

B 5010 – en

DuoDrive geared motors

Manual with installation instructions





Read document and keep for future reference

Read this document carefully prior to performing any work on the device and putting it into operation. It is essential to read and observe the instructions in this document. They serve as the prerequisite for smooth and safe operation and the fulfilment of any warranty claims.

Contact Getriebebau NORD GmbH & Co. KG if your questions regarding the handling of the device are not answered in this document or if you require further information.

The German version of this document is the original. The German document is always decisive. If this document is available in other languages, these will be translations of the original document.

Keep this document in the vicinity of the device so that it is available if required.

Use the version of this documentation that is valid for your device at the time of delivery. You can find the currently valid version of the documentation under www.nord.com.

Please also note the following documents:

- Catalogue for geared motor (G5010),
- Product documentation for components which are attached or provided.

Documentation

Designation: **B 5010**
 Part no.: **6055102**
 Series: Gear units and geared motors
 Type series:
 Gear unit types: **Drive unit consisting of gear unit and synchronous motor**
NORD DuoDrive SK EVO 80-X to SK EVO 200-X
 Power number: X = 1...3

Version list

Title, Date	Order number / Version	Remarks
	Internal code	
B 5010 , March 2021	6055102 / 1221	-
B 5010 , January 2022	6055102 / 0222	<ul style="list-style-type: none"> • General corrections
	33199	
B 5010 , May 2022	6055102 / 1822	<ul style="list-style-type: none"> • Extension of the motor data
	33837	
B 5010 , June 2024	6055102 / 2624	<ul style="list-style-type: none"> • Revision of assignments to frequency inverters • Supplementation of screw tightening torques • Adjustment of disposal notes • General corrections
	38656	

Table 1: Version list B 5010

Copyright notice

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1 Safety information

1.1 Intended use

The geared motor is used to generate, transmit and transform rotary movements. It is intended for use as a drive system in commercially used plant and machinery.

The drive is exclusively intended for operation with frequency inverters.

The drive must not be operated until it has been established that the plant or machinery can be safely operated with the drive. If drive operation, drive fault or failure could result in a risk to persons, suitable protective measures must be provided.

All applicable health and safety requirements must be met. In particular, the Machinery Directive 2006/42/EC, the TR CU 010/2011 and the TR CU 020/2011 as well as the EN 60204 must be especially observed in the relevant areas of application.

The drive may not be used in environments in which an explosive atmosphere can occur.

The drive may only be used as intended and according to the information in this manual with the installation instructions. Pay particular attention to section 2.4 "Requirements for the use of the drive".

The motor has been designed with at least protection class IP55 (see name plate for protection class). The drive can be installed in dusty or humid environments. Depending on the conditions of use and the environment, additional protective measures may be necessary.

1.2 Do not make any modifications.

Unauthorised changes and the use of spare parts and additional equipment not purchased from or recommended by NORD may cause fire, electric shock and injury.

Do not change the original coating / paint or apply additional coatings / paints.

Do not make any structural modifications to the product.

1.3 Only use in perfect condition

Only operate the drive if it is in technically perfect condition and if all associated protective devices are present and functional.

Take care that no components are bent, no insulation distances are changed and that no electrical components are mechanically damaged or destroyed during transport or handling.

1.4 Performing inspection and maintenance work

Due to lack of maintenance and damage, malfunctions may occur which can result in personal injury.

- Carry out all servicing and maintenance work at the specified intervals.
- Also note that servicing is necessary after long storage periods prior to commissioning.
- Do not operate damaged drives. The drive must not have any leaks.

1.5 Personnel qualification

All transport, storage, installation, commissioning and maintenance work must be carried out by qualified specialist personnel.

Qualified specialist personnel are persons who have the training and experience to recognise and avoid any possible risks.

1.6 Safety for particular activities

1.6.1 Check for transport damage

Transport damage may cause malfunctions of the drive, which may cause personal injury. Oil which escapes due to leaks may cause a slipping hazard.

- Check the packaging and the drive for transport damage.
- Do not commission the drive if it has been damaged during transport.

1.6.2 Hazards when lifting

The drive is heavy. Persons may be severely injured by falling or swinging drives. Therefore also observe the following information:

- Cordon off a wide area around the hazard area. Take care that there is adequate space to avoid swinging loads.
- Never stand under suspended loads.
- Use adequately dimensioned means of transport which are suitable for the purpose. The weight of the drive can be obtained from the name plate.
- Only use the attachment points provided.
- Only lift the drive by the eye bolts which are provided. The eye bolts must be fully screwed in. Only pull on the eye bolts vertically, never cross-wise or at an angle. Only use the eye bolts to lift the drive without other components. The eye bolts are not designed for lifting the motor with attachments.

1.6.3 Safety information for installation and maintenance

Before starting any work, disconnect the drive from the power supply and secure it against accidental switch-on. Let the drive cool down.

Damaged or defective components, attachment adapters, flanges and covers may have sharp edges. Wear work gloves and work clothing.

The motor contains strong magnets. Dismantling without specialist knowledge and suitable aids may lead to crushing of hands. Only trained personnel is allowed to dismantle the motor.

1.7 Hazards

1.7.1 Hazards due to electric shock

An electric shock when touching live components may lead to severe injuries or death.

