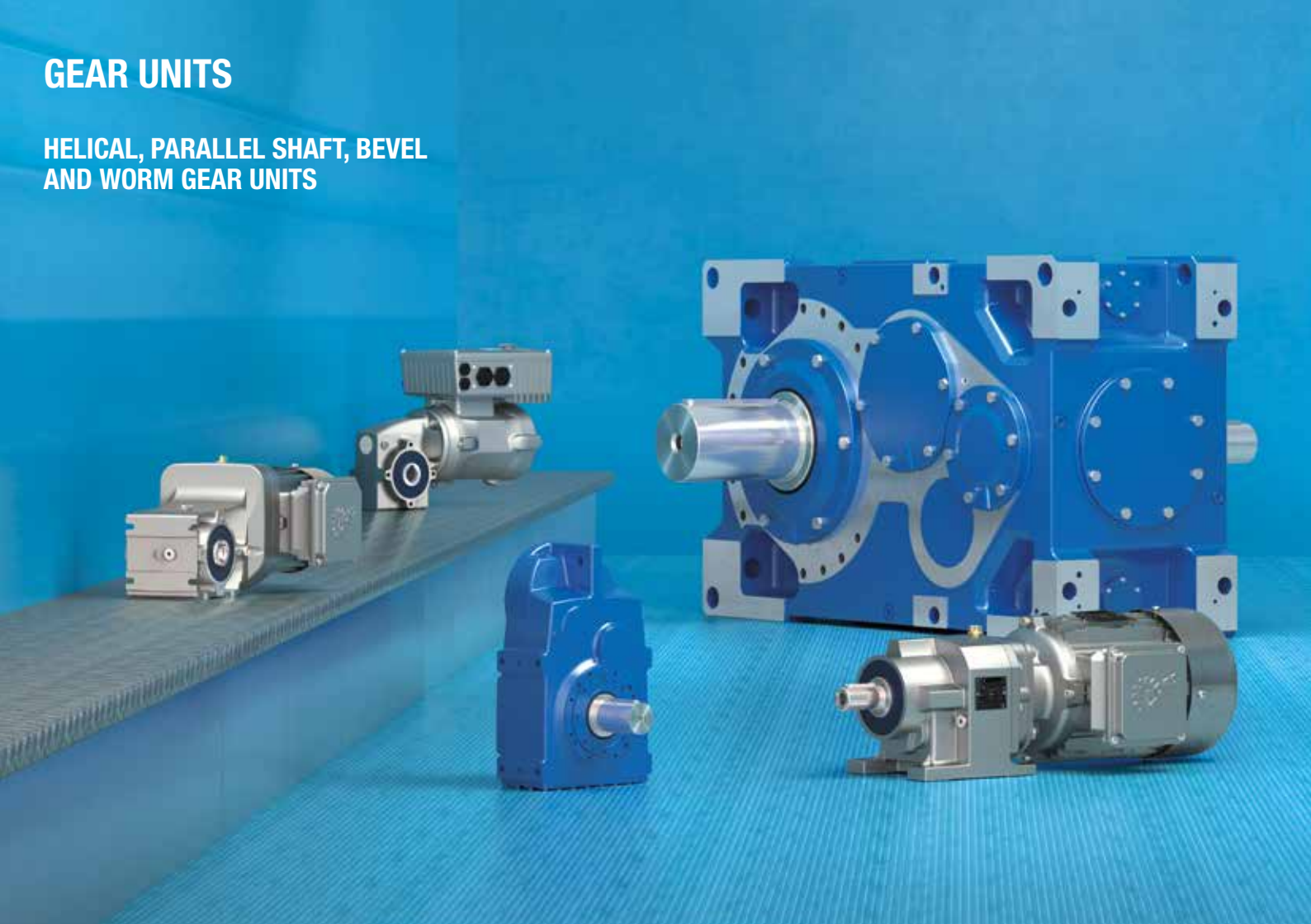
INTERNATIONAL

- Globally networked organisation
- Local advice, assembly and service

CONTENTS

GEAR UNITS

HELICAL, PARALLEL SHAFT, BEVEL AND WORM GEAR UNITS



UNICASE HELICAL IN-LINE GEAR UNITS

The robust all-rounder

UNICASE helical gear units (Catalogue G1000)

- Foot or flange mounted versions
- Long life, low-maintenance
- Optimum sealing
- UNICASE housing

Sizes	11
Power	0.12 – 160 kW
Torque	10 – 26,000 Nm
Speed ratio	1.35 – 14,340.31:1

UNICASE helical gear units

SK 7 2

- 7 — Housing size
- 2 — Gear stages
- 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® helical gear units (Catalogue G1000)

- Foot or flange mounted versions
- Die-cast aluminium alloy housing (cast iron housing for SK 772.1 and above)
- UNICASE housing
- Single-stage version available for high speed applications (SK x71.1)
- Long bearing life
- High permissible radial and axial forces
- Smooth-surface
- Compact design, even with IEC / NEMA adapter
- Natural corrosion protection, even without painting

Sizes	13
Power	0.12 – 37 kW
Torque	30 – 3,300 Nm
Speed ratio	1.07 – 456.77:1

NORDBLOC.1® single stage helical gear units

SK 5 7 1 .1

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

NORDBLOC.1® 2-, 3-stage helical gear units

SK 8 7 2 .1 F

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

STANDARD HELICAL GEAR UNITS

The proven classic

STANDARD helical gear units (Catalogue G2000)

- Foot or flange mounted versions
- Long life, low-maintenance
- Grey cast iron housing
- Reinforced output side (optional)

Sizes	6
Power	0.12 – 7.5 kW
Torque	50 – 700 Nm
Speed ratio	1.92 – 488.07:1

STANDARD helical gear units

SK 2 5 F

B5 flange

Housing size

Special nomenclature:

- The number of digits corresponds to the number of gear stages; exception SK 0: these gear units have two stages
- A “5” at the designation end (e.g. SK 225) indicates a reinforced output configuration (shaft and bearings)

UNICASE PARALLEL SHAFT GEAR UNITS

Slim and powerful

UNICASE parallel shaft gear units (Catalogue G1000)

- Foot, flange or face mounted
- Hollow or solid shaft
- Compact design
- UNICASE housing
- Long service life
- Low-maintenance
- Quiet running – e.g. for theatre applications
- NORDBLOC.1® aluminium parallel shaft gear units up to Size 4

Sizes	15
Power	0.12 – 200 kW
Torque	110 – 100,000 Nm
Speed ratio	4.03 – 15,685.03:1

UNICASE 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 0182.1 and SK 0282.1 the number of stages can be obtained from the nomenclature (a 2- and 3-stage version is available)

