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DRIVESYSTEMS



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The new generation of NORD gear units was developed according to the UNICASE principle. This applies to all versions, such as foot, flange and shaft mounted gear units.

"UNICASE" indicates a unitary housing block in which all bearing seats are integrated. The UNICASE is machined in a single setup on the most modern CNC machines. The highest accuracy, rigidity and stability characterise the UNICASE principle. There are no joints between the output side and the gear unit housing which are subject to overhung or torque loads.

The housings are made of cast iron or cast aluminium. Ductile cast iron housings are available on request.

The pinions and gears are made of high-compounded steel; the teeth are case hardened. (except for worm gear units).

Optimised gearing geometries and corrections as well as precise shaft alignment through the UNICASE principle lead to the highest load capacity, long service life and low noise. The gears, bearings and shafts are calculated according to DIN 3990, DIN ISO 281 resp. Niemann for all in the cataloge shown powers and speeds. Thus, all NORD gear units offer a maximum of safety and reliability.

Bearings and gears operate in an oil bath. The gears in the gear unit also have, in addition to the positive locking keyed connection, a crimp connection between the shaft and hub.

Normally, shaft seals made of NBR material are used. Shaft seals made of FKM (Viton) are available as an option.

Helical gear units

The 2- and 3-stage helical gear units SK 63 to SK 103 have coaxially arranged motor and drive shafts. SK 02 - SK 52 are available in two-stage models. They may also be built as 3-stage units for higher ratios using a built-on housing.



These are designated SK 03 - SK 53. For helical gear unit sizes SK 62/63 and above, the gear units are built in the same housing for the 2- and 3-stage versions.

For the highest ratios, 4- and 5-stage helical gear units are available as multi-stage gear units.

Helical gear units are available in both foot and flange versions. In flange-version helical gear units, the flange is cast on; thus, there are no screw connections between the flange and the housing.

Helical gear units:

Output range from 0.12 – 160 kW, to 23,000 Nm, divided into 11 sizes.

Parallel shaft gear units

The parallel axle offset for parallel shaft gear units leads to a compact design compared to helical gear units. In shaft mounted design (hollow shaft) the gearbox can be mounted directly onto the drive shaft of the application. SK 0182NB to



SK 5282 are available as a 2-stage version. SK 1382NB - SK 5382 are built as 3-stage models for higher ratios, namely using an additional built-on housing for SK 2382 - SK 5382. For parallel shaft gear unit sizes SK 6282/SK 6382 and above, the gear units are built in the same housing for the 2- and 3-stage versions.

The parallel shaft gear units are available in three designs, with hollow or solid shafts, as desired.

- 1) Shaft-mounted design, without machined recesses with torque arm
- 2) Flange design, with machined B14 flange or screwon B5 flange
- 3) Foot-mounted design

Parallel shaft gear units:

Output range from 0.12 – 200 kW, to 90.000 Nm, divided into 14 sizes.











Helical-bevel gear units

Helical-bevel gear units are angular gear units in which the motor shaft and the output shaft form a 90° angle. Through this, a beneficial spatial arrangement of the drive arises.



NORD helical-bevel gear units always have multiple gear stages.

The configuration of stages is a follows:

	2-stage	3-stage	4-stage
Helical stage			1.stage
Helical stage	1.stage	1.stage	2.stage
Bevel gear stage	2.stage	2.stage	3.stage
Helical stage		3.stage	4.stage

Helical-bevel gear units are available with an integrated backstop.

The bevel gear can be placed to the left or right of the bevel pinion, through which the direction of rotation between the drive shaft and output shaft reverses.

Efficiency η:

The great advantage of the helical-bevel gear unit is the almost constant efficiency over the entire gear ratio range that practically equals that of helical and parallel shaft gear units.

Helical-bevel gear units:

Output range from 0.12 – 200 kW, to 50.000 Nm, divided into 16 sizes.

Helical-worm gear units

Helical-worm gear units are angular gear units in which the motor shaft and the output shaft form a 90° angle. Through this, a beneficial spatial arrangement of the



drive arises. The helical worm gear units listed in this catalogue have multiple stages. NORD also has very economically priced single-stage worm gear series which are listed in catalogue G1035. Please request our catalogue G1035.

The helical gears of the helical worm gear units are made of high-compounded steel; the theeth are case

hardened. Optimised gearing geometries and corrections as well as precise shaft alignment through the UNICASE principle lead to the highest load capacity, long service life and low noise. The worm stage has a hardened cylinder worm as well as a worm gear with a welded-on rim made of optimised special bronze. This combination guarantees a long service life. By using the most modern CNC processing machines, we offer the highest possible production quality ensured by constant inspection.

The helical worm gear unit series is lubricated for life at the factory with a high-quality, synthetic long-life lubricant with a polyglycol base. This synthetic lubricant leads to very high efficiency and a long service life through reduced friction.

The helical worm gear units SK 02040 to SK 42125 are available in two-stage models. They may also be built as 3-stage units for higher ratios using a built-on housing. These are designated SK 13050 - SK 43125.

Helical worm gear units:

Output range from 0.12 - 15 kW, to 3.000 Nm, divided into 6 sizes.

Efficiency η:

NORD worm gear units achieve efficiencies up to 92%. Because the worm gear set in new gear units must be run in, the friction coefficient is larger before running in than after. Because of this, the efficiency is slightly lower than before running in. This effect is increased at lower incline angles, thus with a lower number of starts in the worm.

Based on experience, the following allowances should be made:

- 1 gear up to approx. 12%
- 2 gears up to approx. 6%
- 3 gears up to approx. 3%
- 6 gears up to approx. 2%

The number of worm threads is listed in the output and gear ratio tables. The run-in procedure is completed after approx. 25 hours operating time at maximum load. The following conditions must be met in order to achieve the efficiencies shown in the tables:

- gear unit is fully run-in
- gear unit has reached a constant temperature
- the required lubricant is filled
- the rated torque must be taken off from the gear unit



With type W gear units (with free input shafts), the maximum drive output listed in the output and gear ratio tables is valid. With type IEC gear units, the standard power of each size according to DIN EN 50347 applies, but with the maximum power listed in the output and gear ratio tables. With rotation speeds higher than those listed in the output and gear ratio tables, special measures may be required. Please enquire.

With type W gear units, the input shaft bearings must be lubricated regularly (for two-stage gear units sizes SK 62 and SK 6282 and above and three-stage gear units sizes SK 73, SK 7382 and SK 9072.1 and above). We recommend that the exterior anti-friction bearings of the input shaft be lubricated, using the lubricating nipple provided, with approx. 20 to 25 g of grease approx. every 2,500 operating hours. Recommended lubricants: Petamo GHY 133 N (Klüber Lubrication). For the free input shaft an automatic lubricator as well as an external fan to improve the gearbox cooling are available on request, please enquire.

Two stage gear units with IEC adapter \geq 160 of sizes SK 62 and SK 6282 and greater and three-stage gear units with IEC adapter \geq 160 of sizes SK 73, SK 7382 and SK 9072.1 and greater normally have an automatic lubricator that supplies the external anti-friction bearings of the drive shaft with lubricant (see page H18, item 145). The lubricator supplies permanent lubricant to the bearing. The lubricator is filled with 120 cm³ of grease. Before commissioning the gear unit, the automatic lubricator should be activated and then exchanged every 12 months. This applies for an average run time \leq 8 hours/day. With longer run times, the interval between exchanging is reduced to 6 months.

The lubricator is designed for normal use at ambient temperatures from 0°C to 40°C. If the ambient temperature differs from the specified standard value for longer periods of time, special lubricators should be used: please enquire.

The IEC adapter with motor size \geq 160 with the automatic lubricator is, under certain operating conditions, normally not recommended for vertical mounting positions in which the motor is vertically upright. In this case, the direct mounted motor is strictly recommended.

The vertical IEC adapter with motor size \geq 160 (mounting position M2 or M4) must be checked and approved by NORD (with the actual operating conditions). Please pay to attation to this.

In vertical alignments with motor downwards (mounting position M2), the service life of the seal may be decreased.

In this case, we recommend shorter intervals between maintenance. The smaller gear units with IEC adapters up to size SK 52 and SK 5282 (for two-stage gear units) and up to size SK 63, SK 6382 and SK 9052.1 (for three-stage gear units) have bearings which are specially sealed and lubricated for their service life. These are maintenance-free.

The IEC adapter coupling for motor sizes 63 to 180 is not fail-safe. (Exception: IEC motor sizes 160 and 180 if the automatic lubricator is used. From IEC 200 and higher, the couplings used are fail-safe.) With hoists, lifts and other cases of operation with a danger of personal injury, special measures are required: we ask you to enquire about this.

Compared to the direct mounted motor, the IEC adapter has an additional shaft coupling and additional bearing seats. Compared to the direct mounted motor, there are higher no-load losses. We recommend to mount the motor **directly**, since it not only offers **technical advantages**, but also offers **price advantages**.

Maximum allowed motor weights

IEC-BG	63	71	80	90	100	112	132
kg	25	30	40	50	60	80	100
IEC-BG	160	180	200	225	250	280	315
kg	200	250	350	500	700	1000	1500

MK top mount motor platform

By using the MK platform, the designer gets further constructive possibilities in designing machines and systems. The MK platform is designed so that it can be combined in connection with all NORD UNICASE gear units in all mounting positions.

Decisive advantages of the NORD MK platform for the user:

- · Light, vibration-dampening aluminium construction
- Corrosion resistant, easy-to-wield height adjustment for optimal belt tension.
- Corrosion resistant fixing elements
- Useable in all mounting positions
- Pivotable in all directions up to 90°
- Suggestion for ratio iv = 1.0, according to table
- Motor bracket with holes for multiple motor sizes

Five MK sizes cover all motor-gear unit combinations. See the selection table for the respective assignments, which are also valid for the corresponding multi-stage gear units.





Notes on Gear units and Gear Unit Motors

Vertical mounting position for gear units and gear motors

Gear units and gear motors may be mounted in positions with vertical shafts. (Exception: IEC adapters with certain sizes). For these mounting positions, the gear units are filled with increased amounts of lubricant. Some gearbox types are also equipped with specially sealed, grease lubricated bearings. These mounting positions show increased oil-splashing-losses, causing a higher temperature rise in operation (observe thermal limit rating – see page A6). For motors which are mounted vertically upwards (mounting position M4) and ratios < 20, we imperatively recommend oil expansion chambers in order to avoid leakage through the vent plug. Please contact us so that we can suggest an appropriate solution for the particular drive situation.

External installation, tropical use

When installed externally, in damp rooms, or used in the tropics, special seals and anti-corrosion measures are required. Please inform us of such upon ordering.

Special ambient conditions

Special ambient conditions are. for example:

- aggressive or corrosive materials (contaminated air, gases, acids, bases, salts, etc.) in the surroundings
- very high relative humidity or contact between the gear unit motor and liquids
- strong dirt, dust or sand deposits on the gear unit motor
- strong atmospheric pressure variations
- radiation
- extremely high or low ambient temperature or temperature changes
- vibrations, accelerations, shocks, impacts or other abnormal ambient conditions

If special ambient conditions exist, including those which occur during transport or storage before commissioning, these should be taken into account during the project planning phase. Please enquire.

Storage before commissioning

The gear units and gear unit motors should only be stored in a dry area before commissioning. Special measures are required for longer storage. Please request the "Operating and Assembly Instructions B1000", which are available for download on the Internet at www.nord.com.

Vents

The gear units (except for SK 0182NB, SK 0282NB and SK 1382NB) are normally equipped with a vent which compensates for air pressure differences between the inner space of the gear unit and the atmosphere. This vent is closed upon delivery in order to avoid oil leakage during transport. Before commissioning, the vent should be activated by removing the sealing plug. Pressure vents are optionally available.

Multi-stage gear units

With four-, five- and six-stage multi-stage gear units, there is a relevant no-load loss because of the many rotating parts and the relatively small drive input power. Thus, a no-load loss of approx. 40 watts for 4-pole motors up to 0.75 kW is accounted in the perfomence tables.

Drives for aerators, agitators, mixers and fans

Drives for aerators, agitators and mixers in sewage treatment plants, in anaerobic digesters for biogas and in process engineering as well as fan drives (e.g. in cooling towers) are normally subject to extremely hard operating conditions:

- continuous 24h-operation at the rated power torque or rated output
- high mass inertia on the output at lower gear unit ratios
- vibrations in the drive train as well as high flexural bending moments and forces on the output shaft when the mixer and/or fan shaft are positioned directly on the gear unit
- vertical alignment
- external installation, i.e. moisture and aggressive media as well as large temperature changes with condensation
- a high degree of environmental protection is required, e.g. fully leak-proof, safe oil maintenance and low noise level

Based on experience, NORD has developed a package of special measures in order to meet the needs of special operating conditions. NORD thus strongly recommends that you provide for these special measures; please enquire. A minimum service factor of f_B 1,7 must be selected for drives on agitators and mixers because of their extreme duty. NORD recommends a service factor f_B of higher than 2,0. Drives running on frequency inverters may experience control-induced vibrations e.g. from a slip-compensation. Such vibrations must be avoided. Please observe that a possible speed increase via frequency inverter will increase the absorbed power by the third power. Therefore the minimum service factor f_B must always refer to the highest operating speed.



Selecting a gear unit presupposes NORD three-phase asynchronous AC-motors or single phase AC-motors and also applies for technically comparable motors. When using other motors, please consult with NORD.

If the following important guidelines for selecting a gear unit are not adhered to, an overload is likely. In this case, all warranties are inapplicable.

When in doubt, please contact the NORD sales office which is responsible for you so that we may work together to check the gear unit design. In our mutual interests, all problems caused by overloading the gear units should be avoided in every case.

Criteria

Selection criteria constitute:

- The mechanically transferable power P

 this is considered by the service factor f_B in the relevant table in the catalogue. The next chapter describes the determination of the required service factor.
- 2. The thermally transferable power (thermal limit) - this should not be exceeded over a longer time period (3 hours) so that the gear unit does not overheat. The thermally transferable power only represents a possible limit for larger gear units of size SK 62 and SK 6282 and greater (for two-stage gear units) and of size SK 73, SK 7382 and SK 9072.1 and greater (for three-stage gear units).

We recommend that you consult with NORD and check the specific operational situation exactly when two or more of the following items apply:

- vertical alignment (mounting position M2 or M4, see page A51)
- motor mount of type IEC, or type W free drive shaft
- drive power $P_1 > 100 \text{ kW}$
- ratio $i_{ges} < 20$ (for helical-bevel gear units $i_{ges} < 40$)
- drive speed $n_1 > 1500 \text{ min}^{-1}$
- elevated ambient temperature > 40°C

In general, we ask that you consult with us when there are special installation conditions, such as enclosing the gear unit, heat radiation, confined space, etc. Special measures (oil cooler, etc.) are available against thermal overload; please enquire.

Input power and service factor

The required input power for each application is determined by measurement or calculation. The rated power of the motor P_1 is to be selected after this. It is normally slightly higher than the required power because safety factors for special operating conditions of the specific application are to be observed, and rated motor output levels are generally available in standard output level ranges. Short-term and infrequent torque impulses do not need to be accounted for when selecting the rated power of a three-phase AC-motor to be installed. When operating a three-phase AC-motor on a frequency inverter, additional factors influence the selection of the rated output; in this case, we ask for your detailed enquiry.

In contrast to the motor, short-term and infrequent torque impulses significantly influence the load and selection of the gear unit. The gear unit service factor f_B takes this and further effects on the gear unit into account with sufficient accuracy. Diagram 1 shows the required minimum service factor f_{Bmin} dependent on the daily operational time, the cycles per hour Z, and the application load classification A, B, or C.



Diagram 1: Minimum service factor f_{Bmin}

epending on the uniformity of operation and the mass acceleration factor, three load classifications are differentiated. While impacts from the machine that is driven are described in the classification of the uniformity of the operation, the mass acceleration factor determines the load peaks upon activation. The following listing of typical application examples takes into account a long experience in the classification of the uniformity of operation.









Selecting a Gear Unit

Classification of an operation (of uniformity):

A) uniform operation

Light screw conveyors, fans, assembly belts, light conveyor belts, small agitators, elevators, cleaning machines, filling machines, testing machines and belt conveyors.

B) moderate shocks, non-uniform operation

Decoilers, feed drives for wood processing machines, hoists, balancing machines, tapping units, heavy conveyor, belts, winches, sliding doors, stall dunging machines, packaging machines, cement mixers, crane travelling mechanisms, mills, bending machines and gear pumps.

C) heavy shocks, extreme non-uniform operation

Stirrers and mixers, shears, presses, centrifuges, rolling stands, heavy winches and lifts, grinding mills, stone crushers, bucket elevators, punching machines, hammer mills, eccentric presses, folding machines, roller tables, tumbling barrels, choppers, shredders, vibrators.

The load classification results from the uniformity of operation and from the mass acceleration factor m_{af} according to the following table. Here, the higher load classification from either operation or mass acceleration factor applies.

Example: non-uniform operation and m_{af} = 0.2 results in load classification B

Load classification	Operation	Mass acceleration factor	
А	uniform operation	m _{af} ≤ 0,25	
В	non-uniform operation	0,25 < m _{af} ≤ 3	
С	extreme non-uniform operation	3 < m _{af} ≤ 10	

Mass acceleration factor m_{af}

In which m_{af} is the mass acceleration factor:

$$m_{af} = \frac{J_{ex.red.}}{J_{Mot.}} = \frac{J_{ex.}}{J_{Mot.}} \cdot \frac{1}{0} \frac{p}{i_{ges}} p$$

Jex.all external mass moments of inertiaJex.red.all external mass moments of inertia on
the drive motor, reducedJMot.mass moments of inertia of the motors
total gear unit ratio

The mass acceleration factor maf represents the relationship between external output-side and high-speed input-side masses.

The mass acceleration factor significantly influences the level of torque impulses in the gear unit upon start-up and braking procedures, and upon vibration. The external mass moments of inertia also include the load, such as the material transported on conveyor belts. We ask you to consult with NORD if the $m_{af} > 10$, if there is large play in transfer elements, vibration in the system, unclarity regarding the load classification, or if you are in doubt. The gear unit service factor f_B is given in the output and speed overview at the appropriate speed. The service factor is the relation of the maximum gear unit output

torque M_{2max} and the output torque M_2 resulting from the installed motor power P_1 , the output speed n_2 and the gear unit efficiency η .

$$M_2 = \frac{9550 \cdot P_1 \cdot \eta}{n_2} [Nm] \qquad P_1[kW], n_2[min^{-1}]$$

$$f_B = \frac{M_{2max}}{M_2}$$

$$P_1 = \frac{M_2 \cdot n_2}{\eta \cdot 9550} [kW] \qquad M_2 [Nm], n_2 [min^{-1}]$$

When correctly selecting the gear unit, the service factor f_B , taken from the output and speed overview, is larger or the same as the minimum service factor f_{Bmin} according to diagram 1.

Helical, parallel shaft and helical-bevel gear units have a very high level of efficiency (approx. 98% or $\eta = 0.98$ for each gear stage). Thus, the simplified gear unit efficiency $\eta = 1.0$ usually results in sufficiently accurate results. The gear unit efficiency η for helical worm gears is listed in the output and gear ratio tables for each output speed n_2 .

With type W gear units (with free drive shafts), the installed drive output P_1 may, at the most, be:

$$P_1 = \frac{M_{2max} \cdot n_2}{9550 \cdot f_{Bmin} \cdot \eta} [kW] \qquad M_{2max}[Nm], n_2[min^{-1}]$$

Here, the maximum drive power $\mathsf{P}_{1\text{max}}$ may not be exceeded.

$$P_1 \le P_{1max}$$



The performence tables type W and IEC list for each output speed n_2 the maximum gear unit output torque M_{2max} and the maximum motor power $P_{1max.}$

With brakes attached to the drive side, such as braking motors, the brake torque should also be considered in selecting a gear unit. For applications with relatively high external mass moments of inertia ($m_{af} > 2$) – such as is often the case with travel drives, slewing gears, rotary tables, gate drives, agitators and surface aerators – we recommend that a braking torque that does not exceed 1.2 times the rated motor torque is selected. If higher braking torques are to be used, this should be considered when selecting the gear unit. Please enquire.