- Before switching on the voltage supply, ensure that all associated covers are closed and all associated protective devices are installed and functional.
- Even if the drive has been disconnected from the supply voltage, live components and power connections must not be touched immediately, because of possible charged capacitors. Observe the applicable information signs located on the drive. With the motor disconnected from the power supply, the drive can still rotate and possibly generate hazardous voltage.
- Installation of the drive and any work on the drive may only be carried out by qualified personnel (qualified electricians) in strict compliance with the instructions provided in this manual.
- Before starting any work on the drive, stop the motor and disconnect it from the voltage supply by disconnecting all poles. A motor standstill is not identical to electrical isolation from the mains. When the motor is at a standstill, e.g. due to the electronic block of a connected frequency inverter or a jammed drive unit, the connection terminals and supply cables may carry dangerous voltage.
- In addition to the main power circuits, also take any additional or auxiliary circuits into account.
- Prior to any work on the drive, observe the 5 safety rules:
 1. Disconnect
 2. Secure against switching on
 3. Check for no voltage
 4. Earth and short circuit
 5. Cover or cordon off adjacent live components

Do not reverse these measures until the work on the drive has been completed.

1.7.2 Hazards due to rotating parts

Rotating parts cause a risk of entanglement. This may lead to severe injuries such as crushing or strangling.

- Provide contact protection. In addition to shafts, this also applies to driven elements such as belt drives, chain drives, shrink discs and couplings. Take possible run-on of the machine into consideration for the design of protective devices.
- Do not operate the drive without covers or hoods.
- Secure the drive to prevent accidental activation during installation and maintenance work.
- For test operation do not switch on the drive without an installed driven element or secure the motor shaft key.
- Also observe the safety information in the operating and installation instructions provided by manufacturers of components supplied.

1.7.3 Hazards due to unexpected movement of driven machinery

The motor shaft may start moving under certain conditions, e.g. when the supply voltage is switched on or a holding brake is released. This way, the machinery driven by the drive can start to move unexpectedly. This may result in severe injuries, also for third parties.

- Before switching on or releasing a brake, first secure the relevant hazard zone of the machinery and make sure that there are no persons in the hazard zone.

1.7.4 Hazards due to loose parts

Loose parts may cause injuries to persons during transport, installation work or operation.

- Fasten or remove loose parts.
- Secure or remove free keys on the motor shafts.

1.7.5 Hazards due to high or low temperatures

The drive may heat up to 90°C during operation. Touching hot surfaces or contact with hot oil may result in burns. At very low ambient temperatures freezing may occur on contact.

- Only touch the drive when wearing gloves after operation or at very low ambient temperatures.
- Before starting maintenance work, allow the drive to cool down sufficiently after operation.
- Provide a contact guard if there is a risk that persons may touch the drive when it is in operation.
- Bursts of hot oil mist may be emitted from the pressure vent screw during operation. Provide a suitable guard so that persons cannot be injured by this.
- Do not place any flammable materials on the drive.

1.7.6 Hazards due to lubricants and other substances

Chemical substances which are used with the gear unit may be toxic. Eye injuries may result if these substances enter the eyes. Lubricants and adhesives may cause skin irritation.

Oil mist may escape when vent screws are opened.

Due to lubricants and conservation materials, gear units may be slippery and slip out of the hands. There is a slipping hazard from spilled lubricants.

- When working with chemical substances wear chemical-resistant gloves and work clothing. Wash your hands after working.
- Wear protective goggles if there is a possibility of splashed chemicals, for example when filling oil or during cleaning work.
- If chemicals enter the eyes, rinse with large amounts of cold water immediately. Consult a physician in case of symptoms.
- Observe the safety data sheets for the chemicals. Keep the safety data sheets in the vicinity of the gear unit.
- Collect spilled lubricants immediately with a binding agent.

1.7.7 Hazards due to noise

Some motors or attached components may cause hazardous noise levels during operation. Wear hearing protection if work has to be carried out close to such drives.

1.8 Explanation of markings

DANGER

Indicates an immediate danger, which may result in death or very serious injury if it is not avoided.

WARNING

Indicates a dangerous situation, which may result in death or very serious injury if it is not avoided.

CAUTION

Indicates a dangerous situation, which may result in minor injuries if it is not avoided.

NOTICE!

Indicates a situation, which may result in damage to the product or its environment if it is not avoided.

Information

Indicates hints for use and especially important information to ensure reliability of operation.

2 Description of the drive

2.1 Drive type and type designations

Gear unit type / type designations
NORD DuoDrive, drive unit consisting of helical gear unit and synchronous motor SK EVO 80-X to SK EVO 200-X

Table 2: Drive type and type designations

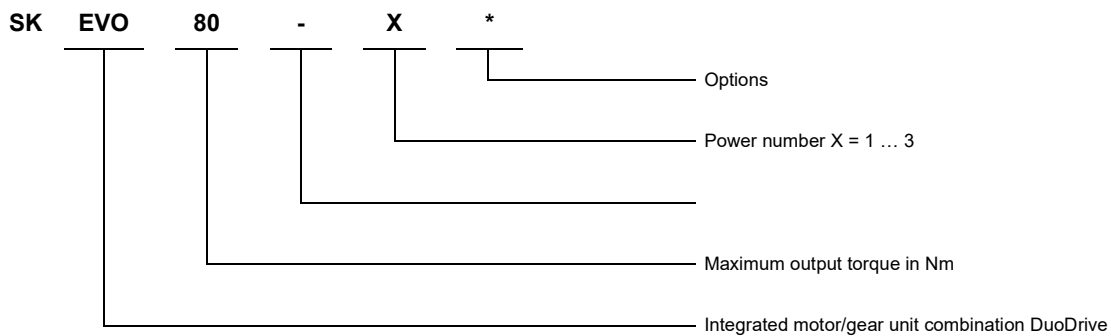


Figure 1: Explanation of type designation

Abbreviation	Description
A	Hollow shaft version
W	Fastening element
D	Torque support
DR	Pressure vent
EA	Hollow shaft with geared hub profile/splined hollow output shaft
F	B5 output flange / block flange
H	Covering cap
H66	IP66 cover
L	Solid shaft on both sides / solid output shaft on both sides
M	GRIPMAXX™
S	Shrink disc
SO1	Synthetic oil ISO VG 220
V	Solid shaft version / solid shaft or plug-in shaft/solid output shaft
VI	Viton radial shaft seals
VL	Reinforced bearings
Z	B14 output flange