UNICASE BEVEL GEAR UNITS

Powerful and proven

UNICASE bevel gear units (Catalogue G1000)

- Foot, flange or face mounted
- Hollow or solid shaft
- UNICASE housing
- High efficiency
- Robust design
- Grey cast iron housing
- Various bearing concepts for high axial and radial load capacities
- Quiet running – e.g. for theatre applications

Sizes	11
Power	0.12 – 200 kW
Torque	180 – 50,000 Nm
Speed ratio	8.04 – 13,432.68:1

UNICASE bevel gear units

SK 90 4 2 .1 AZ

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

Special nomenclature:

- A 6 at the designation end indicates a reinforced version, 3-stage
- A 7 at the designation end indicates a reinforced version, 4-stage (including the bevel gear stage)

NORDBLOC.1® BEVEL GEAR UNITS

Power and design

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

- Foot, flange or face mounted
- Hollow or solid shaft
- UNICASE housing
- Aluminium housing
- nsd tupH treatment (optional)
- Wash-down design
- High power density

Sizes	6
Power	0.12 – 9.2 kW
Torque	50 – 660 Nm
Speed ratio	3.03 – 70:1

NORDBLOC.1® 2-stage 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

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

UNICASE WORM GEAR UNITS

Quiet and powerful

UNICASE worm gear units (Catalogue G1000)

- Foot, flange or face mounted
- Hollow or solid shaft
- UNICASE housing
- Soft and quiet running
- High overload capacity
- High axial and radial loads
- Grey cast iron housing

Sizes	6
Power	0.12 – 15 kW
Torque	93 – 3,058 Nm
Speed ratio	4.40 – 7,095.12:1

UNICASE worm gear units

SK 1 2 080

- 080 — Worm gear size (centre 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)

- The nomenclature can also be used for SK 02040.1

UNIVERSAL WORM GEAR UNITS

Modular and flexible

UNIVERSAL SI worm gear units (Catalogue G1035)

- Modular
- Universal mounting
- Life-long lubrication
- IEC version
- Aluminium housing

Sizes	5
Power	0.12 – 4.0 kW
Torque	21 – 427 Nm
Speed ratio	5.00 – 3,000:1

UNIVERSAL SMI worm gear units (Catalogue G1035)

- Smooth-surfaces
- Life-long lubrication
- IEC version
- Aluminium housing
- nsd tupH (optional)

Sizes	5
Power	0.12 – 4.0 kW
Torque	21 – 427 Nm
Speed ratio	5.00 – 3,000:1

UNIVERSAL SI worm gear units

SK 1 SI 75 / H10

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

UNIVERSAL SMI worm gear units

SK 1 SMI 31 AZ

- 1 – Gear stages
- SMI – SMI design
- 31 – Worm gear size (31 mm)
- AZ – Hollow shaft / B14 flange

GEAR UNIT OPTIONS

Designation	Meaning
A	Hollow shaft
AF	Hollow shaft, B5 flange
AX	Hollow shaft, foot mounting
AXF	Hollow shaft, foot mounting, B5 flange
AZ	Hollow shaft, B14 flange
AZD	Hollow shaft, B14 flange with torque arm
AZK	Hollow shaft, B14 flange with torque bracket
B	Fastening element for hollow shaft
D	Torque support
EA	Hollow shaft, splined, DIN 5480
G	Rubber buffer for torque arm
H	Cover as contact guard
IEC	Adapter for fitting IEC standard motors
LX	Solid shaft - both sides, foot mounting
MK	Motor bracket
R	Integrated backstop
RLS	Backstop in W adapter
S	Hollow shaft with shrink disc
SEK	Servo adapter with clamp coupling
SEP	Servo adapter with parallel key coupling

Designation	Meaning
V	Solid shaft
VF	Solid shaft, B5 flange
VL	Reinforced bearings
VL2	Agitator version
VL3	Agitator design with "Drywell"
VX	Solid shaft, foot mounting
VXF	Solid shaft, foot mounting, B5 flange
VXZ	Solid shaft, foot mounting, B14 flange
VZ	Solid shaft, B14 flange
W	Drive cylinder with free drive shaft
XF	Foot mounting, B5 flange
XZ	Foot mounting, B14 flange

- Not all options are available for all gear units
- Detailed descriptions and diagrams can be found in the relevant catalogues
- Further options in the cited catalogues or on request (e.g. belt drives)
- Multiple options are stated in succession, e.g.: SK 2282 S H G (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 (Catalogue G1050)

- UNICASE housing, no joints subject to torque
- All bearing points and sealing surfaces are machined in a single operation
- High precision axis alignment, quiet running
- Long life, low-maintenance
- Gear ratio range 5.54 to 400:1 with the same dimensions
- Helical and bevel gear units

MAXXDRIVE® helical gear units (Catalogue G1050)

- 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	1.5 – 4,000 kW
Torque	15,000 – 282,000 Nm
Speed ratio	5.54 – 30,000:1

MAXXDRIVE® helical bevel gear units (Catalogue G1050)

- 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	1.5 – 4,000 kW
Torque	15,000 – 260,000 Nm
Speed ratio	12.61 – 30,000:1

MAXXDRIVE® XT helical bevel gear units (TI60-0011)

- 2-stage
- Thermally optimised gear units
- Integrated high power axial fan
- High powers with low speed ratios
- Optimised for horizontal installation orientation
- Ideal for applications such as belt or bucket conveyors

Sizes	7
Power	1.5 – 1,500 kW
Torque	15,000 – 75,000 Nm
Speed ratio	6.14 – 22.91:1

MAXXDRIVE® INDUSTRIAL GEAR UNITS

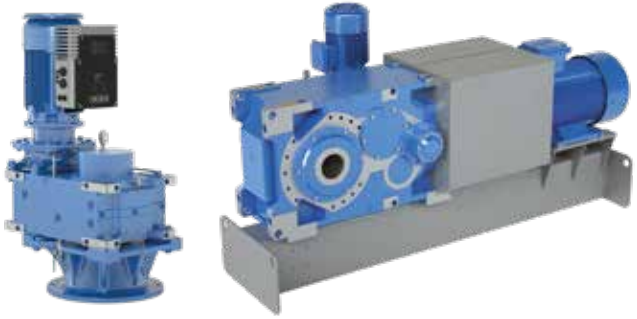
MAXXDRIVE® industrial gear units

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

- 355LP/4 — Motor designation
- FAN — Additional options (FAN, CC, …)
- MS — Motor adapters (IEC, NEMA, MS, ...)
- H — Additional options (D, H, B, …)
- AS — Shaft and mounting options (A, V, L, …)
- 17 — Type designation
- 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 systems (Catalogue G1050)