Energy efficient motors with the classification EFF1 and EPAct (see page F14) have higher breakdown torques and performance reserves. These may, when required by the application and not limited electrically, provide a non-admissible high performance permently. This should be considered when selecting a gear unit.

Especially unusual applications and extraordinarily extreme modes of operation, such as blockages, movements against solid limit stops, reversing while in motion, changing standstill loads, and gear ratios into fast speeds must be particularly considered when selecting a gear unit. Please enquire.

Especially for worm gear units:

When designing worm gear units, you should consider that multi-start worms (reduced possibility of self-locking) should be used when torque impulses, back driving output torques or large mass acceleration factors m_{af} can occur. The number of worm threads z_1 is listed in the output and gear ratio tables. These apply:

m _{af} ≤	0,25	all numbers of worm threads are possible
m _{af} ≤	3,00	numbers of worm threads $z_1 \ge 3$ is recommended
m _{af} ≤	10,00	numbers of worm threads $z_1 \ge 6$ is recommended

With worm gear units, in addition to the service factor fBmin from diagram 1 (page A6), the service factor f_{B1} for the ambient temperature T_u as well as the service factor f_{B2} for the cyclic duration factor ED per hour should be considered. Factors f_{B1} and f_{B2} are found in diagrams 2 and 3.



ED [%] \longrightarrow Diagram 3: Service factor f_{B2} ED = Cyclic duration factor t_B = load time in min/h

When correctly selecting the gear unit, the service factor f_B , taken from the output and speed overview, is larger or the same as the product of the minimum service factor fBmin and factors f_{B1} und f_{B2} .

$$f_B \ge f_{Bmin} \cdot f_{B1} \cdot f_{B2}$$

With type W worm gear units (with free drive shafts), the installed drive output ${\rm P}_1$ may, at the most, be:

$$P_{1} = \frac{M_{2max} \cdot n_{2}}{9550 \cdot f_{Bmin} \cdot f_{B1} \cdot f_{B2} \cdot \eta} [kW] \qquad \qquad M_{2max} [Nm] \\ n_{2} [min^{-1}]$$

Here, the maximum drive power $\mathsf{P}_{1\text{max}}$ may not be exceeded.

$$P_1 \leq P_{1max}$$

The perfomance tables type W and IEC list the maximum gear unit output torque M_{2max} , gear unit efficiency η and the maximum motor power P_{1max} for each output speed n_2 . The gear unit efficiency should be included in the above formula as a factor, e.g. 0.9 = 90%.



Selecting a Gear Unit

Overhung and axial forces

The tables in the output and speed overviews list the permitted overhung forces F_R and axial forces F_A , which may be applied on the output shaft. Many gear unit types are available with optionally reinforced output shaft bearings VL The reinforced VL version includes roller bearings capable of handling heavier loads and in addition, a higher quality of steel for the output shaft (42CrMo4 - 1.7225 - DIN EN 10083) if this is necessary for the safety of the shaft. The overhung and axial forces with reinforced bearings are identified with VL in the tables.

The overhung and axial forces listed apply for foot and flange mounted gear units with solid shafts. The forces given are based on the condition that overhung and axial forces are not present at the same time.

Furthermore, an service factor for the overhung and axial forces f_{BF} =1 forms the basis of the forces given in the tables in the output and speed overviews. With impulse-type forces and longer run times (> 8 hours/day), a corresponding service factor f_{BF} > 1 should also be considered for the overhung and axial forces. The permitted overhung forces F_R and axial forces F_A are reduced accordingly.

The overhung forces listed refer to a force acting on the middle of the shaft end. When determining the permitted overhung forces, the most unfavourable direction of force applied and direction of rotation were assumed. When determining the permitted axial forces, the most unfavourable direction of force and rotation were also assumed. Higher overhung and axial forces are potentially possible - for an exact calculation, please supply us with the details of the actual force and rotation direction as well as the required service life.

If transfer elements are attached to the output shaft, a corresponding factor (f_z) should be considered in determining the overhung force.

corresponding factor f_z

Transfer-Elements	fz	Notes
Gears	1,1	z ≤ 17 teeth
Sprockets	1,4	z ≤ 13 teeth
Sprockets	1,2	z ≤ 20 teeth
Narrow V-belt pulleys	1,7	by pretensioning
Flat belt pulleys	2,5	force

The resulting overhung force on the gear unit shaft is determined as follows:

$$F_{Rvorh}$$
 = $\frac{2 \cdot M_2}{d_o} \cdot f_z \leq F_R$

F_{Rvorh} overhung force on the gear unit shaft [kN]

- **F**_R permitted overhung force from [kN] the speed and output tables
- M₂ gear unit output torque [Nm]

f_Z overhung force-factor from the table

do effective circular diameter [mm]

If the force is not applied to the middle of the shaft, the permitted overhung force at any point "x" may be calculated using formulas I and II.

Formula Formula	1	F _{RXL} F _{RXW}	=	$\frac{z}{y+x} \cdot \frac{c}{(f+x) \cdot 1}$	F _R
F _{RXL}	permitted ov point x - bea	/erhung h aring serv	nung vice li	load at fe	[kN]
F _{RXW}	permitted ov point x - sha	/erhung f aft stabilit	orce y	at	[kN]
F _R	overhung fo output table at shaft mide	rce from s, force a dle	the s applie	peed and d	[kN]
x	distance from the point of	m the sha force app	aft co olicati	llar to on	[mm]
c)					[Nmm]
c _{VL}					[Nmm]
f	Factors:	pages A	64 <i>- I</i>	\65	[mm]
у					[mm]
z)					[mm]
lt should	be noted th	hat calou	lation	e chould	alwaye bo

It should be noted that calculations should always be made according to formula I (service life) as well as formula II (shaft stability); in doing so, the smaller value should be taken as permitted.









Nomenclature

Helical gear units



Sizes

1-stage	2-stage	3-stage	4-stage	5-stage	6-stage
			multi - stage gear unit		
	SK 02	SK 03			
SK 11 E	SK 12	SK 13	SK 12/02		
SK 21 E	SK 22	SK 23	SK 22/02		
SK 31 E	SK 32	SK 33 N	SK 32/12		
SK 41 E	SK 42	SK 43	SK 42/12		
SK 51 E	SK 52	SK 53	SK 52/12		
	SK 62	SK 63		SK 63/22	SK 63/23
	SK 72	SK 73		SK 73/22, SK 73/32	SK 73/23
	SK 82	SK 83		SK 83/32, SK 83/42	SK 83/33 N
	SK 92	SK 93		SK 93/42, SK 93/52	SK 93/43
	SK 102	SK 103		SK 103/52	SK 103/53

Sample Orders:











Nomenclature

Parallel shaft gear units



Sizes

2-stage	3-stage	4-stage	5-stage				
		multi - stag	e gear unit				
SK 0182 NB							
SK 0282 NB							
SK 1282	SK 1382 NB	SK 1282/02					
SK 2282	SK 2382	SK 2282/02					
SK 3282	SK 3382	SK 3282/12					
SK 4282	SK 4382	SK 4282/12					
SK 5282	SK 5382	SK 5282/12					
SK 6282	SK 6382		SK 6382/22, SK 6382/32				
SK 7282	SK 7382		SK 7382/22, SK 7382/32				
SK 8282	SK 8382		SK 8382/32, SK 8382/42				
SK 9282	SK 9382		SK 9382/42, SK 9382/52				
SK 10282	SK 10382		SK 10382/52				
SK 11282	SK 11382		SK 11382/52				
	SK 12382						

Sample Orders:



SK 8382 A G B - W



Free input shaft Fixing element Rubber buffer Hollow shaft Parallel shaft gear unit, 3-stage

SK 10382/52 A Z S H - IEC 132











Nomenclature

Helical-bevel gear units



Sizes

2-stage	3-stage	4-stage	5-stage	6-stage
			multi - stage ge	ear unit
SK 92072	SK 9012.1	SK 9013.1		
SK 92172	SK 9016.1	SK 9017.1		
SK 92372	SK 9022.1	SK 9023.1		
SK 92672	SK 9032.1	SK 9033.1		
SK 92772	SK 9042.1	SK 9043.1		
	SK 9052.1	SK 9053.1		
	SK 9072.1		SK 9072.1/32, SK 9072.1/42	
	SK 9082.1		SK 9082.1/42, SK 9082.1/52	
	SK 9086.1		SK 9086.1/52	
	SK 9092.1		SK 9092.1/52	
	SK 9096.1		SK 9096.1/62	SK 9096.1/63

Sample Orders:



SK 9033.1 A F - W



SK 9086.1/52 A Z K - IEC 160



IEC adapter for motor size 160 Torque console Flange B14 Hollow shaft Helical-bevel gear unit, 5-stage









Nomenclature

Helical worm gear units



Sizes

2-stage	3-stage
SK 02040	
SK 02050	SK 13050
SK 12063	SK 13063
SK 12080	SK 13080
SK 32100	SK 33100
SK 42125	SK 43125

Sample Orders:











Overview of avialable designs

Abbrev	Meaning	Helical gear units	Parallel shaft gear units	Helical-bevel gear units	Worm gear units
without	Solid shaft, foot mounting	\checkmark		\checkmark	\checkmark
Α	Hollow shaft		\checkmark		
AF	Hollow shaft, flange B5		\checkmark	√5)	\checkmark
AX	Hollow shaft, foot mounting		√1)	\checkmark	
AXF	Hollow shaft, foot mounting, with flange B5			\checkmark	
AXZ	Hollow shaft, foot mounting, flange B14			\checkmark	
AZ	Hollow shaft, flange B14		√1)	√5)	\checkmark
AZD	Hollow shaft, flange B14, with torque arm			√2)5)	\checkmark
AZK	Hollow shaft, flange B14, with torque console			\checkmark	
В	Fixing elements for hollow shaft		\checkmark	\checkmark	\checkmark
E	Single stage	\checkmark			
EA	Splined hollow shaft, DIN 5480		√4)	√4)	
EF	Single stage, flange B5	\checkmark			
F	Solid shaft, flange B5	✓			
G	Rubber buffer for torque arm		\checkmark		
н	Cover as a touch guard		✓	\checkmark	\checkmark
IEC	Adapter for mounting B5 IEC standard motors	✓	✓	\checkmark	~
LX	Solid shaft - both sides, foot mounting			\checkmark	\checkmark
R	Integrated backstop			✓	
RLS	Backstop in W adapter	✓	✓	~	~
S	Hollow shaft with shrink disc		\checkmark	✓	\checkmark
V	Solid shaft		\checkmark		
VF	Solid shaft, flange B5		✓	√5)	✓
VL	Reinforced bearing	✓	✓	\checkmark	~
VL2	Agitator design		\checkmark	✓	
VL 3	Agitator design "Drywell"		\checkmark	✓	
VX	Solid shaft, foot mounting		√1)		
VXF	Solid shaft, foot mounting, flange B5			✓	
VXZ	Solid shaft, foot mounting, flange B14			✓	
VZ	Solid shaft, flange B14		√1)	√5)	
W	Drive cylinder with free input shaft	\checkmark	\checkmark	\checkmark	\checkmark
XF	Solid shaft, foot mounting, flange B5	√3)			
XZ	Solid shaft, foot mounting, flange B14	√3)			

✓ Available designs are marked with a checkmark

1) SK xx82NB and higher incl. SK 9282 with machined side footrails for base plate

- 2) Available up to SK 9072.1 (inclusive)
- 3) Available up to SK 52 (inclusive)
- 4) Not available for types SK xx82NB... and SK 92xxx...
- 5) Design have additional threaded holes in the underside of the housing; these are not suitable for mounting the gear unit, ⇒ □ D116



Examples: available helical gear unit designs

Housing for foot mounting





SK 11 E(F) - 90 S/4 Helical gear unit motor, single stage

SK 12 (F) - 90 S/4 Helical gear unit motor, two stage

SK 13 (F) - 71 S/4 Helical gear unit motor, three stage

SK 62 (F) - 132 S/4 SK 63 (F) - 100 L/4 Helical gear unit motor, two and three-stage

SK 12/02 (F) - 63 S/4 Helical gear unit motor, four stage

Flange B14, type supplement XZ

Flange B5, type supplement XF

SK 63/22(F) - 80 S/4 Helical gear unit motor, five and six stage

Options Housing for foot-flange mounting





All helical gear units are also available:

with free drive shaft (type supplement - W)

- to flange on IEC standard motor (type supplement - IEC)

www.nord.com



Examples: available parallel shaft gear unit with hollow shaft designs



SK 1282 A - 90 L/4

Parallel shaft gear unit motor, hollow shaft (type supplement:A)

SK 1282 AG - 90 L/4

Parallel shaft gear unit motor, hollow shaft, rubber buffer for torque element (type supplement:AG)

SK 1282 AB - 90 L/4

Parallel shaft gear unit motor, hollow shaft, fixing element (type supplement:AB)

SK 1282 ASH - 80 L/4

Parallel shaft gear unit motor, hollow shaft, shrink disc (type supplement:ASH) see page A25

SK 1282 AZ - 90 L/4

Parallel shaft gear unit motor, hollow shaft, flange B14 (type supplement:AZ)

SK 1282 AF - 90 L/4

Parallel shaft gear unit motor, hollow shaft, flange B5 (type supplement:AF)

SK 1282 AX - 90 L/4

Parallel shaft gear unit motor, hollow shaft, housing for foot mounting (type supplement:AX)

SK 1282 AXSH - 90 L/4

Parallel shaft gear unit motor, hollow shaft, shrink disc, housing for foot mounting (type supplement:AXSH)









Examples: available parallel shaft gear unit with solid shaft designs



SK 1282 V - 90 L/4

Parallel shaft gear unit motor, solid shaft (type supplement:V)

SK 1282 VZ - 90 L/4

Parallel shaft gear unit motor, solid shaft, flange B14 (type supplement:VZ)

SK 1282 VF - 90 L/4

Parallel shaft gear unit motor, solid shaft, flange B5 (type supplement:VF)

SK 1282 VX - 90 L/4

Parallel shaft gear unit motor, solid shaft, housing for foot mounting (type supplement:VX)









Examples: available helical-bevel gear unit with solid shaft designs















SK 9032.1 - 90 S/4

Helical-bevel gear unit motor, housing for foot mounting, solid shaft at A, three stage

SK 9032.1 LX - 90 S/4

Helical-bevel gear unit motor, housing for foot mounting, solid shaft at A and B, three stage (supplement: LX)

SK 9032.1 VXF - 90 L/4

Helical-bevel gear unit motor, housing for foot mounting, solid shaft at A, flange B5 at A, three stage (supplement: VXF) *This design is not to be used as a flange design; instead, type VF should be used.*

SK 9032.1 VXZ - 90 L/4

Helical-bevel gear unit motor, housing for foot mounting, solid shaft at A, flange B14 at A and B, three stage (supplement: VXZ) *This design is not to be used as a flange design; instead, type VZ should be used.*

SK 9032.1 VF - 90 L/4

Helical-bevel gear unit motor, solid shaft at A, flange B5 at A, three stage (supplement: VF)

SK 9032.1 VZ - 90 L/4

Helical-bevel gear unit motor, solid shaft at A, flange B14 at A, three stage (supplement: VZ)

SK 9032.1 LXZ - 90 L/4

Helical-bevel gear unit motor, housing for foot mounting, solid shaft at A and B, flange B14 at A and B, three stage (supplement: LXZ)









Examples: available helical-bevel gear unit with hollow shaft designs

















SK 9032.1 AZ - 90 S/4

Helical-bevel gear unit motor, hollow shaft, flange B14 at A and B, three stage (type supplement: AZ)

SK 9032.1 AF - 90 S/4

Helical-bevel gear unit motor, hollow shaft, flange B5 at A, three stage (type supplement: AF)

SK 9032.1 AX - 90 L/4

Helical-bevel gear unit motor, hollow shaft, housing for foot mounting, three stage (type supplement: AX) *This design is not to be used as a shaft-mounted designs; instead type AZ should be used. AX design as shaft-mounted designs - on request*

SK 9032.1 AXZ - 90 L/4

Helical-bevel gear unit motor, hollow shaft, housing for foot mounting, flange B14 at A and B, three stage (type supplement: AXZ) *This design is not to be used as a flange design; instead, type AZ should be used.*

SK 9032.1 AXF - 90 L/4

Helical-bevel gear unit motor, hollow shaft, housing for foot mounting, flange B5 at A, three stage (type supplement: AXF) *This design is not to be used as a flange design; instead, type AF should be used.*

SK 9032.1 AZSH - 90 L/4

Helical-bevel gear unit motor, hollow shaft, flange B14 at A and B, shrink disc at B, three stage (type supplement: AZSH)

SK 9032.1 AZD - 90 L/4

Helical-bevel gear unit motor, hollow shaft, torque arm at A, three stage (type supplement: AZD)

SK 9032.1 AZK - 90 L/4

Helical-bevel gear unit motor, hollow shaft, torque console, three stage (type supplement: AZK)







Examples: available helical worm gear unit with solid shaft designs













SK 12080 - 90 S/4

Helical worm gear unit motor, solid shaft at A, housing for foot mounting

SK 12080 VF - 90 S/4

Helical worm gear unit motor, solid shaft at A, flange B5 at A (type supplement: VF)

SK 12080 LX - 90 S/4

Helical worm gear unit motor, solid shaft at A and B, housing for foot mounting (type supplement: LX)









Examples: available helical worm gear unit with hollow shaft designs

















SK 12080 AZ - 90 S/4

Helical worm gear unit motor, hollow shaft, flange B14 at A (type supplement: AZ)

SK 12080 AF - 90 S/4

Helical worm gear unit motor, hollow shaft, flange B5 at A (type supplement: AF)

SK 12080 AZD - 90 S/4

Helical worm gear unit motor, hollow shaft, flange B14 at A, torque arm at A (type supplement: AZD)

SK 12080 AZSH - 90 S/4

Helical worm gear unit motor, hollow shaft, flange B14 at A, fixing component at B (type supplement: AZSH)

SK 12080 AZB - 90 S/4

Helical worm gear unit motor, hollow shaft, flange B14 at A, fixing component at B (type supplement: AZB)

SK 12080 AZH - 90 S/4

Helical worm gear unit motor, hollow shaft, flange B14 at A, cover at B (type supplement: AZH)







Shrink discs

We especially recommend that shrink discs be used with gear units in hollow shaft designs to provide for better and easier assembly. The length of the customer-side shaft end that is inserted into the gear unit hollow shaft must, in this case, correspond to the length of the hollow shaft (mH). The shaft diameter of the shaft end may be executed according to ISO h6 or f6. (f6 = easier assembly). The material used in the customer-side shaft end must have a yield point of at least Re = 360 N/mm^2 so that the compression to create the friction engagement can be established and that no remaining deformations arise.



max. permitted output torque (gear unit) M_{2max} safety of the shrink disc with fits h6 or f6 S at M_{2max}

Zs

number of locking screws

required tightening torque MΔ

Parallel shaft gear units

Gear unit	type		Shrink di	Hexagonal screw DIN 931 / DIN 933* 10.9 Vz					
		Туре	M _{2max} [Nm]	s ^{h6}	s ^{f6}	d x l	Zs	M _A [Nm]	
SK 0282 NB	ASH	SN 30 / 40 V	165	5,9	5,2	M6 x 35*	8	12	
SK 1382 NB	ASH	SN 35 / 46 V	370	3,8	3,4	M6 x 35*	10	12	
SK 1282	ASH	SN 30 / 40 V	296	3,3	2,9	M6 x 35*	8	12	
SK 2282	ASH	SN 35 / 46 V	563	2,6	2,2	M6 x 35*	10	12	
SK 3282	ASH	SN 40 / 55 V	1039	2,3	2,0	M8 x 40	8	30	
SK 4282	ASH	SN 50 / 62 V	2000	2,2	2,0	M8 x 40	10	30	
SK 5282	ASH	SN 60 / 76 V	3235	2,5	2,3	M10 x 50	10	59	
SK 6282	ASH	SN 70 / 90 V	6000	2,3	2,2	M12 x 70*	10	100	
SK 7282	ASH	SN 80 / 108 V	8300	2,5	2,4	M12 x 70*	14	100	
SK 8282	ASH	SN 100 / 128 V	13200	2,3	2,2	M16 x 80*	8	250	
SK 9282	ASH	SN 125 / 158 V	25400	2,3	2,2	M16 x 80*	12	250	
SK 10282	ASH	SN 160 / 210 V	37200	3,6	3,4	M20 x100	14	490	
SK 11282	ASH	SN 180 / 230 V	69000	1,9	1,8	M20 x 100*	12	490	
SK 12382	ASH	SN 180 / 230 VV	90000	4,5	4,4	M30 x 200	16	1700	