Table 3: Gear options

Abbreviation		Description	Motor option with plug base	Motor option with terminal box
BRE		IP66 holding brake		x
HAN10E	(MS31/ MS32/ MS31E/ MS32E)	Harting connector		x
HANQ8	(MS21)	Harting connector		x
IG	(IG6/ IG61P8/ IG62P5/ IG62P8)	Kübler incremental encoder		x
IP55		Protection class IP55	x	
IP66		Protection class IP66	x	
IP69K		Protection class IP69K		x
M23	(MSR/ MSRVA)	Hummel M23 round plug		x
MGZ	(MG/ MGP/ MGHP/ MGH)	Magnetic encoder - Contelec incremental encoder		x
Lacquered		Painting	x	
TF		Temperature sensor, PTC resistor	x	
tupH		nsd tupH surface treatment		x

Table 4: Motor options

2.2 Name plate

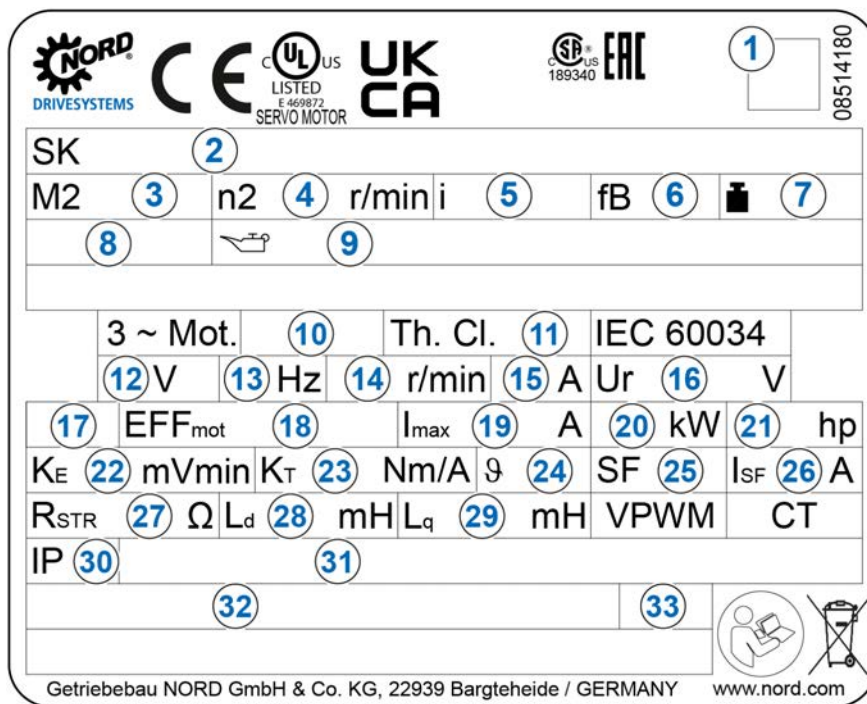


Figure 2: Name plate

- | | | | |
|----|---|----|---|
| 1 | Matrix barcode | 18 | Motor efficiency |
| 2 | NORD gear unit type | 19 | Maximum permitted current |
| 3 | Rated torque | 20 | Nominal power |
| 4 | Nominal speed | 21 | Nominal horsepower |
| 5 | Gear unit speed ratio | 22 | Voltage constant |
| 6 | Operating factor | 23 | Torque constant |
| 7 | Weight according to ordered version | 24 | Reluctance angle |
| 8 | Installation position | 25 | Service factor |
| 9 | Installation position, lubricant type, viscosity and quantity | 26 | Service factor current |
| 10 | Operating mode | 27 | Resistance of windings |
| 11 | Thermal class of insulation system | 28 | Axial inductance |
| 12 | Stator voltage | 29 | Radial inductance |
| 13 | Frequency | 30 | IP protection class |
| 14 | Nominal speed | 31 | Brake, braking torque, voltage, voltage rectifier |
| 15 | Nominal current | 32 | Serial number |
| 16 | System voltage | 33 | Year of manufacture |
| 17 | Efficiency class | | |

2.3 Description

2.3.1 Rotary encoders (option: IG, MGZ)

The rotary encoders' zero signals are pre-set with a specific position with regard to the phase voltages. Please contact the NORD Service, in case you need further information on the operation with external inverters.

Incremental encoder with zero track (option: IG)

The incremental encoder is installed and fixed in the housing. The zero pulse is adjusted electronically.

Magnetic encoder with zero track (option: MGZ)

The magnetic encoder is installed on the outside of the housing – depending on the option at the B bearing cover or brake housing. The zero pulse is adjusted electronically.

2.3.2 Brake (option: BRE)

This option is equipped with a spring-loaded brake. This is a holding brake (safety brake) with emergency brake features that is activated in case of voltage drop.

The brake cannot be adjusted. Information on this can be found in the operating instructions of the brake.

2.4 Requirements for the use of the drive

2.4.1 Ambient conditions

Installation altitude: maximum 1000 m

Ambient temperature: -20°C to +40°C

The motor connection cables and the cable glands must be suitable for temperatures above 90°C.

2.4.2 Frequency inverters and encoders

The motors must only be operated with suitable frequency inverters.

For energy-efficient operation, the frequency inverter must detect the position of the rotor. For this, different options with and without an encoder are possible, see also [G5010](#).

The drive was qualified for operation with link circuit inverters according to DIN EN 60034-18-41 (2014).

Please also observe the operating instructions for the frequency inverter in use.

The insulation system used by NORD consists of suitable varnished copper wire, phase insulation, homogeneous impregnation and groove lining as insulation against earth. The insulation system in the standard version is designed for the increased requirements of operation with link circuit inverters.