- Complete drive systems consisting of the gear unit, motor and drive electronics
- Wide selection of other components, e.g. couplings, brakes, etc.
- Standardised solutions for rockers 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 catalogues
- Further options can be found in the cited catalogues 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

ASYNCHRONOUS MOTORS

Robust motors for all applications

Standard motors (Catalogue M7000)

- Comply with international regulations and directives
- Extensive options possible
- ISO F used according to B (ISO H as option)
- Suited for inverter operation
- High overload reserves

Sizes	63 – 225
Power	0.12 – 55 kW
Number of poles	2, 4, 6, 8
Protection class	IP55, optional IP66
Efficiency class	IE1, IE2, IE3

Switchable pole motors (Catalogue M7000)

- ISO F used according to B

Sizes	63 – 160
Power	0.10 – 17 kW
Number of poles	4-2, 8-2, 8-4 Othres on request
Protection class	IP55, optional IP66
Efficiency class	IE1

Single-phase motors (Catalogue M7000)

- ISO F used according to B
- With operating and starting capacitor and as single-phase motors with Steinmetz circuit

Sizes	63 – 90
Power	0.12 – 1.5 kW
Number of poles	4
Protection class	IP55, optional IP66
Efficiency class	IE1

ASYNCHRONOUS MOTORS

Robust motors for all applications

IEC-motors

SK 100 L H / 4 SH

- SH – Anti-condensation heating
- 4 – Number of poles
- H – Efficiency class
- L – Power class
- 100 – Size (frame size)

- X or W in the nomenclature designates a smaller size
  Example: SK 250WP is a 55 kW Motor in a size 225 housing

NEMA C-FACE-motors

SK 90 L H / 4 145 TC TW

- TW – Motor option (TW = thermostat)
- TC – C-flange
- 145 – Housing size
- 4 – Number of poles
- H – Efficiency class
- L – Power class
- 90 – Size (frame size)

Switchable pole motors

SK 132 M 8 / 2 WU

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

Single-phase motors

SK 90 LB / 4 EHB1

- EHB1 – with capacitor
  EAR1 – with operating and starting capacitor
  EST – with Steinmetz circuit
  ECR – with operating and starting capacitor, CUS approved
- 4 – Number of poles
- LB – Power class
- 90 – Size (frame size)

ASYNCHRONOUS MOTORS

Robust motors for all applications

Smooth motors (Catalogue M7010)

- ISO F
- Suited for inverter operation
- Wash-down design
- nsd tupH (optional)
- Smooth-surfaces, especially suitable for food industry applications

Sizes	71 – 100
Power	0.12 – 2.2 kW
Number of poles	4
Protection class	IP66, optional IP69K in combination with the gear unit
Efficiency class	IE3

Smooth motors

SK 100 L H / 4 HM

- 100 – Size (frame size)
- L – Power class
- H – Efficiency class
- 4 – Number of poles
- HM – Smooth motor type

- For non-ventilated smooth motors, the efficiency code letter is H or P for Premium Efficiency (IE3)

SYNCHRONOUS MOTORS

High performance for your application

Standard motors (TI60-0001 and TI60-0004)

- ISO B
- Only for inverter operation
- Open or closed loop operation with NORD frequency inverters
- High overload reserves

Sizes	80 – 100
Power	1.1 – 5.5 kW
Number of poles	4
Protection class	IP55, optional IP66
Efficiency class	IE4

Smooth motors (DS1007)

- ISO B
- Only for inverter operation
- Open or closed loop operation with NORD frequency inverters
- Wash-down design
- nsd tupH (optional)

Sizes	80 – 100
Power	0.75 – 2.2 kW
Number of poles	4
Protection class	IP66, optional IP69K in combination with the gear unit
Efficiency class	IE4

NORD DRIVESYSTEMS

Standard motors

SK 100 T 2 / 4 Δ

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

Smooth motors

SK 80 T 1 / 4 HM

- Size (frame size)
- Synchronous motors
- Stator code (depending on motor size)
- Number of poles
- Smooth motor type

IE5+ SYNCHRONOUS MOTORS

Efficient, hygienic and compact

IE5+ Synchronous motors (Special flyer 9012)

- 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
- Especially easy to clean and corrosion-proof due to smooth and fanless motor design – Wash-down
- Optional motor-integrated encoder
- Optional integrated mechanical brake

Sizes	71
Power	0.35 – 1.1 kW
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

Optimally secured

Dust explosion-protected motors (Catalogue G2122)

- 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	0.12 – 22 kW
Number of poles	4
Protection class	IP55, optional IP66
Efficiency class	IE2 (80SH and higher)

Gas explosion-protected motors (Catalogue G2122)

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

Sizes	63 – 180
Power	0.12 – 22 kW
Number of poles	4
Protection class	IP55, optional IP66
Efficiency class	IE2 (80SH and higher)

- Motors compliant with NEC explosion protection HazLoc and IECEX are also available
- Further information about European explosion protection is given in Manual Part No. 6091602

NORD UNIVERSAL MOTOR

Can be used in the main global markets

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	0.12 – 45 kW
Number of poles	4
Protection class	IP55, optional IP66
Efficiency class	IE3/Premium

MOTOR OPTIONS

Designation	Meaning
BRE +	Brake / brake torque + sub-options
DBR +	Double brake + sub-options
RG *	Rust protected version
SR *	Dust and rust protected version
IR *	Current relay
FHL *	Lockable manual release
HL	Manual release
MIK	Microswitch
AS55 *	Outdoor installation
BRB	Anti-condensation 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	Hand wheel
RD	Protective shield
RDT	Protective shield, textile fan cowl
RDD	Double fan cowl
AS66	Outdoor installation
OL	Without fan
OL/H	Without fan, without fan cowl
KB	Closed condensation drain hole

Designation	Meaning
MS	Motor plug connection
EKK	One-piece terminal box
KKV	Encapsulated terminal box
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
RLS	Backstop
MG	Magnetic incremental encoder
SL	Sensor bearings
IG	Incremental encoder
IG.P	Incremental encoder with plug connector
IG.K	Incremental encoder with terminal box
AG	Absolute encoder

**not for DBR*

- Not all options are available for all motors
- Detailed descriptions and drawings of the options can be found in M7000
- Further options (e.g. motor plug connection, 2xTF etc.) on request

DRIVE ELECTRONICS

FREQUENCY INVERTERS AND MOTOR STARTERS

NORDAC *PRO* SK 500P

Frequency inverters – for versatile use

NORDAC *PRO* SK 500P (Catalogue E3000)