Shrink discs in reinforced design type VS (shredder)

Gear un	it type		Shrink d		Hexagonal screw DIN 931 10.9 Vz					
		Туре	M _{2max} s ^{h6} s ^{f6} [Nm]			d x l	Zs	M _A [Nm]		
SK 7282	AVSH	SN 85 / 108 VS	8300	3,90	3,65	M16 x 90	10	250		
SK 8282	AVSH	SN 100 / 128 VS	13200	3,57	3,35	M20 x 100	8	490		
SK 9282	AVSH	SN 130 / 158 VS	25400	3,89	3,71	M20 x 130	12	490		
SK 11282	AVSH	SN 180 / 230 VS	69000	3,69	3,57	M24 x 150	16	840		

The data listed also applies to parallel shaft gear units with a higher number of stages. ⇒ □A11, A25, A26













Helical-bevel gear units

Gear uni	it type		Shrink o	Hexagonal screw DIN 931 / DIN 933* 10.9 Vz					
		Туре	M _{2max} [Nm]	s ^{h6}	s ^{f6}	d x l	Zs	M _A [Nm]	
SK 92072	AZSH	SN 25 / 34 V	90	4,19	3,28	M5 x 25	6	7	
SK 92172	AZSH	SN 25 / 35 V	120	4,23	3,43	M5 x 25	8	7	
SK 92372	AZSH	SN 30 / 40 V	230	4,26	3,73	M6 x 35*	8	12	
SK 92672	AZSH	SN 35 / 46 V	380	3,77	3,27	M6 x 35*	10	12	
SK 92772	AZSH	SN 40 / 55 V	660	3,53	3,09	M8 x 40	8	30	
SK 9012.1	AZSH	SN 35 / 46 V	400	3,58	3,11	M6 x 35*	10	12	
SK 9016.1	AZSH	SN 40 / 46 V	610	3,40	3,19	M6 x 35*	10	12	
SK 9022.1	AZSH	SN 40 / 55 V	860	2,71	2,37	M8 x 40	8	30	
SK 9032.1	AZSH	SN 50 / 62 V	1550	2,83	2,63	M8 x 40	10	30	
SK 9042.1	AZSH	SN 60 / 76 V	2800	2,90	2,69	M10 x 50	10	59	
SK 9052.1	AZSH	SN 70 / 90 V	4800	2,87	2,69	M12 x 70*	10	100	
SK 9072.1	AZSH	SN 95 / 108 V	8500	3,70	3,56	M12 x 70*	14	100	
SK 9082.1	AZSH	SN 110 / 138 V	13000	2,66	2,54	M16 x 70	8	250	
SK 9086.1	AZSH	SN 125 / 158 V	20000	2,91	2,77	M16 x 80*	12	250	
SK 9092.1	AZSH	SN 150 / 185 V	32000	2,66	2,56	M16 x 80*	14	250	
SK 9096.1	AZSH	SN 150 / 195 V	50000	2,71	2,61	M20 x 100*	14	490	

Shrink discs in reinforced design type VS (shredder)

Gear unit ty	pe		Shrink c	Hexagonal screw DIN 931 10.9 Vz					
		Туре	M _{2max} [Nm]	s ^{h6}	s ^{f6}	d x l	Zs	M _A [Nm]	
SK 9072.1 A	ZVSH	SN 95 / 108 VS	8500	4,95	4,80	M16 x 90	10	250	
SK 9082.1 A	ZVSH	SN 110 / 138 VS	13000	6,26	5,99	M20 x 130	12	490	
SK 9086.1 A	ZVSH	SN 130 / 158 VS	20000	4,95	4,71	M20 x 130	12	490	
SK 9092.1 A	ZVSH	SN 150 / 195 VS	32000	3,93	3,70	M20 x 100	14	490	
SK 9096.1 A	ZVSH	SN 155 / 195 VS	50000	3,80	3,70	M24 x 180	14	835	

The data listed also applies to parallel shaft gear units with a higher number of stages. $\Rightarrow \square A12$











Helical worm gear units

Gear unit type			Shrink d	Hexagonal screw DIN 931 / DIN 933* 10.9 Vz					
		Туре	M _{2max} s ^{h6} s ^{f6} d x l [Nm]		Zs	M _A [Nm]			
SK 02050	AZSH	SN 25 / 35 V	182	2,8	2,3	M5 x 25	8	7	
SK 02050	AZSH	SN 30 / 40 V	182	5,4	4,7	M6 x 35*	8	12	
SK 12063	AZSH	SN 30 / 40 V	383	2,6	2,2	M6 x 35*	8	12	
SK 12063	AZSH	SN 35 / 46 V	383	3,0	3,2	M6 x 35*	10	12	
SK 12080	AZSH	SN 40 / 55 V	779	3,0	2,6	M8 x 40	8	30	
SK 12080	AZSH	SN 45 / 55 V	779	4,1	3,8	M8 x 40	8	30	
SK 32100	AZSH	SN 50 / 62 V	1604	2,7	2,6	M8 x 40	10	30	
SK 32100	AZSH	SN 60 / 76 V	1604	5,1	4,7	M10 x 50	10	59	
SK 42125	AZSH	SN 60 / 76 V	3120	2,6	2,4	M10 x 50	10	59	
SK 42125	AZSH	SN 70 / 90 V	3120	4,4	4,1	M12 x 70*	10	100	

The data listed also applies to helical worm gear units with a higher number of stages. ⇒ □ A13











Available parallel shaft gear unit motors with shrink disc

Gear unit		Motor													
	63 S/L	71 S/L	80 S/L	90 S/L	100 L/LA	112 M	132 S/M	160 M/L	180 MX/LX	200 L	225 S/M	250 M	280 S/M	315 S/M	315 MA/L
SK 0282 NB ASH	\checkmark														
SK 1282 ASH	\checkmark	~	✓												
SK 1382 NB ASH	✓														
SK 2282 ASH		~	✓	✓	~										
SK 3282 ASH		~	 ✓ 	✓	~										
SK 3382 ASH			✓	✓											
SK 4282 ASH				✓	✓	✓	✓								
SK 5282 ASH				✓	~	~	~	✓	*						
SK 6282 ASH					~	~	~	~	✓						
SK 6382 ASH				✓	~	~	~	✓	 ✓ 						
SK 7282 ASH							~	✓	 ✓ 	\checkmark	*				
SK 7382 ASH					~	~	~	~	✓	\checkmark	*				
SK 8282 ASH							~	✓	 ✓ 	\checkmark	✓				
SK 8382 ASH					~	✓	~	~	 ✓ 	\checkmark	✓				
SK 9282 ASH										\checkmark	✓	~	~		
SK 9382 ASH							~	✓	 ✓ 	\checkmark	✓	✓	~		
SK 10282 ASH													~	✓	✓
SK 10382 ASH								✓	 ✓ 	\checkmark	~	✓	\checkmark	~	✓
SK 11282 ASH													\checkmark	~	✓
SK 11382 ASH								✓	 ✓ 	\checkmark	✓	✓	\checkmark	~	\checkmark
SK 12382 ASH										✓	✓	✓	✓	~	✓

Shrink discs in reinforced design type VS

SK 7282	AVSH					✓	✓	✓						
SK 7382	AVSH			~	✓	✓	\checkmark	✓						
SK 8282	AVSH					✓	✓	✓	✓	*				
SK 8382	AVSH			~	✓	✓	✓	✓	✓	*				
SK 9282	AVSH								✓	✓	✓	✓		
SK 9382	AVSH						\checkmark	✓	✓	~	~	✓		
SK 11282	AVSH											✓	~	~
SK 11382	AVSH						~	~	~	~	~	✓	~	~

* upon request

All parallel shaft multi-stage gear motors are avialable with shrink disc











Available parallel shaft gear units with shrink disc and IEC adapter

Gear ur	nit							IEC ad	apter						
		IEC 63	IEC 71	IEC 80	IEC 90	IEC 100	IEC 112	IEC 132	IEC 160	IEC 180	IEC 200	IEC 225	IEC 250	IEC 280	IEC 315
SK 0282 NB	ASH	~	✓	~	~										
SK 1282	ASH	~	✓	~	~										
SK 1382 NB	ASH	✓	✓	✓	✓										
SK 2282	ASH		✓	~	~	~	~								
SK 2382	ASH														
SK 3282	ASH		✓	 ✓ 	 ✓ 	✓	 ✓ 	✓							
SK 3382	ASH	\checkmark	\checkmark	✓	 ✓ 										
SK 4282	ASH				\checkmark	\checkmark	 ✓ 	✓	✓						
SK 4382	ASH														
SK 5282	ASH				\checkmark	✓	~	✓	✓	✓					
SK 5382	ASH														
SK 6282	ASH					\checkmark	 ✓ 	✓	✓	✓	\checkmark	✓			
SK 6382	ASH				✓	✓	✓	✓	✓	✓					
SK 7282	ASH							\checkmark	✓	✓	\checkmark	✓			
SK 7382	ASH					\checkmark	 ✓ 	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			
SK 8282	ASH							\checkmark	✓	✓	\checkmark	\checkmark	✓	\checkmark	
SK 8382	ASH					✓	✓	✓	✓	✓	\checkmark	✓			
SK 9282	ASH									\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
SK 9382	ASH							✓	✓	✓	\checkmark	✓	\checkmark	\checkmark	
SK 10282	ASH												\checkmark	\checkmark	\checkmark
SK 10382	ASH								~	~	\checkmark	~	\checkmark	\checkmark	✓
SK 11282	ASH												✓	\checkmark	✓
SK 11382	ASH								\checkmark	~	✓	~	\checkmark	\checkmark	\checkmark
SK 12382	ASH								~	~	✓	~	\checkmark	\checkmark	\checkmark

Shrink discs in reinforced design type VS

SK 7282	AVSH					✓	✓	\checkmark	~	✓			
SK 7382	AVSH			~	✓	✓	~	~	~	~			
SK 8282	AVSH					✓	✓	~	\checkmark	~			
SK 8382	AVSH			 ✓ 	✓	✓	√	~	\checkmark	 ✓ 			
SK 9282	AVSH							\checkmark	\checkmark	~	~	✓	✓
SK 9382	AVSH					✓	✓	~	~	✓	~	✓	
SK 11282	AVSH										~	✓	✓
SK 11382	AVSH						\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark

All parallel shaft multi-stage gear units SK 2282/02 and higher are available in the IEC and W design with shrink disc.









Fixing elements

Fixing elements are optionally available for gear units in shaft-mounted designs.

Requirements for use:

The solid shaft to be used must be equipped with a centre bore according to DIN 332/2.

The fixing elements fit solid shafts without a shaft shoulder (1) as well as solid shafts with a shaft shoulder (11).

When assembling using I, the solid shaft is affixed using a retaining ring found in the hollow shaft (item A).

When assembling using II, the solid shaft fits directly onto the hollow shaft using the solid shaft's collar. (item B)



L = length of the customer-side shaft

- 1) Hollow shaft
- 2) Disc
- Hexagon socket head cap screw DIN 912
- 4) Lock washer DIN 127
- 5) * Pressure disc
- 6) * Jacking nut

Assembly:

- 1. the customer-side shaft in the hollow shaft (item 1)
- 2. Insert the disc (item 2) into the hollow shaft
- 3. Affix the disc using the cap screw (item 3) and lock washer (item 4)

Requirements:

- customer-side shaft to be used must be equipped with a centre bore as per DIN 332/2
- When using variant II, the inserted shaft must not exceed dimension L; if it does, it will not be possible to use the jacking elements (items 5, 6, 7)



- 7) Circlip DIN 472
- 8) * Jacking screw
- 9) Custumer-side shaft
- * Suggestion, not provided byNORD

Disassembly:

When attaching following II (solid shaft with collar), the following suggestion for the jacking elements makes disassembly easier:

- 1. Unscrew socket head screw (item 3)
- 2. Take off disc (item 2)
- 3. Insert pressure disc (item 5)
- 4. Insert jacking nut (item 6)
- 5. Install circlip (item 7)
- 6. customer-side shaft from of hollow shaft by turning jacking screw (item 8)



Parallel shaft gear unit

Туре	1	2 3 4 5		6			7	8	9				
	d x mH	а	D			d2	s	d3	s3				L
SK 0182 NBB	25 x 100	19	38	M10 x 45	A10	24,9	3	24,9	12	M10	l 25 x 1,5	M10	79
SK 0282 NBB	30 x 122	19	40	M10 x 45	A10	29,9	3	29,9	12	M12	l 30 x 1,5	M12	100
SK 1382 NBB	35 x 176	23,5	45	M12 x 55	A12	34,9	3	34,9	16	M16	l 35 x 1,75	M16	149
SK 1282B	30 x 122	19	40	M10 x 45	A10	29,9	3	29,9	12	M12	I 30 x 1,2	M12	100
SK 2282B	35 x 139	23,5	45	M12 x 55	A12	34,9	3	34,9	16	M16	l 35 x 1,5	M16	110
SK 3282B	40 x 174	23,7	55	M16 x 70	A16	39,9	4	39,9	16	M16	I 40 x 1,75	M16	140
SK 4282B	50 x 195	24,7	65	M16 x 70	A16	49,9	4	49,9	20	M20	I 50 x 2,0	M20	160
SK 5282B	60 x 230	29	75	M20 x 90	A20	59,9	5	59,9	24	M24	I 60 x 2,0	M24	185
SK 6282B	70 x 290	29,3	95	M20 x 90	A20	69,9	5	69,9	24	M24	l 70 x 2,5	M24	245
SK 7282B	80 x 310	29	102	M20 x 100	A20	79,9	8	79,9	30	M30	l 80 x 2,5	M30	250
SK 8282B	100 x 366	34,5	120	M24 x 110	A24	99,9	8	99,9	30	M30	l 100 x 3,0	M30	310
SK 9282B	120 x 430	34,5	150	M24 x 110	A24	119,9	10	119,9	32	M36	l 120 x 4,0	M36	370

The data listed also applies to parallel shaft gear units with a higher number of stages ⇒ □A11

Helical-bevel gear unit

Туре	1	2	2 3		4	5		6			7	8	9
	d x mH	а	D			d2	s	d3	s3				L
SK 92072 AXB	25 x 116	19	38	M10 x 45	A10	24,9	3	24,9	12	M12	l 25 x 1,5	M12	94
SK 92072 AB	25 x 116	19	38	M10 x 45	A10	24,9	3	24,9	12	M12	l 25 x 1,5	M12	94
SK 92172 AXB	20 x 134	14	30	M6 x 30	A 6	19,9	3	19,9	10	M10	l 20 x 1,5	M10	110
SK 92172 AB	25 x 138	19	38	M10 x 45	A10	24,9	3	24,9	12	M12	l 25 x 1,5	M12	115
SK 92372 AXB	30 x 164	19	40	M10 x 45	A10	29,0	3	29,0	12	M12	l 30 x 1,5	M12	140
SK 92372 AB	30 x 164	19	40	M10 x 45	A10	29,0	3	29,0	12	M12	l 30 x 1,5	M12	140
SK 92672 AXB	35 x 170	23,5	45	M12 x 55	A12	34,9	3	34,9	16	M16	l 35 x 1,75	M12	140
SK 92672 AB	35 x 170	23,5	45	M12 x 55	A12	34,9	3	34,9	16	M16	l 35 x 1,75	M12	140
SK 92772 AXB	40 x 192	24	55	M16 x 70	A16	39,9	4	39,9	16	M16	l 40 x 2,0	M16	160
SK 92772 AB	40 x 192	24	55	M16 x 70	A16	39,9	4	39,9	16	M16	l 40 x 2,0	M16	160
SK 9012.1 AXB	30 x 148	19	40	M10 x 45	A10	29,0	3	29,0	12	M12	30 x 1,5	M12	120
SK 9012.1 AB	35 x 148	23,5	45	M12 x 55	A12	34,9	3	34,9	16	M16	35 x 1,5	M16	120
SK 9016.1 AXB	30 x 148	19	40	M10 x 45	A10	29,0	3	29,0	12	M12	I 30 x 1,5	M12	120
SK 9016.1 AB	40 x 148	24	55	M16 x 70	A16	39,9	4	39,9	16	M16	I 40 x 2,0	M16	120
SK 9022.1 AXB	35 x 180	23,5	45	M12 x 55	A12	34,9	3	34,9	16	M16	l 35 x 1,5	M12	150
SK 9022.1 AB	40 x 180	24	55	M16 x 70	A16	39,9	4	29,9	16	M16	l 40 x 2,0	M16	150
SK 9032.1 AXB	40 x 210	24	55	M16 x 70	A16	39,9	4	39,9	16	M16	40 x 2,0	M16	170
SK 9032.1 AB	50 x 210	25	65	M16 x 70	A16	49,9	4	49,9	20	M20	50 x 2,5	M20	170
SK 9042.1 AXB	50 x 240	25	65	M16 x 70	A16	49,9	4	49,9	20	M20	l 50 x 2,5	M20	200
SK 9042.1 AB	60 x 240	29	75	M20 x 90	A20	59,9	5	59,9	24	M24	l 60 x 3,0	M24	195
SK 9052.1 AXB	60 x 300	29	75	M20 x 90	A20	59,9	5	59,9	24	M24	60 x 3,0	M24	255
SK 9052.1 AB	70 x 300	29,5	95	M20 x 90	A20	69,9	5	69,9	24	M24	70 x 3,0	M24	255
SK 9072.1 AXB	90 x 350	34	102	M24 x 110	A24	89,9	8	89,9	30	M30	90 x 4,0	M30	290
SK 9072.1 AB	90 x 350	34	102	M24 x 110	A24	89,9	8	89,9	30	M30	90 x 4,0	M30	290
SK 9082.1 AXB	100 x 420	34,5	120	M24 x 110	A24	99,9	8	99,9	30	M30	l 100 x 4,0	M30	365
SK 9082.1 AB	110 x 420	34,5	135	M24 x 110	A24	109,9	10	109,9	30	M30	l 110 x 5,0	M30	360
SK 9086.1 AXB	110 x 500	34	135	M24 x 110	A24	109,9	10	109,9	30	M30	110 x 5,0	M30	440
SK 9086.1 AB	120 x 500	34,5	150	M24 x 110	A24	119,9	10	119,9	32	M36	120 x 5,0	M36	440

The data listed also applies to helical-bevel gear units with a higher number of stages ⇒ □A12











Fixing elements

Helical worm gear unit

Туре	1	2		3	4	5		6		7	8	9	
	d x mH	а	D			d2	s	d3	s3				L
SK 02040 AZB	20 x 120	14	30	M6 x 30	A 6	19,9	3	19,9	10	M10	l 20 x 1,5	M10	100
SK 02050 AZB	25 x 132	19	38	M10 x 45	A10	24,9	3	24,9	12	M12	l 25 x 1,2	M12	110
	30 x 132	19	40	M10 x 45	A10	29,9	3	29,9	12	M12	l 30 x 1,2	M12	110
SK 12063 AZB	30 x 148	19	40	M10 x 45	A10	29,9	3	12	12	M12	35 x 1,5	M12	125
	35 x 148	23,5	45	M12 x 55	A12	34,9	3	16	16	M16	40 x 1,75	M16	120
SK 12080 AZB	40 x 168	24	55	M16 x 70	A16	39,9	4	39,9	16	M16	40 x 1,75	M16	135
	45 x 168	25	60	M16 x 70	A16	44,9	4	44,9	16	M16	45 x 2,0	M16	135
SK 32100 AZB	50 x 202	25	65	M16 x 70	A16	49,9	4	49,9	20	M20	50 x 2,0	M20	165
	60 x 202	29	75	M20 x 70	A20	59,9	5	59,9	24	M24	60 x 2,0	M24	155
SK 42125 AZB	60 x 250	29	75	M20 x 90	A20	59,9	5	59,9	24	M24	60 x 2,0	M24	205
	70 x 250	29	95	M20 x 90	A20	69,9	5	69,9	24	M24	70 x 2,5	M24	205

The data listed also applies to helical worm gear units with a higher number of stages ⇒ □A13

Rubber buffer

Type G rubber buffers and type VG reinforced-design rubber buffers are optionally available for parallel shaft gear units in shaft-mounted designs.