The maximum permissible FI input voltage is 500 V +10%. Link circuit voltages in excess of 750 V DC are not permissible. Peak voltages due to the system of inverter, cable and motor must not exceed the following values when the motor is warm due to operation.

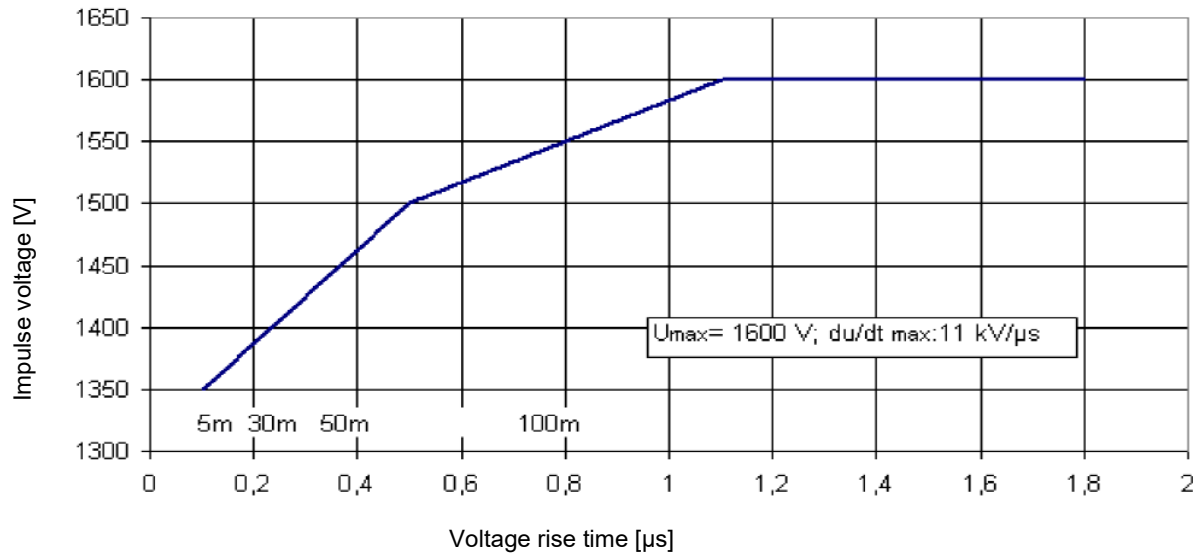


Figure 3: Permissible impulse voltages depending on the voltage rise time

If the values are outside of the permissible range, du/dt or sine wave filters may be used. Observe the additional voltage drop.

The cable lengths shown in the diagram are for guidance only and may deviate depending on the specific conditions.

2.4.3 Geared motors to frequency inverters assignment

The following overview shows the motor data (type plate data) of the geared motors.

Motor data										
Type	M_N [Nm]	P_N [kW]	n_N [rpm]	f [Hz]	I [A]	η	J_{rot} [kgm ²]	m [kg] ¹⁾	M_{max} [Nm]	k_T [Nm/A]

Notice: A comma counts as a full stop and signifies a decimal place.

SK EVO 80-1	1,60	0,35	2100	140	0,88	89,1	0,00019	17,0	3,20	1,82
		0,50	3000	200	1,25	90,6	0,00019	17,0	3,20	1,28
SK EVO 80-2	3,20	0,70	2100	140	1,61	92,5	0,00038	17,8	6,40	1,99
		1,00	3000	200	2,30	93,3	0,00038	17,8	6,40	1,39
SK EVO 80-3	4,80	1,05	2100	140	2,35	93,6	0,00057	18,5	9,60	2,04
		1,50	3000	200	3,38	94,3	0,00057	18,5	9,60	1,42
SK EVO 200-1	5,00	1,10	2100	140	2,41	94,6	0,00090	30,0	10,00	2,07
	4,80	1,50	3000	200	3,36	95,0	0,00090	30,0	9,60	1,43
SK EVO 200-2	6,84	1,50	2100	140	3,41	94,6	0,00110	31,0	13,68	2,01
	7,00	2,20	3000	200	5,00	95,0	0,00110	31,0	14,00	1,40
SK EVO 200-3	10,00	2,20	2100	140	4,77	95,1	0,00176	33,5	20,00	2,10
	9,55	3,00	3000	200	6,55	93,9	0,00176	33,5	19,10	1,46
SK EVO 200-4	13,64	3,00	2100	140	6,24	94,2	0,00176	33,5	20,00	2,19

1) Mass of the entire system (geared motor)

Motor data											
Type	P_N [kW]	k_E [mV/rpm]	U [V]	U_i [V]	I_{max} [A]	ISF	$\cos \varphi$	LD [mH]	LQ [mH]	U1-U2 [Ω]	Reluctance angle [°]

Notice: A comma counts as a full stop and signifies a decimal place.

SK EVO 80-1	0,35	139	325	292	1,76	1	0,92	81,90	122,7	13,10	15
	0,50	97	325	292	2,50	1	0,92	40,10	60,10	6,55	15
SK EVO 80-2	0,70	139	320	291	3,22	1	0,91	41,10	61,80	4,68	15
	1,00	97	323	292	4,60	1	0,91	20,20	30,40	2,51	15
SK EVO 80-3	1,05	140	314	294	4,70	1	0,92	27,30	40,90	2,64	15
	1,50	98	314	293	6,76	1	0,92	13,30	19,90	1,44	15
SK EVO 200-1	1,10	140	316	295	4,83	1	0,93	25,20	45,70	1,66	24
	1,50	101	325	302	6,72	1	0,92	12,99	23,57	1,07	24
SK EVO 200-2	1,50	142	304	298	6,82	1	0,92	20,50	33,20	1,21	24
	2,20	100	307	300	10,00	1	0,92	10,17	16,48	0,62	24
SK EVO 200-3	2,20	144	315	303	9,54	1	0,95	11,20	21,30	0,60	24
	3,00	102	312	305	13,10	1	0,91	5,54	10,54	0,34	24
SK EVO 200-4	3,00	144	318	303	9,54	1	0,95	11,20	21,30	0,60	24

Table 5: Motor data

Operation with NORDAC frequency inverters

When operating the geared motor on a **NORDAC frequency inverter**, use the motor data listed in the corresponding motor data sheet to parameterise the motor data. The motor data sheet is available from NORD or can be requested from NORD.