- Universal drive in various basic versions, can be modularly extended
- Precise current vector control with high overload reserves for operating asynchronous and synchronous motors
- HTL encoder interface for closed-loop servo mode and POSICON positioning function even in the basic SK 500P device
- 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, even in the basic device
- 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
- USB interface for connection to NORDCON, may also be used without a power supply
- Compact slim design, can be mounted directly adjacent to other components
- in Size 1 and 2 all terminals are implemented as plug connections, including the power connections for the mains and the motor

Sizes	3
Voltage	1~ 200 – 240 V 3~ 380 – 480 V
Power	0.25 – 5.5 kW

NORDAC *PRO* SK 500P

SK 500P 551 340 A

- A: EMC line filters: A = Class A1 (C2)
- 340: Mains voltage: x23 = 230 V; x40 = 400 V
- 3: Number of mains phases: 1xx = 1-phase; 3xx = 3-phase
- 5: Digits before decimal point for power: 0 = 0.xx; 1 = 0x.x0; 2 = 0xx.0; 3 = 0xx0.0
- 51: Rated power (xx): 250 = 0.25 kW … 551 = 5.5 kW etc.
- SK 500P: Frequency inverter type: SK 500P, SK 510P, SK 530P, SK 550P

NORDAC *PRO* SK 500E

Frequency inverters – for versatile use

NORDAC *PRO* SK 500E (Catalogue E3000)

- Maximum functionality
- 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 higher
- 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 reserves (200 %) for all power ratings up to 160 kW
- Many field bus- and Industrial Ethernet-based bus systems
- Optional: CANopen integrated in SK 511E and higher
- Integrated Class C1 line filter
- Alternative cooling systems, e.g. “Cold Plate”
- IP20 control cabinet installation

Sizes	11
Voltage	1~ 110 – 120 V 1~ 200 – 240 V 3~ 200 – 240 V 3~ 380 – 480 V
Power	0.25 – 160 kW

NORDAC *PRO* SK 500E

SK 500E 113 340 A

- A: EMC line filters: A = Class A1 (C2)
- 340: Mains voltage: x12 = 115 V; x23 = 230 V; x40 = 400 V
- 3: Number of mains 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 etc.
- SK 500E: Frequency inverter type: SK 500E ... SK 545E

NORDAC *LINK* SK 250E

Frequency inverters – easy to install

NORDAC *LINK* SK 250E (Catalogue E3000)

- Protection class IP65 (< 2.2 kW), IP55 (all devices with fan or option FANO)
- Simple commissioning and installation in the field
- All I/O, bus interface and power connections in plug-in version for easy commissioning and maintenance
- Extensive options e.g. key operated maintenance switch, push buttons, potentiometers
- PLC functionality for drive-integrated functions
- Functions compatible with modular NORDAC *FLEX*
- AS-Interface
- Safe stop with “Safe Torque Off” (STO) and “Safe Stop 1” (SS1) as per EN 61800-5-2
- Many field bus- and Industrial Ethernet-based bus systems
- ASM and PMSM motor operation
- Local or remote control

Sizes	3
Voltage	3~ 380 – 500 V
Power	0.37 – 7.5 kW

NORDAC *LINK* SK 250E

SK 250E FDS 301 340 A

- A: EMC line filters: A = Class A1 (C2)
- 340: Mains voltage: x40 = 400 V
- 3: Number of mains phases: 3xx = 3-phase
- 01: 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: Frequency inverter type: SK 250E ... SK 280E

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

NORDAC *FLEX* SK 200E

Frequency inverters – for flexible use

NORDAC *FLEX* SK 200E (Catalogue E3000)

- Sensorless current vector control (ISD control)
- 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
- Energy-saving function
- Motor or wall mounting
- IP55 (optional IP66)
- AS-Interface integrated in SK 22xE and SK 23xE
- Many field bus- and Industrial Ethernet-based bus systems
- 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	0.25 – 22 kW

NORDAC *FLEX* SK 200E

SK 200E 550 340 A (-C)

- (-C): Protection class: without = IP55 (standard); C = IP66
- A: EMC line filters: A = Class A1 (C2)
- 340: Mains voltage: x12 = 115 V; x23 = 230 V; x40 = 400 V
- 340: Number of mains phases: 1xx = 1-phase; 3xx = 3-phase
- 550: Digits before decimal point for power: 0 = 0.xx; 1 = 0x.x0; 2 = 0xx.0
- 550: Rated power (xx): 550 = 0.55 kW ... 222 = 22 kW etc.
- SK 200E: Frequency inverter type: SK 200E ... SK 230E and SK 205E ... SK 235E

NORDAC *BASE* SK 180E

Frequency inverters – economical in use

NORDAC *BASE* SK 180E (Catalogue E3000)

- Sensorless current vector control (ISD control)
- PLC functionality for drive-integrated functions
- Operation on standard RCD possible, leakage current <16 mA
- AS-Interface integrated in SK 190E
- Energy-saving function
- Motor or wall mounting
- IP55 (optional IP66 or IP69K)
- nsd tupH treatment (optional)
- Integrated line filter
- 2 analogue inputs, 3 digital inputs, 2 digital outputs
- Temperature sensor input (TF+/TF-)
- RS485 (System bus/RS232 interface)
- ATEX Zone 22, Category 3D

Sizes	2
Voltage	1~ 110 – 120 V 1~ 200 – 240 V 3~ 200 – 240 V 3~ 380 – 500 V
Power	0.25 – 2.2 kW

NORDAC *BASE* SK 180E

SK 180E 750 340 B (-C) XXX

- XXX: NSD (nsd tupH) without = Standard, BRI (internal braking resistor)
- (-C): Protection class: without = IP55 (standard), C = IP66
- B: EMC line filters: Class C1, B = Class C1
- 340: Mains voltage: x12 = 115 V; x23 = 230 V; x40 = 400 V
- 340: Number of mains 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 etc.
- SK 180E: Frequency inverter type: SK 180E or SK 190E

NORDAC *LINK* SK 155E

Motor starters – for economical operation

NORDAC *LINK* SK 155E / 175E (Catalogue E3000)

- All I/O, bus interface and power connections in plug-in version for 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*
- Protection class IP65
- Simple commissioning
- AS-Interface or PROFIBUS can be used
- Field installation
- Can be parameterised on-site

Sizes	1
Voltage	3~ 380 – 500 V
Power	0.12 – 3 kW

NORDAC *LINK* SK 155E / 175E

SK 175E FDS 301 340 A

- A: EMC line filters: A = Class A1 (C2)
- 340: Mains voltage: x40 = 400 V
- 340: Number of mains phases: 3xx = 3-phase
- 301: Digits before decimal point for power: 1 = 0x.x0
- 301: Rated power (xx): 301 = 3 kW
- FDS: NORDAC *LINK* FDS
- SK 175E: Frequency inverter type: SK 155E (unidirectional), SK 175E (bidirectional)