Bevel helical gearboxes from size SK9082.1 are supplied in execution AZK with rubber buffer.

Rubber buffers are delivered in pairs.

For further damping, several rubber buffers in a row may be used.

Total travel: $s_{FD tot} = n \times s_{FD}$ [mm]

s_{FD} travel of one rubber buffer [mm]

n number of rubber buffers used in a row

Caution:

When installing the bolt for the rubber buffers may be tightened until the play between the contact surfaces is eliminated!

Technical data ⇒ C116, D93, D95, D97, D99



 $\mathbf{F}_{\mathbf{D}}$ pressure working on the rubber buffer [kN]

c width

s_{FD} travel of one rubber buffer







Reinforced output shaft bearing VL2/VL3

VL2

NORD offers reinforced output shaft bearings with increased bearing distance especially for agitators. These absorb high overhung and thrust loads while providing a longer bearing service life.

The spherical roller bearing (item 3) is especially useful for longer agitator shafts because a portion of alignment errors are compensated for.

Option VL3

The "DRYWELL" design, with an additional oil drip disc (item 1), provides an oil leak indicator or oil sensor (item 2).

Safety provision

In the event of a leakage at either of the two lower seals of the output shaft, the oil drips into the oil chamber of the "DRYWELL" flange via the oil drip disc (item 1). This is signalled to the control system by an oil sensor (item 2).

None of the oil leaks into the agitating chamber.



The service life will be calculated upon request.

We require the following values for the calculation:

Rated power	P	[kW]
Output speed	n ₂	[min ⁻¹]
Axial force	F _a	[N]
Overhung force	F _r	[N]
to the flange support	C	[mm]
Required service life	L _h	[h]





Parallel shaft gear unit motors

SK ..82 VF VL2 mm ⇔ □C114 SK ..82 VF VL3 ا

Helical-bevel gear unit motors



SK 90.. .1 VF VL2 mm ⇔ D114 SK 90.. .1 VF VL3 ⊨⊶



SK ..82 AFSH VL2 mm ⇔ C115 SK ..82 AFSH VL3 ^{I=→→}



SK 90.. .1 AFSH VL2 mm ⇔ □ D115 SK 90.. .1 AFSH VL3 ⊣→→



Backstops

Backstops are available as an option. These allow rotation in only one direction; the other direction of rotation is stopped.

Three-phase AC-motors sized 80 and above and mounting adapters with free input shafts (see pages A69-A73, labelled as RLS) may be equipped with a lubricated backstop. These backstops move out, controlled by centrifugal force, at a rotation speed $n_1 > approx$. 900 min⁻¹ and then run wear-free.

Additionally, helical-bevel gear units in series SK 9012.1 to SK 9096.1 are standardly available with a backstop safety mechanism integrated into the gear unit. For these, the backstop is lubricated through the gear unit oil fill.

The direction of rotation of the gear output shaft must be given for gear units with backstops. The direction of rotation as given is determined by the output shaft.

CW = Clockwise rotation

CCW = Counter-clockwise rotation

For angular gear units, the output shaft position (A or B, see page A48) determines the direction of view for the defined direction of view. The direction of view for describing the direction of rotation is always directed toward the output shaft end. For hollow shaft drive units with shrink discs, the output shaft end is located on the side opposite from the shrink disc side. For hollow shaft gear units with locking keys or a splined hub profile and with hollow shafts on both sides, the direction of view is towards the A side of the angular gear unit.

Caution: danger of breakage! Check the motor and gear unit directions of rotation before commissioning the system. Arrows on the gear units show the direction of rotation.

Previously, the blocking direction was given instead of the direction of rotation:

Blocking direction: left = I \rightarrow Rotational direction CW Blocking direction: right = II \rightarrow Rotational direction CCW



B side worm gear motor



Parallel shaft gear unit motor



A side helical-bevel gear unit motor



A side worm gear motor



Direction of rotation of the motor or input shaft

Direction of rotation of the motor by looking on the fan cover resp. of the input shaft by looking on the input shaft end.

Gear unit type	Output shaft rotational direction: CW	Output shaft rotational direction: CCW
1-stage helical gear units: SK11E to SK51E	Motor rotational direction CW	Motor rotational direction CCW
2-stage helical gear units: SK02 to SK102	Motor rotational direction CCW	Motor rotational direction CW
3-stage helical gear units: SK03 to SK103	Motor rotational direction CW	Motor rotational direction CCW
2-stage parallel shaft gear units: SK0182NB to SK11282	Motor rotational direction CCW	Motor rotational direction CW
3-stage parallel shaft gear units: SK1382NB to SK12382	Motor rotational direction CW	Motor rotational direction CCW
2-stage helical-bevel gear units: SK92072 to SK92772	Motor rotational direction CCW	Motor rotational direction CW
3-stage helical-bevel gear units: SK9012.1 to SK9096.1	Motor rotational direction CW	Motor rotational direction CCW
4-stage helical-bevel gear units: SK9013.1 to SK9053.1	Motor rotational direction CCW	Motor rotational direction CW
2-stage helical worm gear motor: SK02040 to SK42125 Output shaft position A or shrink disc at B	Motor rotational direction CW	Motor rotational direction CCW
2-stage helical worm gear motor: SK02040 to SK42125 Output shaft position B or shrink disc at A	Motor rotational direction CCW	Motor rotational direction CW
3-stage helical worm gear motor: SK13050 to SK43125 Output shaft position A or shrink disc at B	Motor rotational direction CCW	Motor rotational direction CW
3-stage helical worm gear motor: SK13050 to SK43125 Output shaft position B or shrink disc at A	Motor rotational direction CW	Motor rotational direction CCW

(see pages ⇒ □A31 - rotational direction)

If desired, differing from the standard designs listed in the above table, the rotational direction of the output shaft in helical-bevel gear units may be changed, since the bevel gear may be mounted left or right of the bevel pinion. To do this, a special output shaft is required for one-sided solid shaft designs and shrink disc designs.








Technical Explanations

Adapter for mounting servomotors



Available adapter

Gear unit type			Мо	tor s	ize			Sha size	ft	Cylinder	Motor- type	M _{knenn}	Adapter- type
	а	a2	b2	e2	f2	s2	x	d	I	ο	e.g.	[Nm]	
SK 02, SK 12 SK 1282 SK 9012.1, SK 9016.1, SK 9022.1 SK 02050, SK 12063, SK 12080	120	96	80	100	4	M6	15	19	40	125	HJ96 1FK6 04 1FK7 04	10	Servo 100 / 160 S
SK 02, SK 12 SK 1282 SK 9012.1, SK 9016.1, SK 9022.1 SK 02050, SK 12063, SK 12080	165	126	110	130	4	M8	20	24	50	137	HJ116 1FK6 06 1FK7 06	35	Servo 130 / 160 S
SK 22, SK 32 SK 2282, SK 3282 SK 9032.1 SK 32100	155	126	110	130	4	M8	20	24	50	151	HJ116 1FK6 06 1FK7 06	35	Servo 130 / 250 S
SK 02, SK 12 SK 1282 SK 9012.1, SK 9016.1, SK 9022.1 SK 02050, SK 12063, SK 12080	186	155	130	165	5	M10	23	32	58	152	MSK070 MSK071 1 FK6 08 1FK7 08 HJ 155	95	Servo 165 / 160 S
SK 22, SK 32 SK 2282, SK 3282 SK 9032.1 SK 32100	186	155	130	165	5	M10	23	32	58	167	MSK070 MSK071 1 FK6 08 1 FK7 08 HJ155	95	Servo 165 / 250 S
SK 22, SK 32 SK 2282, SK 3282 SK 9032.1 SK 32100	240	192	180	215	5	M12	45	38	80	188	MSK101 1 FK6 10 1FK7 10	95	Servo 215 / 250 S
SK 42, SK 52 SK 4282, SK 5282 SK 9042.1, SK 9052.1 SK 42125	240	192	180	215	5	M12	24	38	80	230	MSK101 1 FK6 10 1 FK7 10	310	Servo 215 / 300 S
SK 42, SK 52 SK 4282, SK 5282 SK 9042.1, SK 9052.1 SK 42125	350	260	250	300	5	M16	26	48	82	232	1FT6 13 1FK7 10	310	Servo 300 / 300 S
SK 62, SK 72, SK 82, SK 92 SK 6282, SK 7282, SK 8282, SK 9282 SK 9072.1, SK 9082.1, SK 9086.1, SK 9092.1, SK 9096.1	350	260	250	300	5	M16	26	48	82	250	1 FT6 13 1FK7 10	310	Servo 300 / 350

The coupling for servo motors is equipped with locking keys for servo adapter type SEP shown above. For servo motors without locking keys, the servo adapter type SEK is available with a clamp coupling sleeve.

It is possible to mount a great number of other servo motor types on the IEC adapter using an intermediate flange. We will gladly process your request.





aD





Туре		Cubic measure and connection dimensions								Shaft size				Flange	
	Α	В	С	Е	R	S	н	н	Ζ	ο	d	t	v	x	
							min	max				u	W		
MK I 63 S - 100 LA	222	253	204	45	60	140	153	173	41	119,5	24 50	27 8	5 40	8	160 S
MK II 80 S - 112 M	236	320	250	50	66	145	199	224	48	113,5	28 60	31 8	5 50	9	250 S
MK III - 1 90 S - 132 MA	303	430	300	58	110	260	254	286	61	125	38 80	41 10	5 70	8	300 S
MK III -2 90 S - 132 MA	303	430	300	58	110	260	254	286	91	170	42 110	45 12	10 90	8	Ø 250
MK IV 112 M - 200 L	476	530	400	75	130	315	315	355	116	252	65 140	69 18	15 110	8	Ø 350
MK V 200 L - 280 M	662	690	570	105	382	369	465	515	119	245	65 140	69 18	15 110	12	Ø 450









Motor brackets - assignment

					63 S 63 L	71 S 71 L	80 S 80 L	90 S 90 L	100 L 100 LA	112 M	132 S 132 M 132 MA
SK 11 E SK 12	SK 1282	SK 9012.1 SK 9016.1 SK 9022.1	SK 02050 SK 12063 SK 12080	W III	MK I	MK I	MK I	MK I	MK I		
SK 21 E SK 31 E SK 22 SK 32	SK 2282 SK 3282	SK 9032.1	SK 32100	W II			MK II	MK II	MK II	MK II	
SK 41 E SK 51 E SK 42 SK 52 SK 63	SK 4282 SK 5282 SK 6382	SK 9042.1 SK 9052.1	SK 42125	W III				MK III-1	MK III-1	MK III-1	MK III-1
SK 62 SK 72 SK 73 SK 83	SK 6282 SK 7282 SK 7382 SK 8382 SK 9382	SK 9072.1		W III				MK III-2	MK III-2	MK III-2	MK III-2
							112 M	132 S 132 M 132 MA	160 M 160 L	180 M 180 L	200 L
SK 62 SK 72 SK 73 SK 83	SK 6282 SK 7282 SK 7382 SK 8382 SK 9382	SK 9072.1		WIV					MK IV	MK IV	MK IV
SK 93				W IV			MK IV	MK IV	MK IV	MK IV	MK IV
SK 82 SK 92 SK 103	SK 8282 SK 9282 SK 10382	SK 9082.1		WV			MK IV	MK IV	MK IV	MK IV	MK IV
		SK 9086.1		WV			MK IV	MK IV	MK IV	MK IV**	MK IV**
					200 L	225 S 225 M	250 M	280 S 280 M			
SK 93	SK 9382			WV		MK V	MK V	MK V			
SK 82 SK 92 SK 103	SK 8282 SK 9282 SK 10382	SK 9082.1 SK 9086.1		W IV		MK V	MK V	MK V			
SK 102	SK 11382 SK 12382	SK 9092.1 SK 9096.1		WIV	MK V	MK V	MK V	MK V			

** Adjustment range is limited

Selection example:

Determine the basic type of gear unit required from the output and speed overview or the output and gear ratio table based on the required output and output rotational speed. e.g.: Page B2 – B38 helical gear units

4 kW, 87 min⁻¹, i = 16,66

results in the basic gear unit type $SK\ 32$ - 112 M/4 or $\ SK\ 32$ - IEC 112.

For this basic gear unit type, you determine from the table (see above) that the motor bracket **MK II** is assigned. Thus, the complete type designation is **SK 32 - MK II - 112**.

From the **MK II** table (page A36), you receive more information concerning the belt pulley and the belt type. The basic dimensions are seen in the table (page A34).



Suggestion for selecting V-belts and belt pulleys (not supplied by NORD)









2D

	MK	l			Belt type SPZ	
Motor	Output	Adjustme	ent range	Belt length	Shaft centre distance	Number of belts
	[kW]	A _{min}	A _{max}	(dwg = 80) (i=1) Lw	А	
63 S/4 63 L/4 71 S/4 71 L/4 80 S/4 80 L/4 90 L/4 90 L/4 100 L/4 110 LA/4	0,12 0,18 0,25 0,37 0,55 0,75 1,10 1,50 2,20 3,00	216 216 224 233 233 243 243 243 253 253	236 236 244 253 253 263 263 263 273 273	697 697 710 737 737 750 750 750 772 772	223 223 229 229 243 243 243 249 249 249 249 260 260	1 1 1 1 1 1 2 2 3
	MKI	l			Belt type XPZ	I
	[kW]	A _{min}	A _{max}	(dwg = 112) (i=1) Lw	A	
80 S/4 80 L/4 90 S/4 90 L/4 100 L/4 100 LA/4 112 M/4	0,55 0,75 1,10 1,50 2,20 3,00 4,00	279 279 289 289 299 299 311	304 304 314 314 324 324 324 336	930 930 950 950 980 980 1000	289 289 299 299 314 314 324	1 1 1 1 1 2 2
	MK II				Belt type SPZ	
	[kW]	A _{min}	A _{max}	(dwg = 160) (i=1) Lw	A	
90 S/4 90 L/4 100 L/4 100 LA/4 112 M/4 132 S/4 132 M/4 132 MA/4	1,10 1,50 2,20 3,00 4,00 5,50 7,50 9,20	344 344 354 354 366 386 386 386 386	376 376 386 386 398 418 418 418	1222 1222 1250 1250 1262 1312 1312 1312	360 360 374 374 380 405 405 405	1 1 1 2 2 3 3
	MKI	V			Belt type XPA	
	[kW]	A _{min}	A _{max}	(dwg = 200) (i=1) Lw	A	
112 M/4 132 S/4 132 M/4 132 MA/4 160 M/4 160 L/4 180 M/4 180 L/4 200 L/4	4,00 5,50 7,50 9,20 11,0 15,0 18,5 22,0 30,0	427 447 447 475 475 475 495 495 515	467 487 487 515 515 535 535 535 555	1500 1550 1550 1600 1600 1650 1650 1700	436 461 461 486 486 511 511 536	1 1 2 2 3 3 4 4
	MK \	/			Belt type SPA	
	[kW]	A _{min}	A _{max}	(dwg = 250) (i=1) Lw	A	
200 L/4 225 S/4 225 M/4	30,0 37,0 45,0	665 690 690	715 740 740	2182 2207 2207	698 710 710	4 4 5
	MK \	/			Belt type SPB	
	[kW]	A _{min}	A _{max}	(dwg = 250) (i=1) Lw	A	
250 M/4 280 S/4 280 M/4	55,0 75,0 90,0	715 745 745	765 795 795	2240 2310 2310	727 762 762	4 5 5



Oil expansion chamber with the motor mounted vertically upright

Gear units with a motor or input shaft mounted vertically upright have a high oil level for lubricating the 1st gear unit stage. The use of an optional oil expansion chamber when the vertical mounting position M4 is used (see page A51) prevents oil from possibly leaking out of the vent plug if the oil foams. NORD thus strongly recommends that oil expansion chamber be used for gear ratios itot < 20 and for helical gear units size SK 42 and higher, for parallel shaft gear units SK 4282 to SK 8282 and higher, and for helicalbevel gear units size SK 9042.1 and higher when the vertical mounting position M4 is used. NORD does not take any warranty in other cases.

NORD also strongly recommends the use of oil expansion chamber for smaller gear unit sizes as well as for other gear unit types, such as helical worm gear units, when the gear ratio itot < 20 and the motor rotational speed is greater than 1800 min⁻¹ (87 Hz characteristic curve).







Helical gear unit

Parallel shaft gear unit

Helical-bevel gear unit

Helical gear unit	Parallel shaft gear unit	Helical-bevel gear unit	Size	D	н	[kg]
SK 42 / SK 43 SK 52 / SK 53 SK 63	SK 4282 / SK 4382 SK 5282 / SK 5382 SK 6382	SK 9042.1 / SK 9043.1 SK 9052.1 / SK 9053.1	I	100	180	5
SK 62 SK 72 / SK 73	SK 6282 SK 7282 / SK 7382	SK 9072.1 SK 9082.1	II	150	300	6
SK 82 / SK 83 SK 92 / SK 93 SK 102 / SK 103	SK 8282 / SK 8382	SK 9086.1 SK 9092.1 SK 9096.1	111	180	300	7



Oil storage tanks are located above the gear unit and thus raise the oil level. Thus the oil level is always above the gear unit in the oil storage tank. All rotating gear unit parts lie completely under the oil level, thus preventing, to a great degree, the formation of oil foam. Further, with <u>vertical</u> mounting, all gear unit bearings are thus also lubricated with oil.

Oil storage tanks are larger than oil expansion chamber and have, because of the additional vent tube, two oil tubes which connect the oil storage tank to the gear unit. The level of oil in the oil storage tank should be checked. NORD thus strongly recommends that oil storage tanks be used for large parallel shaft gear units SK 9282 to SK 12382 when the vertical mounting position M4 is used (see page A51). NORD shall not be liable for cases where this is not observed. As standard, the oil level tank is included as a kit which comprises the necessary oil lines, fixing material and assembly instructions. This enables the gear unit to be transported more cheaply and safely. In addition, the position of the oil level tank can be determined on site during assembly. We will be glad to provide detailed information regarding the positioning possibilities and dimensions of the oil level tank on request (WN 0-521 31).

As standard, the parallel shaft gear unit types SK9282 / SK9382 and SK10282 / SK10382 are supplied filled with the quantity of oil stated on page A60. On commissioning an additional quantity of approx. 30 litres of oil must be filled into the oil level tank, in order to increase the oil level into the tank. The standard delivery is made without this additional quantity of oil. A suitable container of oil can however be supplied on request, subject to an extra charge.

As standard, the parallel shaft gear unit types SK11282 / SK11382 and SK12382 are supplied without oil. With the use of an oil level tank, the necessary quantity of oil is increased by approx. 40 litres compared with the quantity stated on page A60.



Gear unit type	Size	D [mm]	H [mm]	Additional oil quantity [L]	Tank volume [L]
SK 9282 / SK 9382 SK 10282 / SK 10382	Ι	185	390	approx. 30	10
SK 11282 / SK 11382 SK 12382	II	320	390	approx. 40	30



Oil cooler



The gear unit oil is drawn out by a pump and flows through a heat exchanger. The oil is cooled by an air stream created by a fan. The oil is conveyed out of the heat exchanger and back into the housing. Oil level = Pressure line

The temperature is controlled by a thermostat. NORD recommends that the temperature be monitored.