The following assignments of the geared motors to the suitable **NORDAC ON+**, **NORDAC LINK**, **NORDAC PRO** and **NORDAC FLEX** frequency inverters apply to nominal operation. Deviating operating conditions require planning and, if necessary, an adjustment of the assignment to the frequency inverter.

Assignments to the frequency inverters from Getriebebau NORD GmbH & Co. KG		
Type	P _N [kW]	Frequency inverter assignment

Notice: A comma counts as a full stop and signifies a decimal place.

SK EVO 80-1	0,35	-370-340- -550-340-
	0,50	-550-340-
SK EVO 80-2	0,70	-750-340-
	1,00	-111-340-
SK EVO 80-3	1,05	-111-340-
	1,50	-151-340-
SK EVO 200-1	1,10	-111-340-
	1,50	-151-340-
SK EVO 200-2	1,50	-151-340-
	2,20	-221-340-
SK EVO 200-3	2,20	-221-340-
	3,00	-301-340-
SK EVO 200-4	3,00	-301-340-

Table 6: Geared Motor to frequency inverter assignment

2.4.4 Interference emission and resistance to interference

NORD motors comply with the EU Directive 2014/30/EU. Assembly or installation work must not cause impermissible interference emissions. Resistance to interference must still be given.

Interference emissions

Great differences of torque (e.g. when driving a piston compressor) induce a non-sine wave motor current, whose harmonics can cause an impermissible effect on the mains and therefore impermissible interference emissions.

With supply by frequency inverters, various strengths of interference are produced according to the design of the frequency inverter (type, interference suppression, manufacturer).

Always observe the EMC information provided by the inverter manufacturer. If a shielded motor supply cable is recommended by the manufacturer, the shielding is most effective if a large area is electrically connected to the metal terminal box of the motor (with a metal EMC cable gland).

For motors with integrated sensors (e.g. thermistors) interference voltages due to the inverter may be produced in the sensor cables.

Resistance to interference

For motors with integrated sensors (e.g. thermistors) the operator must ensure adequate immunity to interference by the selection of a suitable sensor cable (possibly with screening, with connection as for the motor supply cable) and evaluation device.

Before commissioning, observe the information and instructions given in the operating instructions for the inverter and all other instructions.

3 Transport, storage, assembly

3.1 Transporting the drive

WARNING

Hazard due to falling loads

- The thread of the eye bolt must be fully screwed in.
- Do not pull on the eye bolt at an angle.
- Note the centre of gravity of the motor.

Use every eye bolt attached to the drive for transport. Do not attach additional loads. The eye bolts are not designed for lifting the motor with attachments.

Transport the drive with care. Impacts to the free ends of shafts may cause internal damage to the gear unit.

Use suitable aids such as cross-beams or similar to facilitate attaching or transportation of the drive.

3.2 Short-term storage

For storage of less than 9 months, observe the following:

- Store the drive in mounting position M1 or M4 (see chapter 7.1 "Versions and mounting position"). Secure the drive against falling.
- Lightly grease bare metal housing surfaces and shafts.
- Store the drive in a dry space, relative humidity less than 60%.
- Storage temperature -5°C ... $+50^{\circ}\text{C}$, without large fluctuations.
- Do not expose the drive to direct sunlight or UV light.
- There must be no aggressive, corrosive substances (contaminated air, ozone, gases, solvents, acids, alkalis, salts, radioactivity etc.) in the immediate vicinity.
- The drive must not be exposed to vibration or oscillation.

3.3 Long-term storage

Under certain conditions, storage of 2 to 3 years is possible. The specified storage duration is for guidance only. The actual storage duration depends on the local conditions.

Gear units can be supplied prepared for long-term storage. The gear units are completely filled with lubricant, have VCI corrosion protection agent mixed with the gear oil or are filled with small quantities of VCI concentrate. The adhesive label on the housing shows the respective information.

Conditions of the gear unit and storage area for storage period of more than 9 months prior to commissioning:

- Store the gear unit in the mounting position (see chapter 7.1 "Versions and mounting position"). Secure it against falling.
- Repair damages to the coating. Check if a corrosion protection agent has been applied to the flange bearing surfaces and the shaft ends. If required, apply a suitable corrosion protection agent to the surfaces.
- Check if the sealing cord in the vent screw is in place. It must not be removed during storage.
- Store the gear unit in a dry space. With a relative humidity less than 60%, the gear unit can be stored for up to two years; with a relative humidity less than 50%, storage of up to three years is possible.

- Storage temperature -5°C ... +40°C, without large fluctuations
- In tropical regions, protect the gear unit against damage by insects.
- Do not expose the gear unit to direct sunlight or UV light.
- There must be no aggressive, corrosive substances (contaminated air, ozone, gases, solvents, acids, alkalis, salts, radioactivity etc.) in the immediate vicinity.
- The gear unit must not be exposed to vibration or oscillation.