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

NORDAC *START* SK 135E

Motor starters – for economical operation

NORDAC *START* SK 135E (Catalogue E3000)

- Motor starter with soft start and reversing function
- Integrated brake rectifier to control a brake (BRE)
- PROFIBUS or AS-Interface integrated
- Wall or motor mounting
- IP55 (optional IP66 and IP69K)
- nsd tupH treatment (optional)
- Integrated line filter
- 2 digital inputs, 2 digital outputs
- Temperature sensor input (TF+/TF-)
- RS232 interface
- ATEX Zone 22, Category 3D
- Electronic starter switches without wear
- Reduced mechanical wear due to reduced start-up torque

Sizes	2
Voltage	3~ 200 – 240 V 3~ 380 – 500 V
Power	0.12 – 3 kW or up to 7.5 kW

NORDAC *START* SK 135E

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: Mains voltage: x23 = 230 V; x40 = 400 V
- 340: Number of mains phases: 3xx = 3-phase
- 301: Rated power (xx): 301 = 3.0 kW or 751 = 7.5 kW
- SK 135E: Frequency inverter type: SK 135E or SK 175E

NORDAC *ACCESS BT* / NORDCON *APP*

NORDAC *ACCESS BT*

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

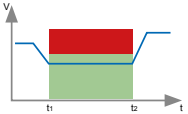
NORDCON *APP*

- Dashboard based visualisation for drive monitoring and fault diagnosis
- Parameterisation 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

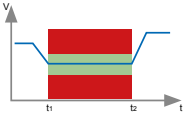
PROFIsafe – SK TU4-PNS

Safe Motion PROFIsafe via PROFINET with module SK TU4-PNS

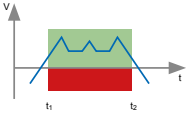
Safety functions for drives according to IEC 61800-5-2



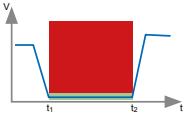
Safely Limited Speed (SLS)



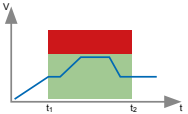
Safe Speed Range (SSR)



Safe Direction (SDI)



Safe Operation Stop (SOS)



Safe Speed Measurement (SSM)

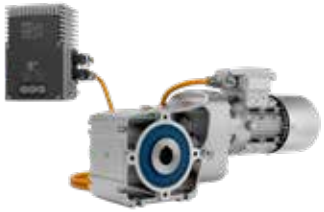
- PL_r (Performance Level) Cat. 4 according to ISO 13849-1
- SIL 3 (Safety Integrity Level) as per IEC 62061

+ User-defined safe I/O configuration

- Simple implementation of safe responses for NORDAC *FLEX* decentralised inverters
- Comprehensive safety for reliable operation of plant and machinery
- Functional safety with a single network cable
- Minimum wiring effort
- Global availability of fail-safe machine data

SPECIAL OPTIONS FOR DECENTRALISED INVERTERS

Plug connections



All connections designed for simple handling, so that drives can be very conveniently configured and installed.

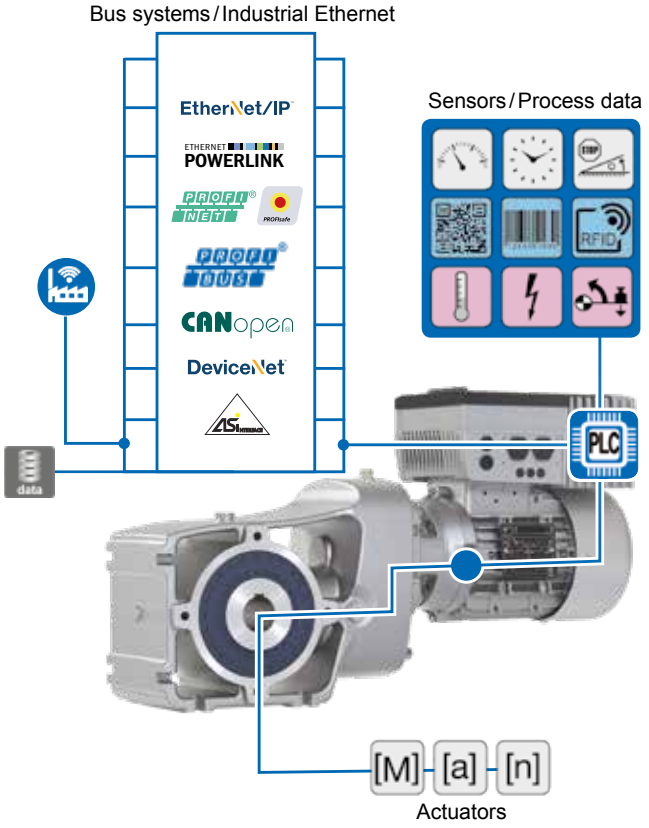
- Simple Plug-and-Play with all common connection plugs
- Mains and motor output plugs
- M12 plugs for sensors and encoders
- Pre-assembled cables

Local control

Switches and keys are located directly on the drives and enable direct starting and stopping as well as mode switching.

- Mains 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 (mains 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)

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.

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

SK CE HQ8-K MA H10E-M1B 3_OM

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

Cable extension

CONDITION MONITORING FOR PREDICTIVE MAINTENANCE

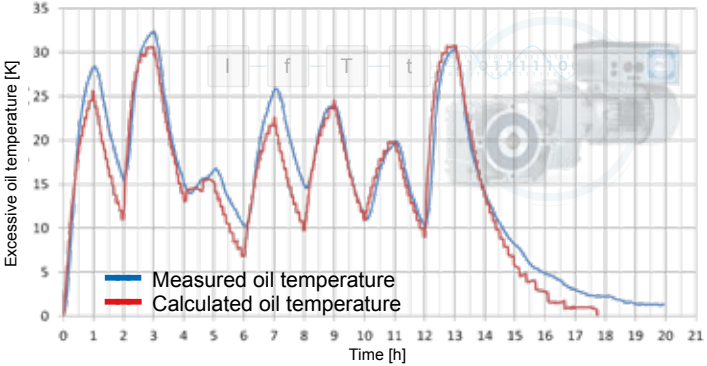
For CONDITION MONITORING, drive and status data are recorded periodically or continuously in order to optimise the operational safety and efficiency of machines and plants. CONDITION MONITORING can provide major information for PREDICTIVE MAINTENANCE. The objective is to maintain machines and plants proactively, to reduce downtimes and to 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 solutions for PREDICTIVE MAINTENANCE systems integrated into the frequency inverter
- System is IIoT / Industry 4.0 READY!
- Available for decentralised and control cabinet solutions

Further information in special flyer S9091

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 / analogue 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 with the integrated PLC
- Pre-processing of threshold values