Design:

Cooler:	TFS/A 8,5-400-F-03-11
Reduction:	Out 1/2" / In 3/4"
Motors:	Tension 3 x 400 V
Output:	0,55 kW
Rated Current:	1,7 A
Speed:	1350 min ⁻¹
Protection class:	IP 55
Insulation class:	F
Temperature class:	В
Available with: - Special voltage 60 F	łz

- Special motor

Weight:

32 kg

Technical Explanations







Water cooling

An integrated heat exchanger is optionally available for parallel shaft gear units and helical-bevel gear units. The cooling water flows through the heat exchanger, which cools the gear unit. NORD recommends that the temperature or the cooling water flow be monitored. Because the cooling coil does not lie in the oil chamber,

NORD water cooling is very reliable (German industrial design registration "Gebrauchsmusteranmeldung" 20 2005 005 452.6).

Water cooling is also suitable for use in an area with potentially explosive atmosphere (ATEX).

In low temperature areas, the heat exchanger may also provide heat to the gear unit.



Possible mounting position for water cooling

Parallel shaft gear units	Mounting positions								
	M1	M2	M3	M4	M5	M6			
SK 6282 / SK 6382	\checkmark	✓		✓	~	~			
SK 7282 / SK 7382	\checkmark	✓		✓	~	~			
SK 8282 / SK 8382	\checkmark	✓		✓	~	~			
SK 9282 / SK 9382	\checkmark	✓		✓	~	~			
SK 10282 / SK 10382	\checkmark	~		✓	~	~			
SK 11282 / SK 11382 / SK 12382	\checkmark	✓		✓	~	~			

Helical-bevel gear units		Mounting positions									
	M1	M2	M3	M4	M5	M6					
SK 9072.1 *			~	~							
SK 9082.1			~	~							
SK 9086.1			~	~							
SK 9092.1			~	~							
SK 9096.1			~	✓							

* only available in design AF(B), AZ... and VF, VZ \Rightarrow D90, D91, D108





Lubricants

Note:

This table presents comparable lubricants from differing manufacturers. The manufacturer of the oil can be changed remaining within one viscosity and lubricant type. If the lubricant type is to be changed, we must be consulted; otherwise, the proper functioning of our gear units cannot be warrantied.

Lubricant type	Ambient temperature	BP	Gastro	FUCHS		Mobil	(interest
Mineral Oil	Worm gear units ISO VG 680 040°C	Energol GR-XP 680	Alpha EP 680 Alpha SP 680 Optigear BM 680 Tribol 1100/680	Renolin CLP 680 CLP 680 Plus	Klüberoil GEM 1-680N	Mobilgear 600 XP 680 Mobilgear XMP 680	Omala S2 G 680
	ISO VG 220 -1040°C (Standard design)	Energol GR-XP 220	Alpha EP 220 Alpha SP 220 Optigear BM 220 Tribol 1100/220	Renolin CLP 220 CLP 220 Plus	Klüberoil GEM 1-220	Mobilgear 600 XP 220 Mobilgear XMP 220	Omala S2 G 220
	ISO VG 100 -1525°C	Energol GR-XP 100	Alpha EP 100 Alpha SP 100 Optigear BM 100 Tribol 1100/100	Renolin CLP 100 CLP 100 Plus	Klüberoil GEM 1-100	Mobilgear 600 XP 100 Mobilgear XMP 100	Omala S2 G 100
Synthetic Oil (polyglykol)	Worm gear units ISO VG 680 -2060°C (Standard design)	-	Alphasyn GS 680	Renolin PG 680	Klübersynth GH 6-680	Glygoyle 680	Omala S4 WE 680
	ISO VG 220 -2580°C	Enersyn SG-XP 220	Alphasyn GS 220	Renolin PG 220	Klübersynth GH 6-220	Glygoyle 220	Omala S4 WE 220
Synthetic Oil (hydrocarbons)	Worm gear units CLP HG ISO VG 460 -3080°C*	-	Alphasyn EP 460 Tribol 1510/460 Optigear Synthetic X 460	-	Klübersynth EG 4-460	Mobil SHC 634	Omala 460 HD
	CLP HC ISO VG 220 -4080°C*	-	Alphasyn EP 220 Tribol 1510/220 Optigear Synthetic X 220	Renolin Unisyn CLP 220	Klübersynth EG 4-220	Mobil SHC 630	Omala S4 GX 220
Biodegradable oil	Worm gear units ISO VG 680 -540°C	-	-	Plantogear 680 S	-	-	-
	ISO VG 220 -540°C	-	Tribol Bio Top 1418/220	Plantogear 220 S	Klübersynth GEM 2-220	-	Naturelle Gear Fluid EP 220
Food grade oil ¹⁾	Worm gear units ISO VG 680 -540°C	-	Optileb GT 680 Tribol FoodPoof 1800/680	Geralyn SF 680	Klüberoil 4 UH1-680N Klübersynth UH1 6-680	Mobil Glygoyle 680 (PAG)	Cassida Fluid GL 680
	ISO VG 220 -2540°C	-	Optileb GT 220 Tribol FoodPoof 1800/220	Geralyn AW 220 Geralyn SF 220	Klüberoil 4 UH1-220N Klübersynth UH1 6-220	Mobil SHC Cibus 220	Cassida Fluid GL 220
Gear-Grease GP 00 K-30	-2560°C	Energrease LS-EP 00	Longtime PD 00 Tribol 3020/1000-00**	Renolit Duraplex EP00	Microlube GB 00 (-20 bis 90/150°C)	Mobil Chassis Grease LBZ	Alvania EP(LF)2
Polyglykolbase GP PG 00 K-30				Renolit LST 00	Klübersynth GE 46-1200		Tivela GL00
Polyalphaolefin- base GP HC 00 K-30					Klübersynth UH1 14-1600 ¹⁾	Mobilith SHC 007	Cassida RLS 00

* Shaft gaskets made of special quality materials should be used in ambient temperatures below -30°C and above 60°C.

** at very low speed

¹⁾ Food grade oils and greases according to regulation H1 / FDA 178.3570





Lubricants for anti-friction bearings

Lubricant type	Ambient temperature	BP	(control)	FUCHS		Mobil	Bhell
Grease mineral oil base	-3060°C (normal)	Enegrease LS 2 Energrease LS2-EP2	Spheerol EPL 2 Longtime PD 2	Renolit FWA 160	Klüberplex BEM 41-132	Mobilux EP2	-
	*-5040°C	-	Optitemp LG 2	Renolit JP 1619	-	-	Gadus S2 V100 2
Synthetic grease	*-2580°C	Energrease SY 2202	Tribol 4747 Spheerol SY 2202	Renolit S2 Renolit HLT 2	Isoflex Topas NCA 52 Petamo GHY 133N	Mobilith SHC 220	Aero Shell Grease 16 oder 7
Biodegradable grease	-2540°C	Biogrease EP 2	-	Plantogel 2 S	Klüberbio M 72-82	Mobil SHC Grease 102 EAL	Shell Alvania RLB 2
Food grade grease ¹⁾	-2540°C	-	Obeen UF2	Renolit G7 FG1	Klübersynth UH1 14-151	Mobilgrease FM 222	Cassida RLS 2

* Shaft gaskets made of special quality materials should be used in ambient temperatures below -30°C and above 60°C.

¹⁾ Food grade oils and greases according to regulation H1 / FDA 178.3570

Lubricants

The closure of the vent plug should be removed before commissioning and longer storage to prevent increased pressure which could lead to leaks developing in the gear unit. Upon delivery, gear units and gear unit motors, with the exception of types SK 11282, SK11382, SK12382 and SK9096.1, are factory-filled with lubricant. This first filling corresponds to a lubricant taken from the column for ambient temperature (normal design) in the lubricant table. The corresponding lubricants for other ambient temperatures are available for an additional charge.

If the gear unit is filled with mineral oil, the lubricant should be changed after every 10,000 operating hours or after two years. These time periods are doubled when synthetic products are used. It is advantageous that you replace the lubricants more frequently if the unit is operated in extreme conditions, such as high humidity, aggressive environment and high temperature. We recommend that replacing the lubricants be combined with a thorough cleaning.

After changing the lubricant, and in particular after the initial filling, the oil level may change during the first few hours of operation, as the oil galleries and hollow spaces only fill gradually during operation. The oil level is still within the permissible tolerance.

If at the express request of the customer, an oil inspection glass is installed at an additional charge, we recommend that the customer corrects the oil level after an operating period of approx. 2 hours, so that when the gear unit is at a standstill and has cooled down, the oil level is visible in the inspection glass. Only then, is it possible to check the oil level by means of the inspection glass. The gear unit is normally filled with mineral oil. Synthetic oil is available at an additional charge.

Comment: Do not mix synthetic and mineral lubricants! This also applies when they are disposed of.

NOTICE:

The fill volumes shown are guideline amounts. The exact amount varies depending on the exact gear ratio. When filling, definitely pay attention to the oil level plug as an indicator of the exact oil volume. The tables on pages A59-A61 show guideline amounts for the oil fill volume in litres, depending on the mounting position or configuration.

Gear unit types SK 11282, SK 11382, SK 12382 and SK 9096.1 are normally delivered without oil. (⇔ □ A54 /A60)









Symbols for oil screw plugs in the mounting positions



The oil level plug is located in mounting position M1 in the housing cover on the face of gear unit (opposite the motor) in helical-bevel gear units SK 92072 - SK92772 in the foot-mounting housing design. If a gear unit of this design is mounted on the vertical footrails, be sure to pay attention to the accessibility of the oil level plug. Depending on the way that the gear unit is mounted, the plug could be obscured.



Coating

Туре	Version	TFD [μm]	TFD total [μm]	EN 12944 CorroCat.	Recommended use
F1	1 x 1-K dip-primed, red-brown (cast iron components)	40	CO 100		For top-coat to be applied
	1 x Two-shot polyurethane primer (2-K-PUR primer)	60	60-100		by customer
F2 Sorios	1 x 1-K dip-primed, red-brown (cast iron components)	40	50-90	C2	For indoor installation
Jenes	1 x 2-K polyurethane (2-K-PUR)HS finishing coat	50	50-90	02	
F3.0	1 x 1-K dip-primed, red-brown (cast iron components)	40			For indoor and protected
	1 x Two-shot polyurethane primer (2-K-PUR primer)	60	110-150	C2	with low environmental
	1 x 2-K polyurethane (2-K PUR)HS finishing coat	50			e.g. open, unheated halls
F3.1	1 x 1-K dip-primed, red-brown (cast iron components)	40			For outdoor installation,
	1 x Two-shot polyurethane primer (2-K-PUR primer)	60	160-200	C3	atmosphere with low
	2 x 2-K polyurethane (2-K PUR)HS finishing coat	2x50			contamination
F3.2	1 x 1-K dip-primed, red-brown (cast iron components)	40			For outdoor installation,
	2 x Two-shot polyurethane primer (2-K-PUR primer)	2x60	220-260	C4	atmospheres with
	2 x 2-K polyurethane (2-K PUR)HS finishing coat	2x50			pollution
F3.3	Sandblast all dip-primed cast iron parts, includes version Z as described below				For outdoor installation, urban and industrial atmospheres with bigh
	1 x 1-K dip-primed, red-brown (cast iron components)	40			environmental pollution
	2 x Two-shot EP zinc phosphate epoxy primer	2x50	200-240	C5	
	2 x 2-K polyurethane (2-K PUR)HS finishing coat	2x50			
F3.4	1 x 1-K dip-primed, red-brown (cast iron components)	40			For normal chemical
	1 x Two-shot EP zinc phosphate epoxy primer	50	100-140		CAPOSUIC
	1 x ALEXIT chemical resistant final coat	50			
F3.5	1 x 1-K dip-primed, red-brown (cast iron components)	40			Machinery for the
	1 x Two-shot EP zinc phosphate epoxy primer	50	100-140		paonaging of 10005
	1 x ALEXIT final coat	50			
Α	Additional anti-microbial coating for all paints types except F3.4 and F3.5	25			
Z	Compensation of contour depressions and crevices wit	h seam se	ealer on poly	urethane bas	is

1-K = single component 2-K = two-component, TFD = Dry film thickness max. [μ m], HS = high solids



Addition sample for dimension drawings

The gear unit motors are dimensioned directly in the dimension drawings.

For gear units - with built-on housing

- as multi-stage gear units
- with free drive shaft (W)
- for mounting IEC standard motors (IEC)

the overall dimension must be added together from the individual dimension drawings.

Example: Parallel shaft gear unit SK 2282A



SK 2282A - 80L/4





* ⇒ □C78 o ⇒ □C103



 SK 2282A - IEC80

 *
 ⇒ □ C78

 o
 ⇒ □ C103



⇒ 🛄 C78

⇒ 🛄 C99

SK 2282/02A - IEC80

qABre ⇒ 🛄 C99



**

qz

0

SK 2282/02A - W

⇒ 🕮 C78

⇒ШC99

⇒ 🕮 C102



αZ



αZ

SK 2282/02A - IEC80 ** ⇔□C78 qz ⇔□C99 o ⇔□C102

General information regarding * and **

*) With the designs W or IEC, if there are several values given for " * " in the dimensional drawings, the value without brackets generally applies. The value listed in the following table must be added/subtracted for the respective gear - W or gear - IEC combinations.

**

qA

Туре	[mm]												
	W	IEC 100	IEC 112	IEC 132	IEC 160	IEC 180	IEC 200	IEC 225	IEC 250	IEC 280	IEC 315		
SK 82 SK 92 SK 93 SK 103	16 14 0 16	- - -	- - - -	- - -	- - -		- - -		16 14 14 16	16 14 14 16	- 14 - 16		
SK 8282 SK 9282 SK 9382 SK 10382 SK 11382 SK 12382	15 15 0 16 9 9	- - - - -	- - - - -				- - - - -	- - - - -	15 15 15 16 - -	15 15 15 16 - -	- 15 - 16 9 9		
SK 9072.1 SK 9082.1 SK 9086.1 SK 9092.1 SK 9096.1	-18 -20 -20 16 0	-18 - - - -	-18 - - - -	-18 - - - -	-18 - - - -	-18 - - - -13	-18 - - - -13	-18 - - - -13	- -20 -20 -16 -	- -20 -20 -16 -	- 8 8 -11 -		

**) With double gear units, if there are several values given for " ** " in the dimensional drawings, the value without rackets generally applies. The value listed in the following table must be added/subtracted for the respective double gear units combination.

Туре	[mm]
SK 63 / 22, 23	4
SK 73 /22, 23	-22
SK 73732	-22
SK 6382 / 22	4
SK 7382 / 22	-22
SK 7382 / 32	-22
SK 9092.1 / 62	16
SK 9096.1 / 62	-13
SK 9096.1 / 63	-13

CAD drawings (dimension drawings, sketches, and 3D models) may be ordered online on the Internet using NORD's NORDCAD software.









Tolerances

Output and input shafts	Hollow shafts	Customer-side shaft
Tolerance of shaft - ø (DIN 748) ø14 - ø50 mm = ISO k6 >ø 50 m = ISO m6	Tolerance of hollow shaft - ø (DIN 748) as per ISO H7	Tolerance of customer shaft end as per ISO h6 with load classification "C" (see table page A7) as per ISO k6
Threaded holes as per DIN 332, sheet 2 = \emptyset 13 - \emptyset 16 \Rightarrow M5 > \emptyset 16 - \emptyset 21 \Rightarrow M6 > \emptyset 21 - \emptyset 24 \Rightarrow M8 > \emptyset 24 - \emptyset 30 \Rightarrow M10 > \emptyset 30 - \emptyset 38 \Rightarrow M12 > \emptyset 38 - \emptyset 50 \Rightarrow M16 > \emptyset 50 - \emptyset 85 \Rightarrow M20 > \emptyset 85 - \emptyset 130 \Rightarrow M24	Splined hub profile DIN 5480 9H	L = length of the insert shaft DIN 5480 recommended fitting 8f Tolerance of customer shaft end with shrink disc as per ISO h6 or f6
Keys acc. DIN 6885, sheets 1 and 3	Keys acc. DIN 6885, sheets 1and 3	Keys acc. DIN 6885, sheets 1 and 3
* SK 9016.1 ⇔ □ D70 SK 9017.1 ⇔ □ D72	Hollow shaft with key acc. to DIN 6885, page 3	
Shaft height	Flanges	IEC and servo adapters
Shaft height "h" as per DIN 747	Tolerance of the hole - ø (DIN 42 948)	Tolerance of the hole - ø (DIN 42 948)
	Tolerance of the flange - Ø (DIN 42 948) centring ≤ Ø 230 mm as per ISO j6 > Ø 230 mm as per ISO h6	Tolerance of the flange centring as per ISO H7
g1Bre kBre k1Bre k2Bre mBre nBre pBre bFre	Dimensions of motors are subject to change	The housings are made of cast materials. Thus, due to the manufacturing process, the dimensions of the un-machined housing surfaces may differ slightly from the nominal dimensions.

Abbreviations in the output and selection tables

Abbreviation	Description	Unit
f _B	service factor (M _{2max} / M ₂)	
F _A ¹⁾	permitted axial load	[kN]
F _R ¹⁾	permitted overhung load, force applied at the middle of the output shaft	[kN]
F _D	pressure on the rubber buffer	[N]
i _{ges}	total gear unit ratio	
z ₁	number of worm threads	
z ₂ /z ₁	gear unit reduction ratio: worm gear unit	
i ₁	gear unit reduction ratio: helical gear unit	
M ₂	output torque	[Nm]
M _{2max}	maximum permitted output torque	[Nm]
n ₂	output speed	[min ⁻¹]
P ₁	drive power of the gear unit	[kW]
P _{1max}	maximum drive power	[kW]
VL	reinforced bearing	
η	efficiency	[%]
kg	total weight of the gear unit motor	[kg]
1)	If a "-" appears in the tables, no reinforced bearing is possible.	







Structure of the Performance Tables: Type Gear motor

0,12 kW -----> Gear unit motor power

Rated motor power





Structure of the Performance Tables: Type W and type IEC

SK 9072.1 — Gear unit type



Position of the shafts, flanges, torque arms and shrink discs for angular gear units

For helical-bevel gear units and helical worm gear units, the position of the output shaft, the B5 flange, the torque arm and the shrink disc is defined as follows:



The definitions of sides A and B relate to mounting position M1. Further information about mounting positions M1 - M6 \Rightarrow \square A51



Terminal box and cable entry

Standard version: Terminal box at 1 and cable entry at I.

If another layout is desired, please specifically note when ordering. Please always enquire about terminal box at IV.

Cable entry at I and III is standard for brake motors of size 63 to 132.

Helical gear units



Parallel shaft gear units



Further information about mounting positions M1 - M6 \Leftrightarrow \square A51

2





Terminal box and cable entry

Standard version: Terminal box at 1 and cable entry at I.

If another layout is desired, please specifically note when ordering. Please always enquire about terminal box at IV.

Cable entry at I and III is standard for brake motors of size 63 to 132.

Helical-bevel gear units



Helical worm gear units



Further information about mounting positions M1 - M6 \Leftrightarrow III A51



Mounting positions – nomenclature

For gear units and gear motors, NORD specifies six installation positions from M1 to M6 as shown in the following diagrams. The relavant installation position must be stated when ordering.

Changes to the installation position require a correction of the quantity of oil, and often other measures such as the installation of encapsulated roller bearings. Damage may result if the necessary measures are not observed. Inclined installations, which are not at right angles are possible. Please contact us.



The mounting positions which include the position of the oil level plug, the vent plug as well as the oil drain plug are shown beginning on page A53.