In addition to the preparations listed in 4 "Commissioning", the following measures are necessary before commissioning:

- Check the gear unit for external damage.
- After storage of more than 2 years, or with storage temperatures outside the permissible range from -5 °C to +40 °C, change the lubricant and the radial shaft seals in the gear unit before commissioning.
- If the gear unit is completely filled, the oil level must be reduced according to the mounting position. For the lubricant quantity and lubricant type, refer to the information on the name plate.
- For gear units without oil filling, the oil level must be refilled and checked according to chapter 4.1 "Checking the oil level" before commissioning. The VCI concentrate may remain in the gear unit. The VCI concentrate is not mixable with polyglycol-based lubricants (PG oils). If PG oils are used, the VCI concentrate must be removed from the gear unit. When using VCI additive, only use the oil types which are specified on the name plate and are approved by Getriebebau NORD (Chap. 7.2 "Lubricants").
- Check the insulation resistance of the winding (see chapter 4.3 "Check insulation resistance").

3.4 Preparing for installation

3.4.1 Check for damages

Please examine the delivery for transport and packaging damage immediately on receipt. Pay particular attention to radial shaft seals and sealing caps. Report any damage to the carrier immediately.

Do not put the drive into operation if damage such as leaks are visible.

3.4.2 Remove corrosion protection agents

All bare metal surfaces and shafts of the drive are protected with corrosion protection agents before shipping.

Thoroughly remove corrosion protection agents and any dirt (e.g. colour residues) from all shafts, flange surfaces and gear unit attachment surfaces before assembly.

3.4.3 Check rotational direction

If an incorrect rotational direction may result in damage or potential risk, check for the correct rotational direction of the output shaft during a test run before attaching it to the machine. Ensure the correct rotational direction during operation.

3.4.4 Check ambient conditions

Make sure that no aggressive or corrosive substances which attack metal, lubricants or elastomers are present at the installation site or are subsequently expected during operation. If such substances are to be expected, contact Getriebebau NORD.

The gear unit, especially its radial shaft seals should be protected from exposure to direct sunlight.

Ensure that the drive is suited for the installation location with regard to requirements prescribed by standards, ambient conditions and the installation height.

3.4.5 Drives with nsd tupH surface treatment

Drives with **nsd tupH** surface treatment must be electrically decoupled from other components by the use of non-conductive intermediate layers in order to prevent galvanic corrosion.

3.5 Installation

NOTICE

Damage of bearing and gear wheel

- Do not carry out any welding work on the geared motor.
 - Do not use the geared motor as earth connection for welding work.
-

Install the geared motor in the correct mounting position (see chapter 7.1 "Versions and mounting position"). **The oil drain screw must be accessible.**

The base or flange to which the geared motor is fitted should be vibration-free, torsionally rigid and flat. The flatness of the bolting surface on the base or flange must comply with DIN ISO 2768-2 tolerance class K.

Precisely align the gear unit with the drive shaft of the machine in order to prevent additional forces from being imposed on the gear unit due to distortion.

Fasten the gear unit to all gear unit feet of one side or to all flange holes. Use bolts with a minimum quality of 10.9. Tighten the bolts with correct torques (see chapter 7.3 "Screw tightening torques").

Earth the geared motor housing.

Either tighten the eye bolts used for transport or remove them completely.

Protect the motor, rotating shafts and unused shaft ends against contact.

Secure unused shaft keys against being thrown out or remove them.

The top section of the terminal box can be rotated by 4 x 90 degrees.

3.6 Installation of a hub on solid shaft (option: V, L)

NOTICE

The gear unit may be damaged by axial forces.

Bearings, gearwheels, shafts and housings may be damaged by incorrect fitting.

- Use a suitable pulling device.
- Do not hit the hub with a hammer.

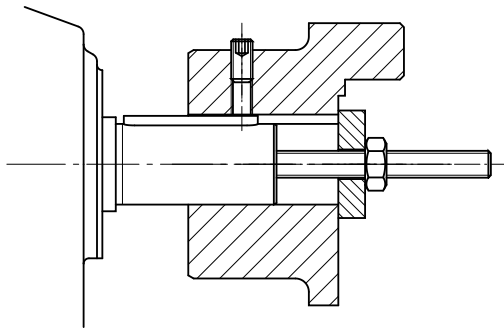


Figure 4: Example of a simple pulling device

During fitting, ensure that the shaft axes are precisely aligned with each other. Comply with the permissible tolerance details provided by the manufacturer.

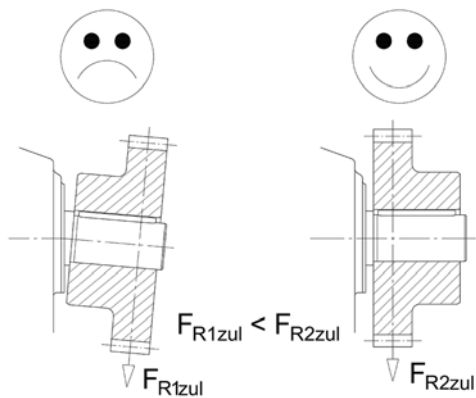
Information

Use the end thread of the shafts for pulling. Fitting can be facilitated by coating the hub with lubricant or heating it up to approx. 100 °C beforehand.

Position the coupling according to the coupling installation instructions on the specific drawing for the order. If no position details are stated on the drawing, align the coupling flush with the end of the motor shaft.

The maximum radial forces FR1 and FR2 and axial forces FA2 which are imposed on the driving and driven elements of the gear unit must not be exceeded (refer to the name plate). Pay particular attention to the correct tension of belts and chains.

Additional loads due to unbalanced hubs are not permitted.



The transverse force must be applied as closely as possible to the gear unit. For drive shafts with free shaft ends (Option W), the maximum permissible transverse force F_{R1} applies for the application of the transverse force to the centre of the free shaft journal. For output shafts, the application of the transverse force F_{R2} must not exceed the dimension x_{R2} . If the radial force F_{R2} is stated on the name plate, but no dimension x_{R2} is stated, application of force is assumed to be to the centre of the shaft journal.