TECHNICAL INFORMATION

nsd tupH surface protection
Energy saving directives for motors
Nominal operating modes
International Protection Codes
Installation orientations
Enquiry process

NORD geared motors and electronics (SK 1xxE) with nsd tupH are ideal for use in extreme ambient conditions:

- Easy to clean surfaces
- Resistant to acids and alkalis (wide pH range)
- No blistering, even if damaged
- Cannot flake
- Corrosion resistant – prevents contact corrosion
- Alternative to stainless steel
- Complies with FDA Title 21 CFR 175.300
- Free from chromates

The complete solution for extreme conditions:

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

nsd tupH for extreme conditions:

- Food and beverage industry
- Dairies
- Pharmaceutical industry
- Water and waste water plants
- Car wash equipment
- Offshore and coastal areas
- Chemical cleaning (Wash-down, wide pH range)

Tests performed on surface treated aluminium housing components:

- ASTM D714 Blister formation
- ASTM D610-08 Corrosion
- ASTM D1654-08 Scratching
- ASTM B117-09 Salt spray test
- ASTM D3170 Gravelometer test
- DIN EN ISO 9227 Salt spray mist test
- DIN EN ISO 2409 Cross-cut test

Overview of advantages	Paint	Stainless steel	nsd tupH
No flaking possible	––	++	++
Corrosion resistant	+	++	++
Costs	+	––	o
Weight	++	–	++
Available products	+	–	+
Thermal conductivity	+	–	+

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

Products available with nsd tupH:

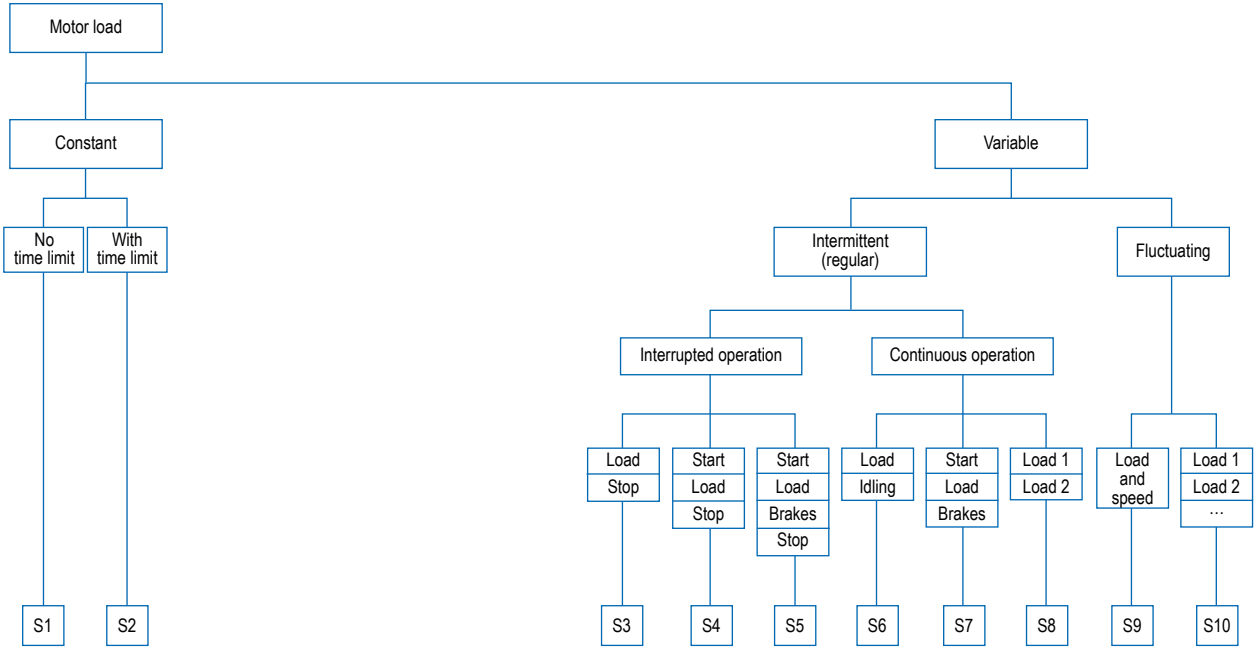
- Helical gear units
- Bevel gear units
- Worm gear units
- Smooth motors
- NORDAC *START* and NORDAC *BASE* electronics

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

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

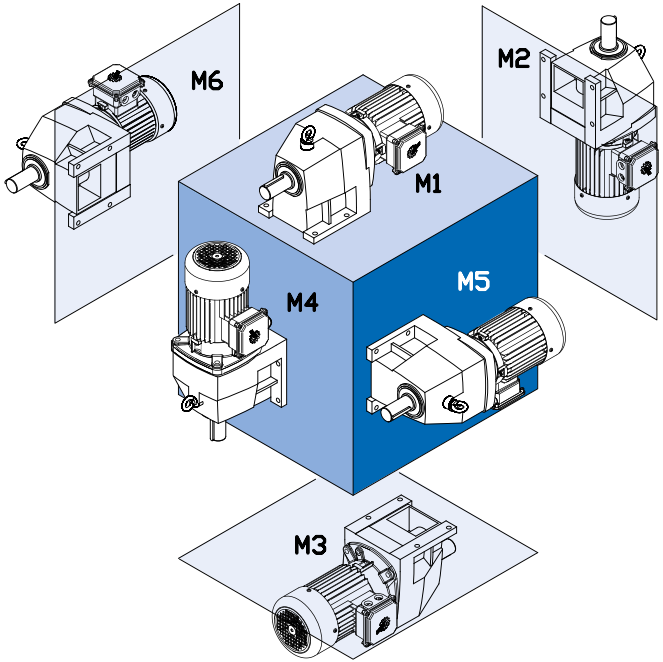
- IE3 for 0.75 – 1,000 kW and IE2 for 0.12 – <0.75 kW including for brake motors, inverter operated motors and Ex motors (Ex eb is exempted)
- IE2 for frequency inverters from 0.12 – 1,000 kW