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M4 V5/V1 0-

50

M5 B6/B5II

M3 B8/B5I

M4 V5/V1 $\mathbf{\nabla}$

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M5 B6/B5II

M3 B8/B5I





























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[L]			2	<u> </u>					"JH	ſ		
⇒ ⊞A5 1	M1	M2	M3	M4	M5	M6	M1	M2	M3	M4	M5	M6
⇒ ⊞A53	B 3	V6	B8	V5	B6	B7	B5	V3	B5I	V1	B5II	B5III
SK 11E	0,25	0,50	0,55	0,40	0,35	0,35	0,30	0,35	0,50	0,30	0,40	0,40
SK 21E	0,60	1,20	1,20	1,00	1,00	1,00	0,50	1,40	1,10	0,70	0,90	0,90
SK 31E	1,10	2,70	2,20	2,30	1,70	1,70	0,80	1,30	1,65	1,10	2,00	2,00
SK 41E	1,70	2,60	3,30	2,50	2,60	2,60	1,00	2,60	2,80	1,60	3,30	3,30
SK 51E	2,20	4,40	4,70	4,00	3,40	3,40	1,80	3,50	4,10	3,00	3,80	3,80
			ſ	<u>_</u>					ſF	77-1		
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SK 02	0,15	0,60	0,70	0,60	0,40	0,40	0,25	0,60	0,60	0,60	0,50	0,50
SK 12	0,25	0,75	0,85	0,75	0,50	0,50	0,35	0,85	0,90	0,90	0,60	0,60
SK 22	0,50	1,80	2,00	1,80	1,35	1,35	0,70	2,00	2,00	1,80	1,55	1,55
SK 32	0,90	2,50	3,00	2,90	2,00	2,00	1,30	2,90	3,30	3,10	2,40	2,40
SK 42	1,30	4,50	4,50	4,30	3,20	3,20	1,80	4,40	4,50	4,00	3,70	3,70
SK 52	2,50	7,00	6,80	6,80	5,10	5,10	3,00	6,80	6,20	7,40	5,60	5,60
~ <u>+</u>			Ţ									
	0.50	45.0	42.0	40.0	45.0	45.0	7.00	45.0	44.0	40.5	40.0	40.0
5K 62	6,50	15,0	13,0	16,0	15,0	15,0	7,00	15,0	14,0	18,5	16,0	16,0
SK 72	9,00	23,0	18,0	26,0	23,0	23,0	10,0	23,0	18,5	28,0	23,0	23,0
5K 82	14,0	35,0	27,0	44,0	52,0	52,0	15,0	37,0	29,0	45,0	34,5 52.0	52.0
SK 102	25,0	73,0	47,0	102	52,0	52,0	20,0	73,0 91.0	47,0	104	52,0 72.0	52,0
51(102	30,0	13,0	00,0		71,0	71,0	40,0	01,0	00,0	104	12,0	12,0
<u>محت</u> (L)									Ē			
SK 03	0,30	1,00	0,80	0,90	0,60	0,60	0,50	0,80	0,90	1,10	0,80	0,80
SK 13	0,60	1,25	1,10	1,20	0,70	0,70	0.,85	1,20	1,20	1,20	0,95	0,95
SK 23	1,30	2,40	2,30	2,35	1,60	1,60	1,50	2,60	2,50	2,80	2,80	2,80
SK 33N	1,60	2,90	3,20	3,70	2,30	2,30	1,90	3,40	3,50	4,40	2,60	2,60
SK 43	3,00	5,60	5,30	6,60	3,60	3,60	3,50	5,70	5,00	6,10	4,10	4,10
SK 53	4,50	8,70	7,70	8,70	6,00	6,00	5,20	8,40	7,00	8,90	6,70	6,70
	12.0	115	1/5	16.0	12.0	12.0	125	14.0	15 5	19.0	14.0	14.0
SK 72	20.5	20.0	22.5	27.0	20.0	20.0	22.0	22.5	10,0	27.5	20.0	20.0
SK 83	30.0	20,0	34.0	37.0	20,0	20,0	31.0	34.0	25,0	40.0	20,0	20,0
SK 93	53.0	70.0	59.0	72.0	49.0	49.0	53.0	70.0	59.0	74.0	49.0	49.0
SK 103	74.0	71.0	74.0	97,0	67.0	67.0	69.0	78.0	78.0	99.0	67.0	67.0





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⇔ ⊞A51	M1	M2	М3	M4	M5	M6	⇔ ⊞A51	M1	M2	М3	M4	M5	M6
⇒ ΩA54	H1	H6	H2	H5	H4	H3	⇒ ⊒A54	H1	H6	H2	H5	H4	H3
SK 0182NB	0,40	0,55	0,60	0,55	0,35	0,35							
SK 0282NB	0,70	1,00	0,80	1,10	0,90	0,90							
							SK 1382NB	1,30	2,30	1,40	2,10	2,00	1,90
[L]			1				[L]						
SK 1282	0,90	1,30	0,90	1,20	0,95	0,95							
SK 2282	1,65	2,40	1,90	2,00	1,80	1,80	SK 2382	1,70	2,60	1,90	3,10	1,50	1,50
SK 3282	3,15	4,10	3,24	4,10	3,15	3,15	SK 3382	4,10	4,90	3,30	5,60	3,30	3,30
SK 4282	4,70	6,10	4,75	5,40	4,70	4,70	SK 4382	5,90	6,80	4,90	8,30	4,90	4,90
SK 5282	7,50	8,80	7,50	8,80	7,20	7,20	SK 5382	12,5	12,0	6,70	14,0	8,30	8,30
SK 6282	17,0	14,0	12,0	17,5	10,0	14,0	SK 6382	16,5	13,0	9,60	18,0	14,0	12,5
SK 7282	25,0	21,0	20,0	27,0	16,0	21,0	SK 7382	22,0	20,0	16,0	25,0	23,0	19,0
SK 8282	37,0	33,0	30,0	41,0	31,0	31,0	SK 8382	34,0	32,0	25,0	38,0	35,0	30,0
SK 9282	74,0	70,0	55,0	72,0	60,0	59,0	SK 9382	73,0	70,0	45,0	74,0	65,0	60,0
₹ <u>_</u>													
[L]				, F			[L]						
SK 10282	90,0	90,0	40,0	90,0	60,0	82,0	SK 10382	85,0	100	73,0	100	80,0	80,0
SK 11282*	165	160	145	195	100	140	SK 11382*	160	155	140	210	155	135
							SK 12382*	160	155	140	210	155	135

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ل ⊏] ⊳∩∆51	M1	M2	M3	M4	M5	M6	M1	M2	M3	M/	M5	M6
		D6				Ve	D5I	D5	DEIII	DEII		
-> ⊫A33/30	DJ	DU	DO	DJI	vJ	VU			DOIII			
01/ 00070	0.40	0.00	0.50	0.50	0.40	0.40	HI	H4	HZ	нз	CH 0.40	H 0
SK 92072	0,40	0,60	0,50	0,50	0,40	0,40	0,40	0,60	0,50	0,50	0,40	0,40
SK 92172	0,60	0,90	0,95	1,10	0,75	0,62	0,50	0,92	0,87	1,05	0,75	0,65
SK 92372	0,90	1,30	1,45	1,60	1,20	1,20	1,15	1,50	1,20	1,70	1,15	1,15
SK 92672	1,80	3,50	3,20	3,40	2,60	2,60	1,55	2,80	2,50	3,30	2,40	2,40
SK 92772	2,30	4,50	4,60	5,30	4,10	4,10	2,75	4,40	4,50	5,50	3,50	3,50
			Ø				(
[L]				<u>H</u>				ų <u> </u>		س		
SK 9012.1	0,70	1,60	1,90	2,40	1,20	1,70	0,70	1,90	1,90	2,10	1,20	1,70
SK 9016.1	0,70	1,60	1,90	2,40	1,20	1,70	0,70	1,90	1,90	2,10	1,20	1,70
SK 9022.1	1,30	2,60	3,50	4,20	2,00	2,80	1,30	2,60	3,50	4,20	2,00	2,80
SK 9032.1	1,70	4,80	6,40	6,70	4,10	5,10	1,90	5,20	6,40	7,30	3,30	5,10
SK 9042.1	4,40	8,70	10,0	9,80	6,80	7,50	3,60	9,70	11,4	11,5	6,50	8,20
SK 9052.1	6,50	16,0	19,0	21,5	11,0	15,5	7,50	16,5	20,0	21,5	11,5	18,0
SK 9072.1	10,0	27,5	32,0	36,0	18,0	24,0	12,0	27,5	33,0	38,5	19,0	26,0
SK 9082.1	17,0	51,5	62,5	71,5	33,0	46,5	21,0	54,0	66,0	80,0	38,0	52,0
SK 9086.1	29,0	73,0	85,0	102	48,0	62,0	36,0	78,0	91,0	107	53,0	76,0
SK 9092.1	41,0	157	170	172	80,0	90,0	40,0	130	154	175	82,0	91,0
SK 9096.1	70,0	187	194	254	109	152	98	187	193	257	113	156
							(Î.		h
										<u> </u>		u
SK 9013.1	1,20	2,00	2,20	3,00	1,40	1,90	1,20	2,30	2,20	3,00	1,40	1,90
SK 9017.1	1,20	2,00	2,20	3,00	1,40	1,90	1,20	2,30	2,20	3,00	1,40	1,90
SK 9023.1	2,40	3,00	3,80	5,30	2,20	3,10	2,40	3,00	3,80	5,30	2,20	3,10
SK 9033.1	3,30	6,60	7,00	7,80	4,30	5,10	3,80	5,70	6,90	8,50	3,60	5,60
SK 9043.1	4,60	10,2	10,7	12,8	5,20	6,70	5,70	10,2	14,7	14,7	6,60	9,60
SK 9053.1	10,0	17,0	20,0	24,2	11,5	16,5	12,5	18,0	26,5	26,5	13,0	17,0

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⇔ ⊞A5 1	M1	M2	М3	M4	M5	M6	M1	M2	M3	M4	M5	M6	M1	M2	М3	M4	M5	M6
⇒ A57/58	B3	B6	B 8	B3I	V5	V6	B5I	B5	B5III	B5II	V1	V3	H1	H4	H2	H3	H5	H6
SK 02040	0,45	0,60	0,60	0,60	0,50	0,50	0,50	0,80	0,75	0,60	0,50	0,50	0,40	0,80	0,65	0,60	0,50	0,50
SK 02050	0,40	1,20	0,70	1,15	0,70	0,70	0,45	1,40	0,90	1,25	1,00	1,00	0,45	1,10	0,90	1,10	0,80	0,80
SK 12063	0,60	1,70	1,20	1,55	1,00	1,00	0,50	1,60	1,40	1,80	1,50	1,50	0,50	1,45	1,20	1,40	1,10	1,10
SK 12080	0,80	2,60	1,70	2,70	1,70	1,70	0,95	3,20	3,10	3,30	2,50	2,50	0,90	3,10	3,00	3,00	2,20	2,20
SK 32100	1,60	5,50	3,40	5,40	3,20	3,20	1,50	7,10	4,90	7,10	4,40	4,40	1,50	5,20	3,80	5,30	3,80	3,80
SK 42125	2,80	11,0	6,20	10,3	5,80	5,80	3,30	11,2	6,10	10,4	6,80	6,80	3,20	12,9	6,10	10,5	6,30	6,30
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SK 13050	0,95	1,55	1,10	1,45	0,95	0,95	0,90	1,80	1,15	1,75	1,25	1,25	0,85	1,75	1,25	1,35	1,15	1,15
SK 13063	1,30	2,30	1,60	2,00	1,25	1,25	0,95	2,10	1,65	2,15	1,75	1,75	0,90	2,10	1,55	2,10	1,45	1,45
SK 13080	1,70	3,20	2,10	3,30	1,95	1,95	1,40	4,20	3,35	4,20	2,75	2,75	1,70	3,75	3,60	3,60	2,55	2,55
SK 33100	2,20	7,60	4,00	6,30	3,70	3,70	2,30	7,60	5,50	7,80	4,85	4,85	2,10	6,10	4,80	6,30	4,20	4,20
SK 43125	7,80	14,0	7,20	13,5	6,70	6,70	4,30	14,5	7,10	12,1	7,70	7,70	4,80	13,5	7,40	14,5	8,00	8,00





	M _{2max} [Nm]		M _{2max} [Nm]		M _{2max} [Nm]
		SK 02	99	SK 03	110
SK 11E	58	SK 12	184	SK 13	194
SK 21E	77	SK 22	374	SK 23	340
SK 31E	185	SK 32	710	SK 33N	672
SK 41E	290	SK 42	1244	SK 43	1289
SK 51E	492	SK 52	2024	SK 53	2232

	M _{2max} [Nm]		M _{2max} [Nm]
SK 62	3120	SK 63	3700
SK 72	4708	SK 73	5650
SK 82	7246	SK 83	9180
SK 92	10775	SK 93	14000
SK 102	17367	SK 103	23160

info ⇔ 🛄 B40 - B60

	M _{2max} [Nm]		M _{2max} [Nm]		M _{2max} [Nm]
SK 0182NB	116				
SK 0282NB	165				
SK 1382NB	370				
		SK 1282	296		
		SK 2282	563	SK 2382	563
		SK 3282	1015	SK 3382	1039
		SK 4282	2000	SK 4382	2077
		SK 5282	3235	SK 5382	3200

	M _{2max} [Nm]		M _{2max} [Nm]
SK 6282	4537	SK 6382	6000
SK 7282	6473	SK 7382	8300
SK 8282	10618	SK 8382	13200
SK 9282	17930	SK 9382	25400

	M _{2max} [Nm]		M _{2max} [Nm]
SK 10282	32000	SK 10382	37200
SK 11282	42000	SK 11382	69000
		SK 12382	90000

info ⇒ 🕮 C46 - C66





M_{2max}

	M _{2max} [Nm]		M _{2max} [Nm]		M _{2max} [Nm]
SK 92072	90	SK 9012.1	400	SK 9013.1	400
SK 92172	120	SK 9016.1	610	SK 9017.1	610
SK 92372	230	SK 9022.1	860	SK 9023.1	860
SK 92672	380	SK 9032.1	1550	SK 9033.1	1550
SK 92772	660	SK 9042.1	2800	SK 9043.1	2800
		SK 9052.1	4800	SK 9053.1	4800
		SK 9072.1	8500		
		SK 9082.1	13000		
		SK 9086.1	20000		
		SK 9092.1	32000		
		SK 9096.1	50000		

info ⇒ 🛄 D42 - D55

ê ê Q	M _{2max} [Nm]	ê († Q	M _{2max} [Nm]
SK 02040	100		
SK 02050	185	SK 13050	195
SK 12063	360	SK 13063	380
SK 12080	710	SK 13080	770
SK 32100	1420	SK 33100	1590
SK 42125	2850	SK 43125	3090

info ⇒ 🕮 E18 - E29







 $\mathbf{F}_{\mathbf{R}}$

	У	2	C	CVL		u	•
	[mm]	[mm]	[Nmm]	[Nmm]	[mm]	[mm]	[mm]
SK 11E	65,0	85,0			39,0	20	40
SK 21E	77,0	102,0			50,0	25	50
SK 31E	104,5	134,5			69,5	30	60
SK 41E	111,5	146,5			67,0	35	70
SK 51E	125,0	165,0			74,0	40	80
SK 02, SK 03	63,8	83,8	0,06 x 10 ⁶	,06 x 10 ⁶ 0,10 x 10 ⁶		20	40
SK 12, SK 13	73,5	98,5	0,12 x 10 ⁶	0,18 x 10 ⁶	14,0	25	50
SK 22, SK 23	86,0	116,0	0,19 x 10 ⁶	0,30 x 10 ⁶	14,0	30	60
SK 32, SK 33N	112,5	152,5	0,39 x 10 ⁶	0,60 x 10 ⁶	30,0	40	80
SK 42, SK 43	123,0	168,0	0,42 x 10 ⁶	0,73 x 10 ⁶	30,0	45	90
SK 52, SK 53	149,5	204,5	0,92 x 10 ⁶	1,56 x 10 ⁶	35,0	55	110
SK 62, SK 63	191,0	256,0	1,46 x 10 ⁶	2,46 x 10 ⁶	35,0	65	130
SK 72, SK 73	212,0	282,0	2,13 x 10 ⁶	4,45 x 10 ⁶	37,0	75	140
SK 82, SK 83	248,5	333,5	4,24 x 10 ⁶	6,89 x 10 ⁶	38,0	90	170
SK 92, SK 93	278,0	383,0	8,07 x 10 ⁶	12,50 x 10 ⁶	41,0	110	210
SK 102, SK 103	323,5	448,5	14,86 x 10 ⁶	22,84 x 10 ⁶	46,0	130	250



	У	Z	С	c _{VL}	f	d	I
	[mm]	[mm]	[Nmm]	[Nmm]	[mm]	[mm]	[mm]
SK 0182NB	80,0	104,5	0,13 x 10 ⁶	0,18 x 10 ⁶	0	25	50
SK 0282NB	112,0	138,0	0,12 x 10 ⁶	0,17 x 10 ⁶	0	25	50
SK 1382NB	145,0	176,0	0,16 x 10 ⁶	0,26 x 10 ⁶	0	30	60
SK 1282	95,1	125,1	0,18 x 10 ⁶	0,27 x 10 ⁶	0	30	60
SK 2282, SK 2382	109,6	144,6	0,27 x 10 ⁶	0,44 x 10 ⁶	0	35	70
SK 3282, SK 3382	135,6	180,6	0,61 x 10 ⁶	0,94 x 10 ⁶	0	45	90
SK 4282, SK 4382	158,1	213,1	0,90 x 10 ⁶	1,48 x 10 ⁶	0	55	110
SK 5282, SK 5382	179,6	244,6	1,63 x 10 ⁶	2,60 x 10 ⁶	0	65	130
SK 6282, SK 6382	235,6	305,6	1,82 x 10 ⁶	3,42 x 10 ⁶	0	75	140
SK 7282, SK 7382	253,0	338,0	3,81 x 10 ⁶	6,19 x 10 ⁶	0	90	170
SK 8282, SK 8382	300,0	405,0	8,31 x 10 ⁶	12,79 x 10 ⁶	0	110	210
SK 9282, SK 9382	353,6	478,6	16,32 x 10 ⁶	24,92 x 10 ⁶	0	140	250
SK 10282, SK 10382	425,0	575,0		18,95 x 10 ⁶	0	160	300
SK 11282, SK 11382	453,0	603,0		19,15 x 10 ⁶	0	180	300
SK 12382	453,0	603,0		20,30 x 10 ⁶	0	180	300







	У	z	С	c _{VL}	f	d	I.
	[mm]	[mm]	[Nmm]	[Nmm]	[mm]	[mm]	[mm]
SK 92072	95,0	115,0	0,06 x 10 ⁶		0	20	40
SK 92712	111,0	131,0	0,05 x 10 ⁶		0	20	40
SK 92372	128,0	153,0	0,08 x 10 ⁶		0	25	50
SK 92672	136,0	166,0	0,12 x 10 ⁶		0	30	60
SK 9012.1, SK 9013.1	111,0	141,0	0,14 x 10 ⁶	0,24 x 10 ⁶	0	30	60
SK 9016.1, SK 9017.1	111,0	146,0	0,25 x 10 ⁶	0,41 x 10 ⁶	0	35	70
SK 92772	153,0	188,0	0,16 x 10 ⁶		0	35	70
SK 9022.1, SK 9023.1	144,0	179,0	0,17 x 10 ⁶	0,30 x 10 ⁶	0	35	70
SK 9032.1, SK 9033.1	171,5	216,5	0,29 x 10 ⁶	0,58 x 10 ⁶	0	45	90
SK 9042.1, SK 9043.1	181,0	241,0	1,22 x 10 ⁶	1,99 x 10 ⁶	0	60	120
SK 9052.1, SK 9053.1	237,0	307,0	1,75 x 10 ⁶	3,08 x 10 ⁶	0	70	140
SK 9072.1	281,0	366,0	4,49 x 10 ⁶	7,05 x 10 ⁶	0	90	170
SK 9082.1	326,75	431,76	8,36 x 10 ⁶	12,82 x 10 ⁶	0	110	210
SK 9086.1	422,0	527,0	9,56 x 10 ⁶	15,60 x 10 ⁶	0	120	210
SK 9092.1	515,0	640,0	14,40 x 10 ⁶	24,61 x 10 ⁶	0	140	250
SK 9096.1	550	710	48,73 x 10 ⁶		0	140	320



	у	Z	z c		f	d	I
	[mm]	[mm]	[Nmm]	[Nmm]	[mm]	[mm]	[mm]
SK 02040	99,5	115,5	0,07 x 10 ⁶		0	20	40
SK 02050, SK 13050	104,0	129,0	0,12 x 10 ⁶	0,19 x 10 ⁶	0	25	50
SK 12063, SK 13063	118,5	148,5	0,19 x 10 ⁶	0,30 x 10 ⁶	0	30	60
SK 12080, SK 13080	150,0	185,0	0,21 x 10 ⁶	0,41 x 10 ⁶	0	35	70
SK 32100, SK 33100	179,0	224,0	0,51 x 10 ⁶	0,94 x 10 ⁶	0	45	90
SK 42125, SK 43125	233,5	293,5	1,33 x 10 ⁶	2,19 x 10 ⁶	0	60	120