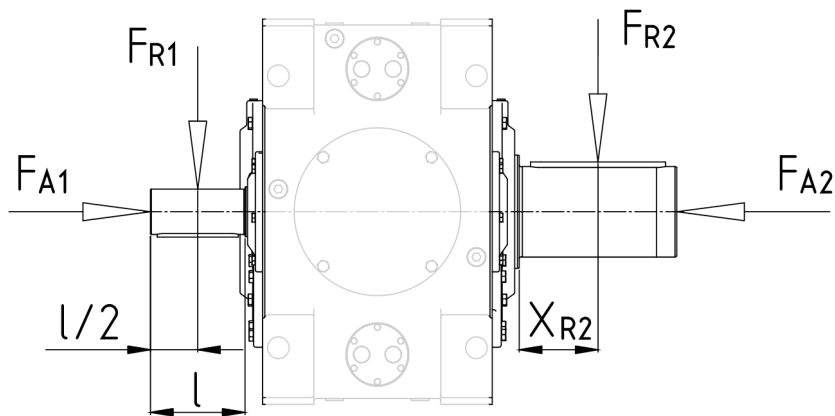


Figure 5: Permissible application of force to drive and driven shafts

3.7 Fitting push-on gear units with fastening element (option: B)

WARNING

Risk of severe injuries

If the screw fastenings of the torque arm are removed during operation, the gear unit will rotate around the output shaft.

- Secure the screw fastening against loosening, e.g. with Loctite 242 or a second nut.

NOTICE

The gear unit may be damaged by axial forces.

Bearings, gearwheels, shafts and housings may be damaged by incorrect fitting.

- Use a suitable pulling device.
- Do not strike the gear unit with a hammer.

Assembly and subsequent dismantling is facilitated by applying an anti-corrosive lubricant to the shaft before fitting (e.g. NORD Anti-Corrosion Part No. 089 00099). Excess lubricant may escape after fitting and may drip off. This escape of grease is not due to a leak in the gear unit. Thoroughly clean these points on the output shaft after a running-in time of approx. 24 hours.

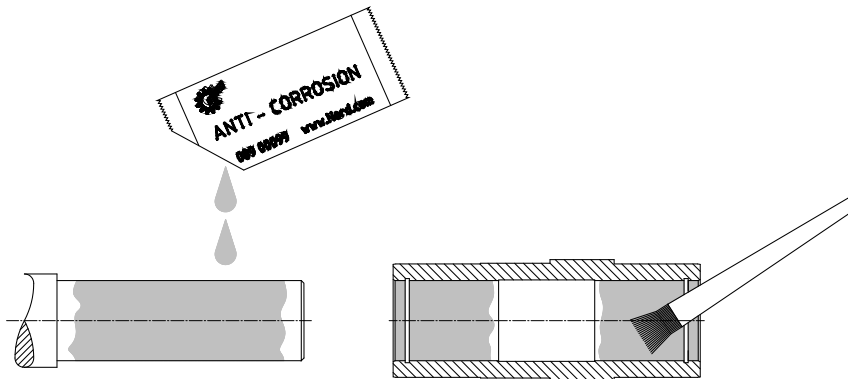


Figure 6: Applying lubricant to the shaft and the hub

For push-on gear units with cover cap IP66 (option H66) and fastening element (option B) the pressed-in closing cap must be pushed out before installing the gear unit. The pressed-in closing cap may be destroyed during dismantling. A 2nd closing cap is supplied as a spare part. Fit the closing cap after installation of the gear unit as described in Section 3.10 "Fitting the covers (option: H, H66)".

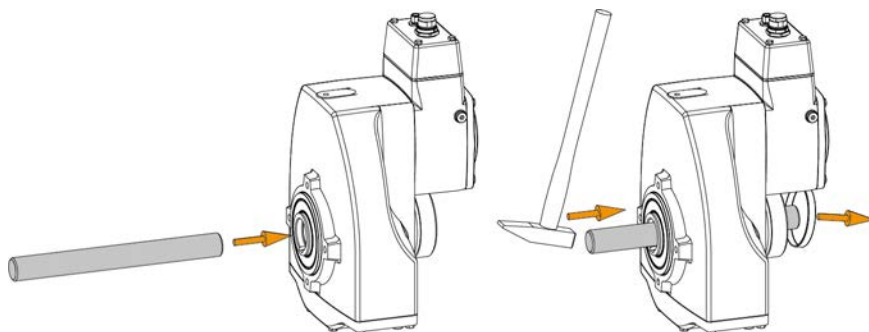


Figure 7: Removing the factory-fitted closing cap

The gear unit can be fitted to solid shafts with and without a shoulder using the fixing element (Option B). Tighten the fastening element bolt with correct torque (see chapter 7.3 "Screw tightening torques"). When fastening without a contact shoulder, a circlip is used in the hollow shaft for axial fastening.

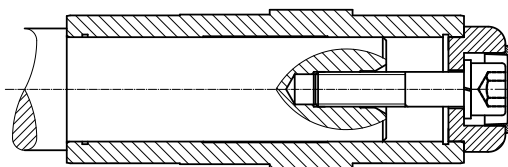


Figure 8: Gear unit mounted on shaft with a shoulder using the fastening element

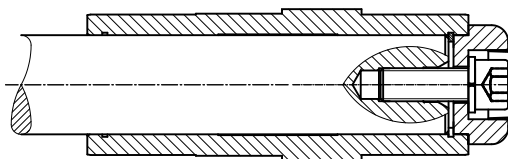


Figure 9: Gear unit mounted on shaft without a shoulder using the fastening element

A gear unit can be removed from a shaft with a shoulder e.g. using the following device.