JULY 2023

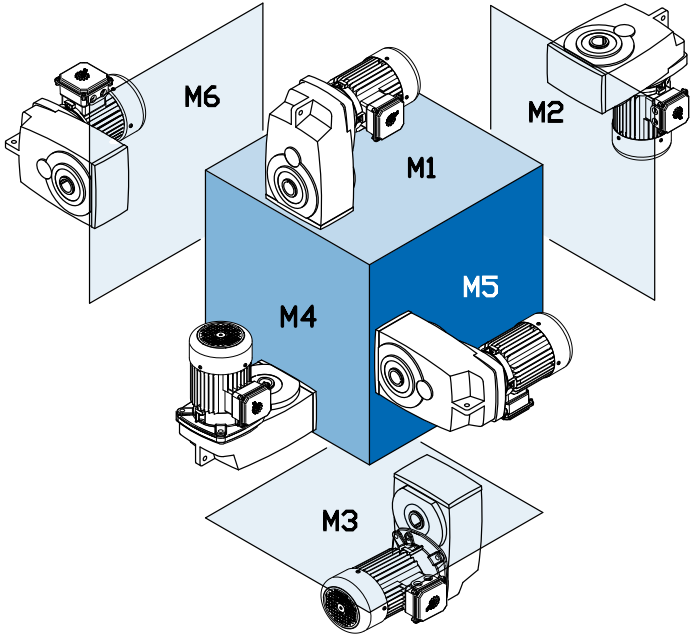
- IE4 for 75 – 200 kW
- IE2 for Ex eb motors
- IE2 for single-phase motors

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

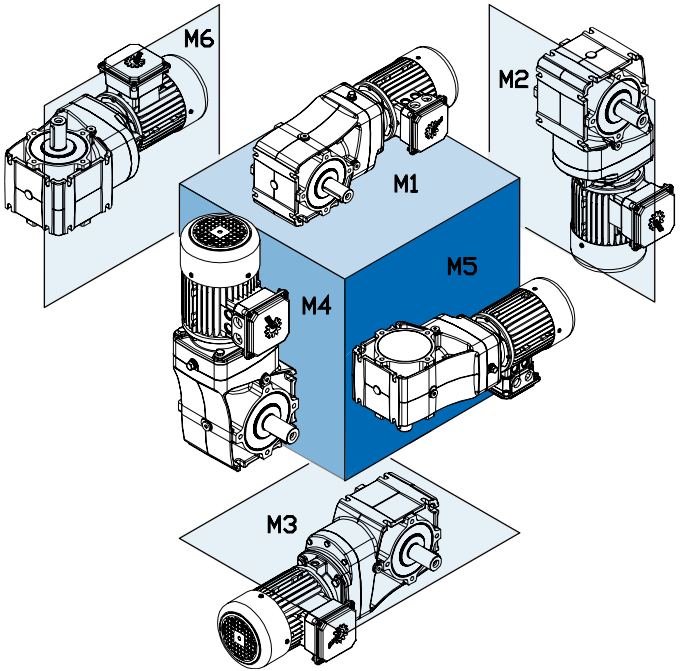
INSTALLATION ORIENTATIONS HELICAL GEAR UNITS



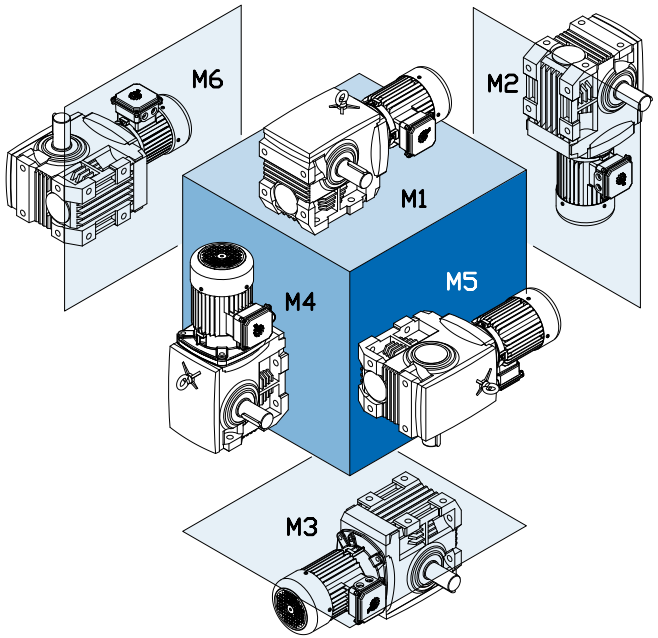
INSTALLATION ORIENTATIONS PARALLEL SHAFT GEAR UNITS



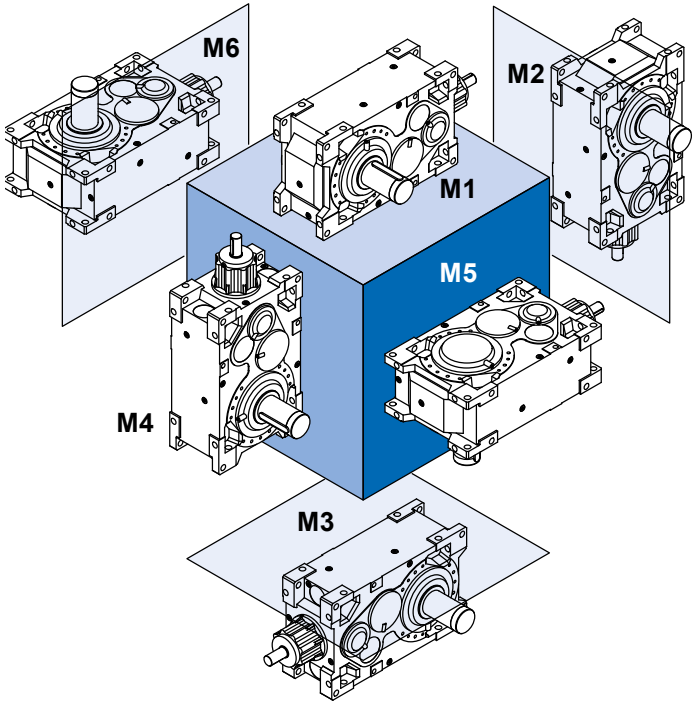
INSTALLATION ORIENTATIONS BEVEL GEAR UNITS