W - Adapter



1	(
	SK 0182NB	SK 92072		P ₁ [kW]
	OIT 0202IND	010 32 17 2		0,12 0,18 0,25 0,37 0,55 0,75 1,10 1,50
				F _{R1} [kN]
				0,55 0,54 0,53 0,50 0,47 0,44 0,37 0,30
				F_{A1} [kN]
	SK 1382NB	SK 92372	SK 02040	P. [kW]
				0,12 0,18 0,25 0,37 0,55 0,75 1,10 1,50 2,20 3,00
				F _{R1} [kN]
				0,85 0,82 0,78 0,75 0,72 0,70 0,61 0,43 0,42 0,23
				F _{A1} [kN]
				1,2 1,1 1,0 0,89 0,77 0,58 0,35 0,29 0,20 0,15
		SK 92672		P ₁ [kW]
				0,12 0,18 0,25 0,37 0,55 0,75 1,10 1,50 2,20 3,00 4,00 5,50 7,50 9,20
				F _{R1} [kN]
				2,13 2,1 2,1 2,1 2,1 2,0 1,9 1,8 1,8 1,7 1,6 1,1 1,0 1,0 0,74
				F _{A1} [kN]
				2,9 2,9 2,8 2,6 2,5 2,3 2,1 2,0 1,7 1,5 0,98 0,66 0,45 0,28
		SK 92772		P ₁ [kW]
				0,12 0,18 0,25 0,37 0,55 0,75 1,10 1,50 2,20 3,00 4,00 5,50 7,50 9,20
				F _{R1} [kN]
				F A1 [KN] 37 35 32 31 30 28 26 24 22 20 10 10 10 15 11
				3,1 3,3 3,2 3,1 3,0 2,0 2,0 2,4 2,2 2,0 1,8 1,8 1,5 1,1

⇒Ш A9

 $F_{R1} \rightarrow F_{A1} = 0$ $F_{A1} \rightarrow F_{R1} = 0$











(<u>(</u>		10	
SK 11E SK 02	SK 1282 SK 2382	SK 9012.1 SK 9016.1 SK 9022.1	SK 02050 SK 12063	
SK 12	SK 3382		SK 12080	0,12 0,18 0,25 0,37 0,55 0,75 1,10 1,50 2,20 3,00
SK 13 SK 23		SK 9013.1 SK 9017.1	SK 13050 SK 13063	0,85 0,82 0,78 0,75 0,72 0,70 0,61 0,43 0,42 0,23
SK 33N		SK 9023.1 SK 9033.1	SK 13080 SK 33100	F _{A1} [kN]
SK 21E	614 2202	SK 0022 1	SK 22100	1,2 1,1 1,0 0,89 0,77 0,58 0,35 0,29 0,20 0,15
SK 31E	SK 3282	SK 9043.1	SK 43125	0,12 0,18 0,25 0,37 0,55 0,75 1,10 1,50 2,20 3,00 4,00 5,50 7,50
SK 22 SK 32 SK 43	SK 5382	SK 9053.1		F _{R1} [kN] 2,1 2,1 2,1 2,1 2,1 1,0 1,0
SN 33				F _{A1} [kN]
SK 41E	SK 4282	SK 9042.1	SK 42125	2,9 2,9 2,0 2,0 2,5 2,3 2,1 2,0 1,7 1,5 0,90 0,05 0,27
SK 51E SK 42	SK 5282 SK 6382	SK 9052.1		0,37 0,55 0,75 1,10 1,50 2,20 3,00 4,00 5,50 7,50 9,20 11,0
SK 52	3N 0302			
51(05				
				4,1 3,9 3,8 3,5 3,3 2,7 2,5 2,3 1,6 1,4 1,0 0,59
SK 62 SK 72	SK 6282 SK 7282	SK 9072.1		P₁ [kW] 0,75 1,10 1,50 2,20 3,00 4,00 5,50 7,50 9,20 11,0 15,0 18,5 22,0 30,0 37,0
SK 73	SK 6382* SK 7382			F _{R1} [kN]
SK 83 SK 93	SK 8382 SK 9382			4,4 4,3 4,2 4,1 3,9 3,7 3,4 3,4 3,1 2,7 2,7 2,3 1,8 1,2 0,87
SK 63*	SK 9382*			F _{A1} [kN]
6K 02	SK 0202	SK 0092 1		6,1 5,9 5,8 5,5 5,2 4,9 4,4 4,3 3,9 3,3 3,3 2,7 2,2 1,1 0,74
SK 92	SK 9282	SK 9082.1 SK 9086.1		P₁ [kw] 3 00/4 00/5 50/7 50/9 20/11 0/15 0/18 5/22 0/30 0/27 0/45 0/55 0/75 0/90 0/
SK 102 SK 83*	SK 10382 SK 8382*	SK 9092.1 SK 9096.1		5,00 4,00 5,50 7,50 5,20 11,0 15,0 18,5 22,0 50,0 57,0 45,0 55,0 75,0 50,0
SK 93* SK 103	SK 9382*			11,0 10,9 10,8 10,4 10,1 9,9 9,5 9,3 9,3 8,4 8,1 8,3 7,4 4,6 5,2
				F _{A1} [kN]
				4,3 4,2 4,1 3,8 3,6 3,4 3,1 3,0 2,9 2,3 2,0 2,2 1,5 0,78 0,24
	SK 10282 SK 10382			P ₁ [kW]
	SK 11282			11,0 15,0 18,5 22,0 30,0 37,0 45,0 55,0 75,0 90,0 110 132 160 200
	SK 11382 SK 12382			F _{R1} [kN]
				[17,3]17,1]10,9]11,7]10,1]15,7]15,2]14,5]13,2]12,1]10,7]9,0]6,9]3,6]
				13,4 13,7 13,4 13,1 12,5 12,0 11,7 11,0 9,6 8,5 7,2 6,8 5,0 2,6

$$F_{A1} \rightarrow F_{R1} = 0$$

* W - Adapter VL

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W - Adapter

F_{R1}





				У	z	С	d1	11
			a a a	[mm]	[mm]	[Nmm]	[mm]	[mm]
	SK 0182NB SK 0282NB	SK 92072 SK 92172		58,5	78,5	0,027 x 10 ⁶	14	40
	SK 1382NB	SK 72372	SK 02040	58,5	78,5	0,037 x 10 ⁶	16	40
		SK 92672		59,5	79,5	0,032 x 10 ⁶	19	40
		SK 92772		69,0	94,0	0,109 x 10 ⁶	24	50
SK 03 SK 11E SK 02 SK 12 SK 13	SK 1282	SK 9012.1 SK 9016.1 SK 9013.1 SK 9017.1	SK 02050 SK 12063 SK 12080 SK 13050 SK 13063	70,0	90,0	3,64 x 10 ⁴	16	40
SK 23	SK 2382	SK 9022.1 SK 9023.1	SK 13080					
SK 33N	SK 3382	SK 9033.1	SK 33100	00.5	101 5	4.07 4.05		50
SK 21E SK 31E SK 22 SK 32 SK 43 SK 53	SK 2282 SK 3282 SK 4382 SK 5382	SK 9032.1 SK 9043.1 SK 9053.1	SK 32100 SK 43125	96,5	121,5	1,07 x 10 ³	24	50
SK 41E SK 51E SK 42 SK 52 SK 63	SK 4282 SK 5282 SK 6382	SK 9042.1 SK 9052.1	SK 42125	110,5	150,5	4,70 x 10 ⁵	38	80
SK 62 SK 72 SK 73 SK 83 SK 93 SK 63*	SK 6282 SK 7282 SK 7382 SK 8382 SK 9382 SK 6382*	SK 9072.1		149,5	204,5	4,60 x 10 ⁵	42	110
SK 82 SK 92 SK 103 SK 83* SK 93*	SK 8282 SK 9282 SK 8382* SK 9382*	SK 9082.1 SK 9086.1 SK 9092.1		207,5	277,5	1,82 x 10 ⁶	65	140
		SK 9096.1		299,0	369,0		70	140
SK 102				224,5	294,5	1,66 x 10 ⁶	65	140
	SK 10282 SK 10382 SK 11282 SK 11382 SK 12382			413,0	482,0		70	140

* W-Adapter VL

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SK 11E W0	SK 02 W0 SK 12 W0	SK 03 W0 SK 13 W0 SK 23 W0 SK 33N W0	SK/02 W0 SK/12 W0 SK/23 W0		2	90 	75 70,5	M5 x 13	14 38,5	16 5	5 30	2 M5
SK 11E WII	SK 02 WII SK 12 WII	SK 03 WII SK 13 WII SK 23 WII SK 33N WII	SK/02 WII SK/12 WII SK/23 WII	RLS	2	120 	100 74,0	M8 x 13	16 40	18 5	4 32	8 M5
SK 21E WIII SK 31E WIII	SK 22 WIII SK 32 WIII	SK 43 WIII SK 53 WIII	SK/22 WIII SK/32 WIII SK/43 WIII SK/53 WIII		2	120 	100 113,5	M8 x 13	16 40	18 5	4 32	8 M5
SK 11E WIII	SK 02 WIII SK 12 WIII	SK 03 WIII SK 13 WIII SK 23 WIII SK 33N WIII	SK/02 WIII SK/12 WIII SK/23 WIII		2	150 	125 119,5	M8 x 13	24 50	27 8	5 40	8 M8
SK 21E WI SK 31E WI	SK 22 WI SK 32 WI	SK 43 WI SK 53 WI	SK/22 WI SK/32 WI SK/43 WI SK/53 WI		1	180 140	125 113,5	M8 x 13	24 50	27 8	5 40	8 M8
SK 41E WIV SK 51E WIV	SK 42 WIV SK 52 WIV	SK 63 WIV	SK/42 WIV SK/52 WIV		1	180 140	125 124	M8 x 13	24 50	27 8	5 40	8 M8
SK 21E WII SK 31E WII	SK 22 WII SK 32 WII	SK 43 WII SK 53 WII	SK/22 WII SK/32 WII SK/43 WII SK/53 WII	RLS	1	180 140	150 113,5	M10 x 18	28 60	31 8	5 50	9 M10
SK 41E WI SK 51E WI	SK 42 WI SK 52 WI	SK 63 WI	SK/42 WI SK/52 WI		1	180 140	150 124	M10 x 16	28 60	31 8	5 50	9 M10
	SK 62 W0 SK 72 W0	SK 73 W0 SK 83 W0 SK 93 W0			2	180 	150 124	M10 x 18	28 60	31 8	5 50	9 M10
SK 41E WII SK 51E WII	SK 42 WII SK 52 WII	SK 63 WII	SK/42 WII SK/52 WII	RLS	1	290 250	215 125	M12 x 20	38 80	41 10	5 70	8 M12
	SK 62 WI SK 72 WI SK 82 W0	SK 73 WI SK 83 W SK 93 WII SK 103 W0			1	290 250	215 170	M12 x 25	38 80	41 10	5 70	8 M12
SK 41E WIII SK 51E WIII	SK 42 WIII SK 52 WIII	SK 63 WIII	SK/42 WIII SK/52 WIII		1	290 250	250 125	M16 x 25	38 80	41 10	5 70	8 M12
	SK 62 WII SK 72 WII SK 82 WII	SK 73 WII SK 83 WI SK 93 WIII SK 103 WII			1	290 250	250 170	M16 x 25	38 80	41 10	5 70	8 M12

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RLS	1	290 250	250 170	M16 x 25	42 110	45 12	10 90	8 M16
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SK 62 WIII SK 72 WIII	SK 73 WIII SK 83 WIII SK 93 WIII	RLS	1	290 250	250 170	M16 x 25	42 110	45 12	10 90	8 M16
SK 62 WIV SK 72 WIV SK 82 WV SK 92 WV	SK 73 WIV SK 83 WIV SK 93 WIV SK 103 WIV		1	350 300	300 252	M20 x 30	65 140	69 18	15 110	8 M20
SK 82 WI SK 92 WI SK 102 WI	SK 103 WI		1	350 300	250 236	M16 x 25	42 110	45 12	10 90	8 M16
SK 82 WIII SK 92 WIII SK 102 WIII	SK 103 WIII	RLS	1	350 300	300 236	M20 x 30	65 140	69 18	15 110	8 M20

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SK 0182NB W0 SK 0282NB W0	SK 1382NB W0			2	120 	75 61,5	M5 x 11	14 40	16 5	5 30	8 M5
SK 0182NB WII SK 0282NB WII	SK 1382NB WII			2	120 	100 61,5	M8 x 11	16 40	18 5	4 32	8 M5
SK 1282 W0	SK 2382 W0 SK 3382 W0	SK/02 W0 SK/12 W0		2	90 	75 70,5	M5 x 13	14 38,5	16 5	5 30	2 M5
SK 1282 WII	SK 2382 WII SK 3382 WII	SK/02 WII SK/12 WII	RLS	2	120 	100 74	M8 x 13	16 40	18 5	4 32	8 M5
SK 2282 WIII SK 3282 WIII	SK 4382 WIII SK 5382 WIII	SK/22 WII SK/32 WII		2	120 	100 113,5	M8 x 13	16 40	18 5	4 32	8 M5
SK 1282 WII	SK 2382 WIII SK 3382 WIII	SK/02 WIII SK/12 WIII		2	150 	125 119,5	M8 x 13	24 50	27 8	5 40	8 M8
SK 2282 WI SK 3282 WI	SK 4382 WI SK 5382 WI	SK/22 WI SK/32 WI		1	180 140	125 113,5	M8 x 13	24 50	27 8	5 40	8 M8
SK 4282 WIV SK 5282 WIV	SK 6382 WIV	SK/42 WIV SK/52 WIV		1	180 140	125 124	M8 x 13	24 50	27 8	5 40	8 M8
SK 2282 WII SK 3282 WII	SK 4382 WII SK 5382 WII	SK/22 WII SK/32 WII	RLS	1	180 140	150 113,5	M10 x 18	28 60	31 8	5 50	9 M10
SK 4282 WI SK 5282 WI	SK 6382 WI	SK/42 WI SK/52 WI		1	180 140	150 124	M10 x 16	28 60	31 8	5 50	9 M10
SK 6282 W0 SK 7282 W0	SK 7382 W0 SK 8382 W0 SK 9382 W0			2	180 	150 124	M10 x 18	28 60	31 8	5 50	9 M10
SK 4282 WII SK 5282 WII	SK 6382 WII	SK/42 WII SK/52 WII	RLS	1	290 250	215 125	M12 x 20	38 80	41 10	5 70	8 M12
SK 6282 WI SK 7282 WI	SK 7382 WI SK 8382 WI SK 9382 WI			1	290 250	215 170	M12 x 25	38 80	41 10	5 70	8 M12
SK 4282 WIII SK 5282 WIII	SK 6382 WIII	SK/42 WIII SK/52 WIII		1	290 250	250 125	M16 x 25	38 80	41 10	5 70	8 M12
SK 6282 WII SK 7282 WII SK 8282 WII	SK 7382 WII SK 8382 WII SK 9382 WII	SK 10382 WII SK 11382 WII		1	290 250	250 170	M16 x 25	38 80	41 10	5 70	8 M12
SK 6282 WIII SK 7282 WIII	SK 7382 WIII SK 8382 WIII SK 9382 WIII		RLS	1	290 250	250 170	M16 x 25	42 110	45 12	10 90	8 M16
SK 6282 WIV SK 7282 WIV SK 8282 WV	SK 7382 WIV SK 8382 WIV SK 9382 WIV SK 10382 WV			1	350 300	300 252	M20 x 30	65 140	69 18	15 110	8 M20
SK 8282 WI SK 9282 WI	SK 10382 WI SK 11382 WI SK 12382 WI			1	350 300	250 236	M16 x 25	42 110	45 12	10 90	8 M16
SK 8282 WIII SK 9282 WIII	SK 11382 WIII SK 10382 WIII SK 12382 WIII		RLS	1	350 300	250 236	M20 x 30	65 140	69 18	15 110	8 M20
SK 8282 WIV SK 9282 WIV	SK 11382 WIV SK 10382 WIV SK 12382 WIV			3	550 	500 245	Ø 17,5	65 140	69 18	15 110	12 M20















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SK 92072 W0 SK 92172 W0 SK 92372 W0 SK 92672 W0 SK 92772 W0				2	120 	75 61,5	M5 x 11	14 40	16 5	5 30	56 M5
SK 92072 WII SK 92172 WII SK 92372 WII SK 92672 WII SK 92772 WII				2	120 	100 61,5	M8 x 11	16 40	18 5	4 32	8 M5
SK 9012.1 W0 SK 9016.1 W0 SK 9022.1 W0	SK 9013.1 W0 SK 9017.1 W0 SK 9023.1 W0 SK 9033.1 W0			2	90 	75 70,5	M5 x 13	14 38,5	16 5	5 30	2 M5
SK 9012.1 WII SK 9016.1 WII SK 9022.1 WII	SK 9013.1 WII SK 9017.1 WII SK 9023.1 WII SK 9033.1 WII		RLS	2	120 	100 74	M8 x 13	16 40	18 5	4 32	8 M5
SK 9032.1 WIII	SK 9043.1 WIII SK 9053.1 WIII	SK/32 WIII		2	120 	100 113,5	M8 x 13	16 40	15 8	4 32	8 M5
SK 9012.1 WIII SK 9016.1 WIII SK 9022.1 WIII	SK 9013.1 WIII SK 9017.1 WIII SK 9023.1 WIII SK 9033.1 WIII			2	150 	125 119,5	M8 x 13	24 50	27 8	5 40	8 M8
SK 9032.1 WI	SK 9043.1 WI SK 9053.1 WI	SK/32 WI		1	180 140	125 113,5	M8 x 13	24 50	27 8	5 40	8 M8
SK 9042.1 WIV SK 9052.1 WIV		SK/42 WIV SK/52 WIV		1	180 140	125 124	M8 x 13	24 50	27 8	5 40	8 M8
SK 9032.1 WII	SK 9043.1 WII SK 9053.1 WII	SK/32 WII	RLS	1	180 140	150 113,5	M10 x 18	28 60	31 8	5 50	9 M10
SK 9042.1 WI SK 9052.1 WI		SK/42 WI SK/52 WI		1	180 140	150 124	M10 x 16	28 60	31 8	5 50	9 M10
SK 9072.1 W0				2	180 	150 124	M10 x 18	28 60	31 8	5 50	9 M10
SK 9042.1 WII SK 9052.1 WII		SK/42 WII SK/52 WII	RLS	1	290 250	215 125	M12 x 20	38 80	41 10	5 70	8 M12
SK 9072.1 WI				1	290 250	215 170	M12 x 25	38 80	41 10	5 70	8 M12
SK 9042.1 WIII SK 9052.1 WIII		SK/42 WIII SK/52 WIII		1	290 250	250 125	M16 x 25	38 80	41 10	5 70	8 M12
SK 9072.1 WII SK 9082.1 WII SK 9086.1 WII				1	290 250	250 170	M16 x 25	38 80	41 10	5 70	8 M12
SK 9072.1 WIII			RLS	1	290 250	250 170	M16 x 25	42 110	45 12	10 90	8 M16
SK 9072.1 WIV SK 9082.1 WV SK 9086.1 WV				1	350 300	300 252	M20 x 30	65 140	69 18	15 110	8 M20
SK 9082.1 WI SK 9086.1 WI SK 9092.1 WI SK 9096.1 WI				1	350 300	250 236	M16 x 25	42 110	45 12	10 90	8 M16
SK 9082.1 WIII SK 9086.1 WIII SK 9092.1 WIII SK 9096.1 WIII			RLS	1	350 300	300 236	M20 x 30	65 140	69 18	15 110	8 M20
SK 9082.1 WIV SK 9086.1 WIV SK 9092.1 WIV SK 9096.1 WIV			RLS	3 ⇒∭ A	550 31 / A:	500 245 32	Ø 17,5	65 140	69 18	15 110	12 M20
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SK 02040 W0			2	120		75	61,5	M5 x 11	14 40	16 5	5 30	8 M5
SK 02040 WII			2	120		100	61,5	M8 x 11	16 40	18 5	4 32	8 M5
SK 02050 W0 SK 12063 W0 SK 12080 W0	SK 13050 W0 SK 13063 W0 SK 13080 W0 SK 33100 W0		2	90		75	70,5	M5 x 13	14 38,5	16 5	5 30	2 M5
SK 02050 WII SK 12063 WII SK 12080 WII	SK 13050 WII SK 13063 WII SK 13080 WII SK 33100 WII	RLS	2	120		100	74	M8 x 13	16 40	18 5	4 32	8 M5
SK 32100 WIII	SK 43125 WIII		2	120		100	113,5	M8 x 13	16 40	18 5	4 32	8 M5
SK 02050 WIII SK 12063 WIII SK 12080 WIII	SK 13050 WIII SK 13063 WIII SK 13080 WIII SK 33100 WIII		2	150		125	119,5	M8 x 13	24 50	27 8	5 40	8 M8
SK 32100 WI	SK 43125 WI		1	180	140	125	113,5	M8 x 13	24 50	27 8	5 40	8 M8
SK 42125 WIV			1	180	140	125	124	M8 x 13	24 50	27 8	5 40	8 M8
SK 32100 WII	SK 43125 WII	RLS	1	180	140	150	113,5	M10 x 8	28 60	31 8	5 50	9 M10
SK 42125 WI			1	180	140	150	124	M10 x 16	28 60	31 8	5 50	9 M10
SK 42125 WII		RLS	1	290	250	215	125	M12 x 20	38 80	41 10	5 70	8 M12
SK 42125 WIII			1	290	250	250	125	M16 x 25	38 80	41 10	5 70	8 M12

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Potentially explosive gas or dust atmospheres are found in various areas of industry and manual trade. These are mostly caused by oxygen mixing with ignitable gases or airborne or settled ignitable dust. Therefore, electrical and mechanical equipment for explosion-risk areas is subject to special national and international standards and guidelines. Explosion protection regulations are aimed at protecting persons and objects from potential explosion hazards. Integrated explosion protection indicates that explosion protection measures should be taken in a defined order:

- Rules for preventing the development of potentially explosive atmospheres
- Avoiding ignition of potentially explosive atmospheres
- Keeping the impact of an explosion within safe limits

Mechanical and electrical equipment is constructed with a view to avoiding ignition and/or limiting its impact. This is where explosion protection requirements are implemented.