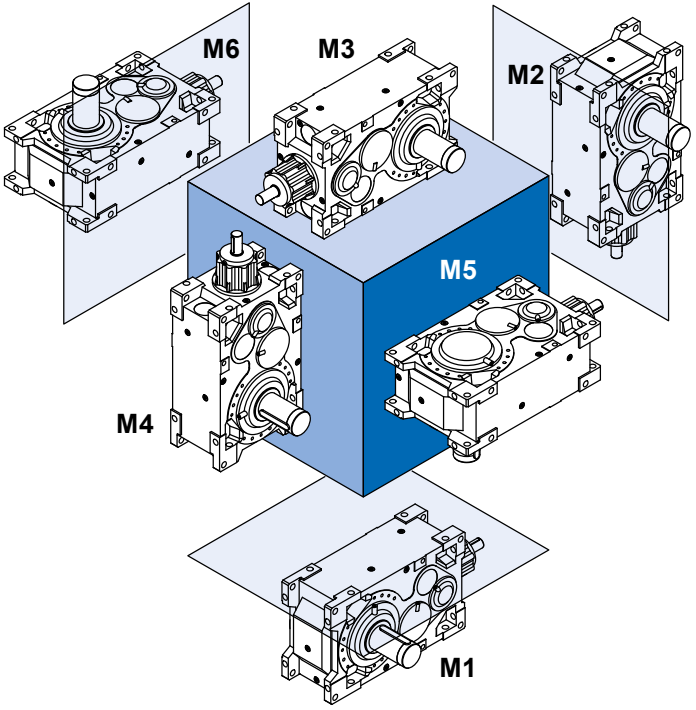


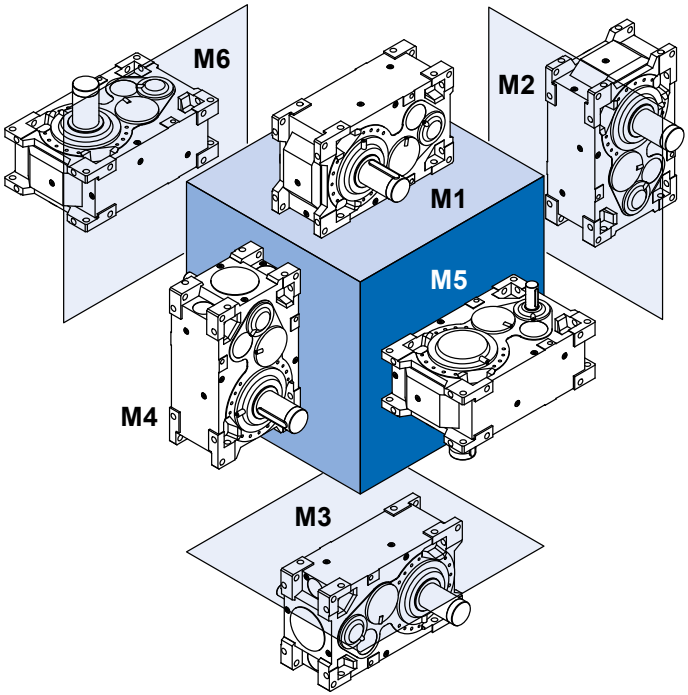
INSTALLATION ORIENTATIONS WORM GEAR UNITS



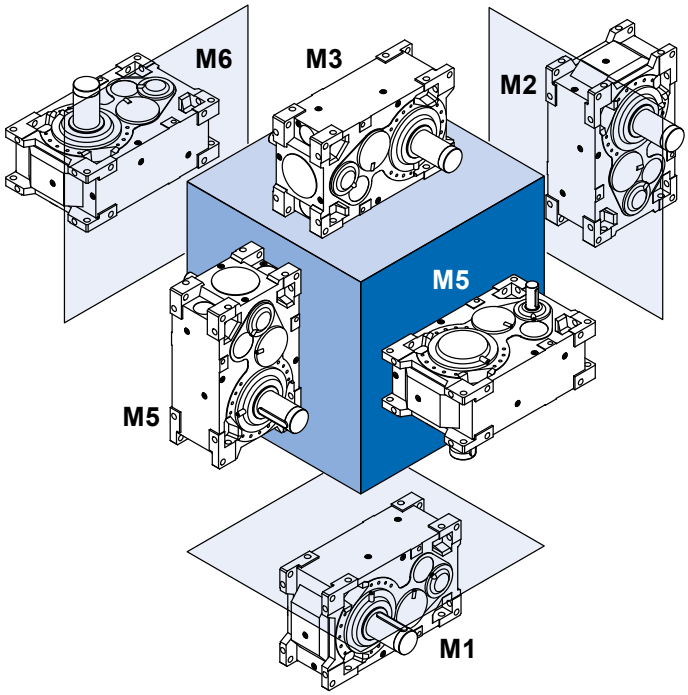
INSTALLATION ORIENTATIONS
MAXXDRIVE® BEVEL GEAR UNITS





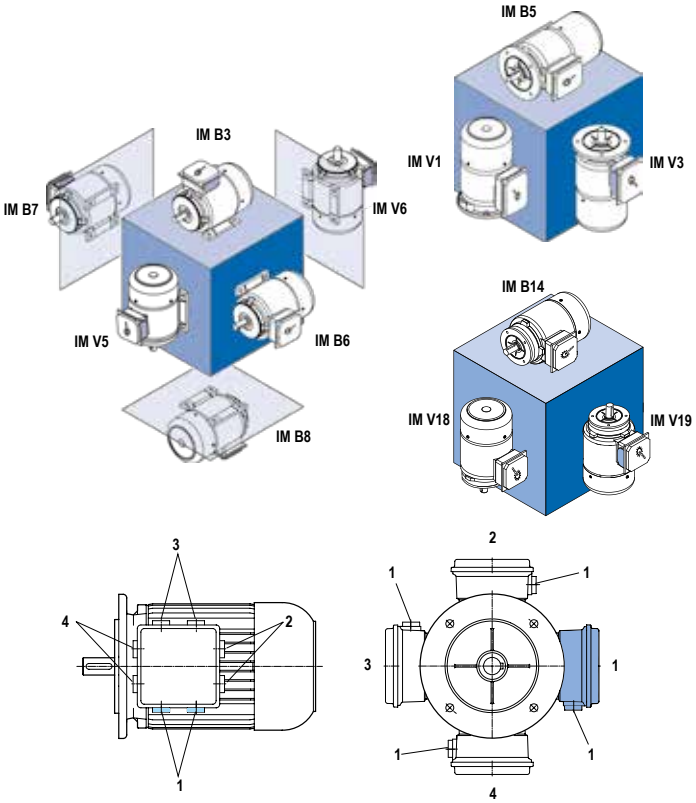


2-stage gear unit installation orientations



3-stage gear unit installation orientations

INSTALLATION ORIENTATIONS FOR MOTORS AND TERMINAL BOXES



The nomenclature is also available as a poster (Part No. 6091985)

ENQUIRY PROCESS

myNORD

The online product configurator in the myNORD (www.mynord.com) customer portal enables convenient selection of the drive unit. Ex drives including options can also be selected for

- Precise configuration,
- Direct generation of CAD- data (3D models, dimensioned drawings, outline drawings),
- Creation of offers online.

It must be emphasised that the configurator indicates whether or not a selected drive unit is Ex compliant. Price information as well as an enquiry / order form are also included.

If configuration with myNORD is not possible, an enquiry form is available (www.nord.com > Forms > General Enquiry Form) Selection of the drive unit and checking of conformity will then be carried out by your technical contact partner.

Configurator for precisely tailored drives

Generate offer with purchase prices

Generate CAD data, (3D models, dimension sheets, outline drawings)

Track order status

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www.nord.com/locator

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