The term ATEX which is frequently used for explosion protection consists of the first letters of an old French directive title: "Atmospheres Explosives". On the basis of this, the European Parliament issued EU directive 94/9/ EC in March 1994, equalizing the legal requirements for equipment and protective systems intended for use in potentially explosive atmospheres. This directive is also referred to as the "equipment directive" in order to distinguish it from the workplace directive 99/92/EC for companies with explosion-risk areas. As of 1 July, 2003, directive 94/9/EC for explosion-proof applications has been adopted exclusively and is mandatory throughout the EU. Basic safety and health requirements are met by drawing on harmonized standards, examples of which are listed below:

Standards for electrical equipment:

DIN EN 60 079 - 0 General requirements DIN EN 60 079 - 1 Flameproof enclosure "d" DIN EN 60 079 - 7 Increased safety "e" DIN EN 60 079 - 15 Non sparking "n" DIN EN 50281 - Combustible dust

Standards for mechanical equipment

Series of standards EN 13463 especially EN 13463-1 Basic method and EN 13463-5 Protection by constructional safety Directive 94/9/EC means that besides special motors, mechanical equipment and protective systems must also meet specific requirements. Furthermore, quality assurance was added as an additional safety measure. Every manufacturer of electrical EX equipment (Category 1 or 2) must submit to auditing. Auditing is conducted by a "Notified Body".

 \rightarrow cf. the Getriebebau NORD certificate at page A80.

"Equipment" and "Component"

Directive 94/9/EC defines "equipment" as "machines, apparatus...which, separately or jointly, are intended for the generation, transfer, storage, measurement, control and conversion of energy for the processing of material and which are capable of causing an explosion through their own potential sources of ignition". Therefore, all gear units and motors supplied by NORD for explosion protection are defined as equipment.

"Components" are defined as "any item essential to the safe functioning of equipment and protective systems but with no autonomous function".

The term "Equipment Group"

The ATEX directive distinguishes two equipment groups: Group I applies to equipment intended for use in mines, whereas group II applies to all other uses of equipment. Thus, for most applications, the EX protection declaration on the name plate begins with a "II", so that special features of Group I systems shall not be taken into consideration any further.

Equipment category (e.g.: 2G, 3G, 2D or 3D)

The equipment category indicates instantly whether the equipment is intended for use in gas atmospheres (G = gas) or dust atmospheres (D = dust). The choice of a category number is based on the zone defined for the operating environment of a gear motor. Here, it is important to consider whether the equipment is exposed to potentially explosive atmospheres

- infrequently (Zone 2 for gas, Zone 22 for dust),
- occasionally (Zone 1 for gas, Zone 21 for dust),
- continuously, for long periods or frequently (Zone 0 for gas, Zone 20 for dust)

As an exception, a Category 2D motor is also required for Zone 22 in the case of conductive dust, e.g. coal dust. For Zone 20 and Zone 0 environments, e.g. inside pipelines, electrical gear units are usually not available. This is a typical domain for other solutions such as compressedair technologies. This is also the reason why NORD does not supply any gear units for category 1.



Zone Categorization - What and Where

Zone categorization for combustible gases, vapours and mists

Zone 0:

The area where a potentially explosive atmosphere caused by a mixture of air with combustible gases, vapours or mists is present **continuously**, **for long periods or frequently**.

Zone 1:

The area where a potentially explosive atmosphere caused by a mixture of air with combustible gases, vapours or mists is likely to occur **occasionally** during normal operation.

Zone 2:

The area where a potentially explosive atmosphere caused by a mixture of air with combustible gases, vapours or mists is **unlikely to occur** or only occurs **for short periods** during normal operation.

Zone categorization for combustible dust

Zone 20:

The area where a potentially explosive atmosphere in the form of a cloud made up of combustible dust contained in the air is present **continuously, for long periods or frequently**.

Zone21:

The area where a potentially explosive atmosphere in the form of a cloud made up of combustible dust contained in the air can occur **occasionally during normal operation**.

Zone 22:

The area where a potentially explosive atmosphere in the form of a cloud made up of combustible dust contained in the air is **unlikely to occur** or only occurs **for short periods** during normal operation.

Protection type

Following the equipment category and the risk category, the lower case characters in the EX protection declaration indicate the exact protection types of a piece of equipment. The main protection options to be considered in the case of drives are enclosures and construction measures. Depending on the danger zone and equipment category, different solutions are premissible and possible.

Protection type

Electrical:	Short reference:
Flameproof enclosure	d
Increased safety	е
Non sparking	n
Mechanical:	Short reference:
Constructional safety	C
Liquid immersion	k

Constructional safety, e.g. "c"

A gear unit usually becomes an EX-proof system on account of the constructional safety measures incorporated in its design. The requirements for technical components are set out in the highly informative EN 13463-5 which describes protection type "c". Some drive manufacturers tend to be sceptical as to whether liquid immersion according to protection type "k" is a suitable alternative form of explosion protection for drives. A risk of sparks cannot be excluded, e.g. in cases of breakage, at least within systems that are only partly immersed in oil.

Increased safety (Ex e)

For motors falling into equipment categories 2G and 3G, i.e. EX zones 1 and 2, sparks and impermissible temperatures are avoided in accordance with protection type "e" (Increased safety). This is achieved by constructing fans and fan hoods, as well as by proper storage and terminal boxes. One of the characteristic features of such arrangements is the low surface resistance of plastic fans (depending on the fan circumference speed). There are considerable air gaps between rotating parts and large air and creepage distances in the terminal box.

When choosing a model, you have to be aware that drives falling under protection type "e" often have less output power than the corresponding standard motors. These motors have different windings to comparable motors designed for non Ex areas. In practice, this results in lower performance levels. These motors are usually used for temperatures up to **Temperature class T3**.

Flameproof enclosure (Ex d and Ex de)

Protection type "de" offers a different kind of protection: These motors are constructed so as to bear up against explosions in the internal space of the motor and prevent a transmission of the explosion to the surrounding atmosphere. Such motors are fitted with stronger walls to contain the excess pressure developing inside them during ignition. These systems also have fans of protection type "e".

The drives offer the same rated power as non-EX-proof motors and can normally be used in the same way as gear motors with protection type "e" in Zone 1 and 2. These motors are frequently used for inverter operations, brakes, encoders and/or when a very high degree of safety is required. Typically, the flameproof motors supplied by NORD meet the requirements of **Explosion group IIC** and **Temperature class T4**.



Non-sparking (Ex n)

Motors falling under protection type "n" can only be used in Zone 2, i.e. for category 3G equipment. These simple, non-sparking systems resemble those of protection type "e" in design, but do not achieve the same protection levels. Instead, they have the same output power as the corresponding

standard motors without explosion protection. These motors can be operated with the inverter if the motor and the inverter have been accepted in conjunction. Nonsparking motors are usually used up to **Temperature class T3**.

Explosion		Ignition temp	erature classes	
group	T1: > 450°C	T2: 300°C450°C	T3: 200°C300°C	T4: 135°C200°C
I	methane			
IIA	acetone ethane benzene carbon monoxide methanol propane	n-amylacetate ethyl alcohol n-butanen-butyl alcohol cyclohexane	petrols diesel fuel oils n-hexane spirits of turpentine	acetaldehyde
IIB	dimethyl aether	ethylene	hydrosulphide	ethyl aether
IIC	hydrogen	acetylene		

Gas and vapour classification for explosion protection

For short-time atmospheres falling into temperature classes T5 (100 $^{\circ}$ C ...135 $^{\circ}$ C) and T6 (85 $^{\circ}$ C...100 $^{\circ}$ C), there is usually no electric drive technology available.

Explosion groups for motors (IIA, IIB or IIC)

Gases, vapours and mists are differentiated by so-called explosion groups: Group I comprises gases occurring in mining, while Group II covers all other applications; these are subdivided into Groups IIA, IIB and IIC. Protection requirements for drives are lowest for A, highest for C. There are different specifications for permissible current and voltage values in intrinsically safe circuits as well as for gap sizes in case of flameproof enclosures. For gear motors falling into explosion group IIA, even a gap width of more than 0.9 mm is allowed. For NB equipment, gaps must not be wider than 0.5 to 0.9 mm. Group IIC equipment, on the other hand, with gaps of less than 0.5 mm, is even suitable for atmospheres containing hydrogen and other particularly hazardous gases.

Explosion groups for gear units (IIA, IIB or IIC)

Non-electrical equipment is also assigned an explosion group in categories 1, 2 and 3. For this, the chargeability of non-conductive plastic components and the thickness of the coating is of particular importance.

Temperature specification, e.g.: 125°C for dust and temperature class T1 to T6 for gases

In the case of dust EX drives, the EX protection declaration on the name plate ends with the specification of a maximum surface temperature for the equipment in degrees Celsius. Depending on the drive manufacturer, a standard limit value could be 120°C or 125°C: For most dust-air-mixtures in industry, these temperatures are sufficient and compatible with operations.

Gases are grouped in temperature classes. The figure above shows the exact temperature ranges and a classification of frequently occurring gases into these classes and into explosion groups. However, unlike when you use dust EX equipment, when there is a danger of a gas explosion, ignition hazards within the appliances must be taken into consideration in addition to the surface temperature

ATEX Documentation

There are high standards for documentation in explosion protection: The very elaborate operating and maintenance instructions must be included in the delivery and are provided at least in the language used by the manufacturer. If the machine designer and/or operator use different languages, additional versions of the documentation must be provided in these languages. In individual cases, i.e. for special mounting positions, additional documentation is necessary. At the time of the editorial deadline for this catalogue, operating and maintenance instructions were available in the following languages: German, Danish, English, Finnish, French, Greek, Italian, Dutch, Polish, Portuguese, Swedish, Slovak, Spanish, Czech, Hungarian, Russian.

If there are no operating and maintenance instructions, the drive must not be put into operation. You can request the operating and maintenance instructions from NORD or download them from www.nord.com on the internet..





An example of a name plate for a gear unit:



An example of a name plate for a motor:

Jun RD	Getriebebo D-22934	iu NO Barç	IORD GmbH & Co. KG gteheide EN 60034 (H)							
	Type Sł	<	8	30 S	5/4	2G TF 양				
	3^{\sim} Mot	•	Mot.	Nr.	: 33	<u>ة 8091170/0548/005</u>				
	102 Th.Cl. F IP55 S1									
	PTB 02 ATEX 3119/01									
0,	55 kW		1385)	1/r	min 230/400 V△/Y				
	242/380-	-42	0VA	./Y		2,77/1,60 A 🔍				
50 Hz	COSØ	0,71	1			TMS, bei Angabe der t _Æ Zeit, nur mit zugelassenem PTC-Auslösegerät nach				
⟨E ∦ Ⅱ 2G	EExe II	T1	T2	Т3	Τ4	TMS, with indication of the t _A time,				
IA/IN:	tE [s] :	30	30	29		after				
Baujahr :	20	05				(Ex) II (2) G, PTC DIN 44082-M110 t _A 35s				



The NORD ATEX product range

All NORD gear units are available in versions complying with ATEX. Exceptions are variable-speed friction wheel gear units and Minibloc worm gear units for category 2. In this way, there is a suitable gear unit for every application. The table at the bottom of this page gives an overview. Make choosing easy. Download the application form (figure page A81 in the appendix) from www.Nord.com/ ATEX and send it to your customer service representative. We will look for the right drive for you. We are also excellently prepared for any special requests. Just ask us.

Available options

Category	Protection type	TF	2TF	тw	RLS	60Hz	T>40°C <60°C	Protection canopy	2.Shaft end	Additional flywheel mass	External fan
2G	de	S	\checkmark	-	-	√	✓	✓	-	-	\checkmark
2G	е	✓	\checkmark	-	-	✓	✓	\checkmark	-	-	-
3G	n	✓	-	-	-	✓	✓	\checkmark	-	-	-
2D	-	~	-	-	-	√	✓	\checkmark	✓	-	-
3D	-	✓	~	-	~	√	✓	✓	✓	-	✓

Category	IP 65	IP 66	3D / 2D extra	SH Standstill heating	IG	SOSP	Pole- changing	Brake	VIK	Frequency inverter operation	Terminal box inverter	Operating with soft start appliance possible
2G	~	✓	✓	✓	\checkmark	✓	✓	✓	✓	✓	?	\checkmark
2G	~	-	-	-	-	~	-	-	~	-	-	-
3G	-	-	-	-	-	✓	-	-	-	✓	-	-
2D	-	S		-	-	✓	-	✓	-	~	-	-
2D	-	-		-	~	✓	✓	✓	✓	\checkmark	✓	?

?

s = Included in standard version

Yes, optionally available for most sizes

Not, not an available optionUpon request

TF 2TF	= =	3 Temperature sensors (thermistors) 2x3 Temperature sensors for warning and switch-off
RLS	=	Backstop
60Hz	=	Motor suitable for 60Hz mains frequency
T>40°C<60°C	=	Surrounding temperature
Protection canopy	=	Protection from rain and falling objects for version with fan cover on top
2.Shaft end	=	for mounting a hand wheel
Additional flywheel mass	=	for a softer start
External fan	=	for cooling the motor when frequencies are < 20 Hz
IP 65	=	optimal protection from foreign matter (prescribed in cases of conductive dust)
IP 66	=	strong protection from dust and water entering the unit
3D / 2D	=	suitable for category 3D and 2D
SH	=	Standstill heating
IG	=	Incremental encoder
SOSP	=	Special voltage
pole-changing	=	pole-changing motors
brake	=	designed as holding or working brake
VIK	=	Design acc. to the Association of the Energy and Power Generation Industry, registered society

Available gear unit types

Gear unit type	Series	Torque from - to [Nm]	available in Cat.2	available in Cat.3
Helical gear unit	Block	46 - 23.000	\checkmark	√
Helical gear unit	Nordbloc	41 - 3.200	\checkmark	√
Helical gear unit	Standard	38 - 658	\checkmark	√
Parallel shaft gear unit	Block	128 - 90.000	\checkmark	√
Parallel shaft gear unit	Nordbloc	73 - 370	\checkmark	√
Bevel gear unit	Block	45 - 50.000	\checkmark	√
Helical worm gear unit	Block	37 - 3.094	\checkmark	\checkmark
Worm gear unit	Universal	30 - 160	\checkmark	√
Worm gear unit	Minibloc	10 - 283		✓
Variable speed belt gear unit	RGAE	4- 690	\checkmark	\checkmark



CERTIFICATE



Annex 1 of July 18, 2006

Getriebebau NORD-Gruppe

bebau NORD GmbH & Co. KG Neeel Strate 1, D-22941 Bardsheide

ice of reducers, geared ebau NORD GmbH

denberg, F-68800 Vixux Thann, BP 67 F-68802 Than Georges Clemenosau, F-93421 Villepinte Cedex

tion, sales and service of reducers, geared motors, frequency inverters and accesso

NORD AANDRUVINGEN NED. B.V. Vollstraat 12, NL-2181 HA Hillegom

NORD Drivsystem AB Pyttargatan 277, S-194 02

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Cert

ading the b



Conformity explanation



MU \sim U.Küchenmeister, Managing Director

i.V. Boucher i.V. Dr. B. Bouché, Technical Manager



Explosion protection / ATEX Requirements What are the details?

Company Street Town Contact Telephone Telefax E-mail							Rudolf-Diesel-Strasse 1 D-22941 Bargteheide Telefon +49(0)4532/401-0 Telefax +49(0)4532/401-254 Email: ATEX@nord-de.com www.nord.com							
Type (incl. Op	otions, see	e catalog	jue) :	SK									
Quantity	1:									AT	EX Ga	S		
Mountin	g:									Zone 1 🐼 II 2	G		(fb≥1,01)	
Ratio i:										Zone 2 🕢 II 3	G			
Dutput s	shaft sp	peed N ₂ :		1			min-1			EEx e II T3	(or	ily DOL	operation)	
Output s	shaft to	rque M ₂ :		1			Nm			EEx de IIC T4		(norma	Ily via IEC	
VFD	peratio	n, 2 data	each for	N2 and M	M2 at : min	. Hz and m	ax. Hz)			ATE	EX Du	st		
Output external load FA		kN, F _R	5	kN, lever		mm		Zone 21 😥 II 20	D (fb ≥ 1,0	0 & IP6X !)			
nput external load F _A		kN, F _R		kN, lever		mm		Zone 22 🔂 II 31	D					
nput po	wer P ₁	1				kW	(rate	d/abs.)		non-conductive	dust			
nput sp	eed N ₁	i F				min-1				conductive dust		(M	otor II2D I)	
Mode of operation :			(Standard : S1)					Options						
Ambient	mbient temperature : min.		min.	1	°C max.			°C	TF PTC thermistors					
	1	DOL ope	ration							RD drip-proof fa	ancowl			
		VFD ope	ration	(ATI	EX Gas or	nly EEx de	IIC T4 wit	th TF)		F auxiliary fan				
	Freq	. range : r	nin.	T.	Hz	max.		Hz		SO 1/2 syntheti	c oil			
	≤ 50	Hz consta	ant torqu	e and >	50 Hz con	stant powe	r		SO 3/4 food-grade oil					
87 Hz - curve ≤ 87 Hz constant torque								SO 5/6 biologically degradable oil						
Special requirements								Paint finish 3.2 oder 4						
resp. further information on the driven machine / application :							IP66 Motor							
									RLS in bevel gearbox					
										VIK Motor				
									Brakemotor					
D Do	cumer	tation in a	dditiona	I languag	ges see B	MC								
Docume	entation	n, O&M m	anuals :	Please c	heck boxe	s for requir	red langu	ages.	//54				-	
	Concernant of the	DE	DK F	ES FI	FR	GB GR	HU	IT	NL	PL PT	RU	SE	SK	

ATEX Inquiry form VU Edition 9 GB xIs