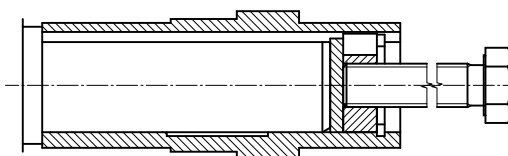
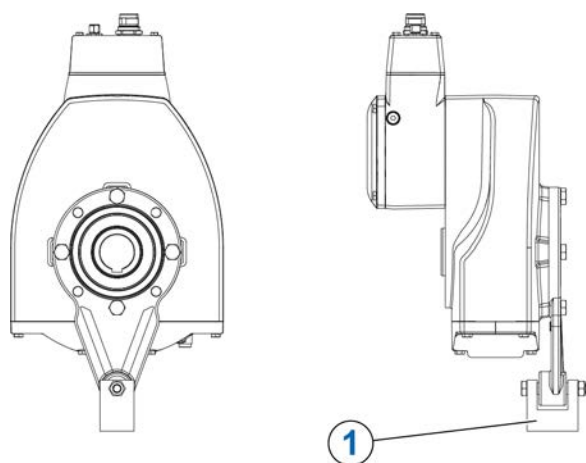


Figure 10: Removal using dismantling device

Do not distort the support when installing push-on gear units with a torque support.



Explanation

- 1 Always support torque support on both sides

Figure 11: Attaching the torque support

Tighten the fastenings of the torque support with the correct torque (see chapter 7.3 "Screw tightening torques") and secure them against loosening, e.g. with Loctite 242 or Loxeal 54-03.

3.8 Fitting a hollow shaft with shrink disc (Option: S)

NOTICE

Risk of damage to the gear unit if the shrink disc is installed incorrectly

- Do not tighten the tensioning bolts if the solid shaft is not installed. This would permanently deform the hollow shaft.

Hollow shafts with shrink discs must be protected from dust, dirt and moisture. NORD recommends option H/H66 (see chapter 3.10 "Fitting the covers (option: H, H66)").

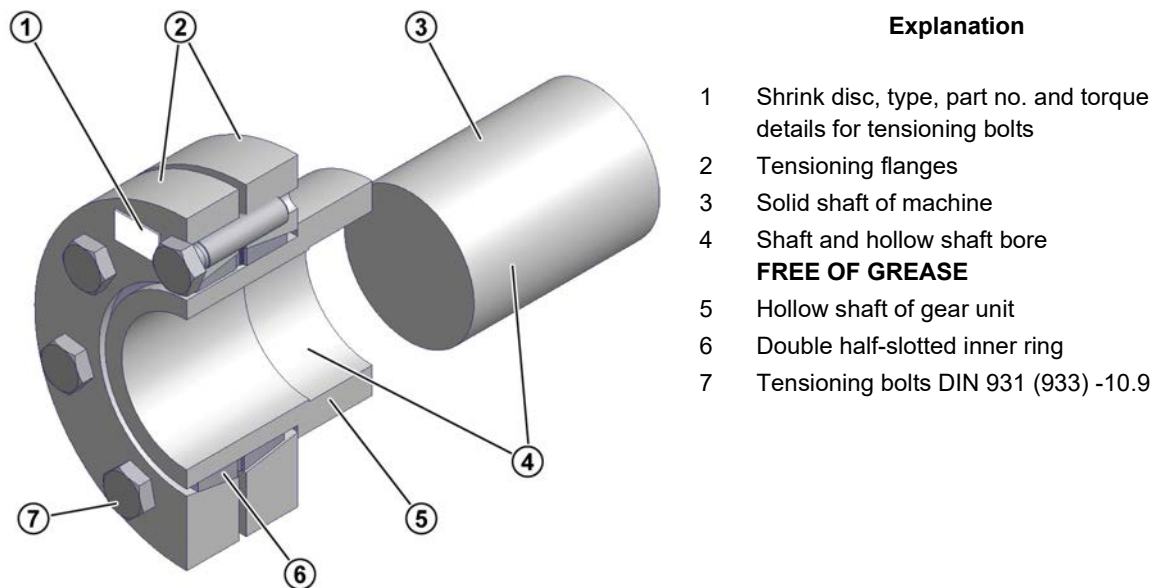


Figure 12: Hollow shaft with shrink disc

The shrink disc is supplied ready for fitting. It must not be dismantled prior to fitting.

The solid shaft material must have a minimum yield strength of 360 N/mm². This ensures that no permanent deformation occurs due to the clamping force.

If necessary, also observe the documentation from the manufacturer of the shrink disc.

Prerequisites

- The hollow shaft must be completely free of grease.
- The solid shaft of the machine must be completely free of grease.
- The external diameter of the solid shaft must be within the tolerance h6 or k6 for highly irregular operation, unless otherwise specified in the order-related dimension sheet. The fit must be according to DIN EN ISO 286-2.

Fitting procedure

1. Remove the cover, if any.
2. Loosen the tensioning bolts of the shrink disc, but do not unscrew them completely. Tighten the tensioning bolts gently by hand until there is no play between the flanges and the inner ring.
3. Lightly grease the bore of the inner ring. Push the shrink disc onto the hollow shaft until the outer clamping flange is flush with the hollow shaft.
4. Grease the solid shaft of the machine in the area which will later come into contact with the bushing in the hollow shaft. Do not grease the bronze bushing. It is essential that the tensioning seat of the hollow shaft is free of grease.
5. Insert the solid shaft of the machine into the hollow shaft so that the area around the shrink connection is completely filled.
6. Tighten the tensioning bolts of the shrink disc with approx. $\frac{1}{4}$ rotation of the bolt per turn **in sequence** in a clockwise direction by several turns.
7. Check if there is an even gap between the clamping flanges. If this is not the case, the shrink disc connection must be dismantled and checked for correct fit.
8. Mark the hollow shaft of the gear unit and the solid shaft of the machine with a label in order to detect any slippage under load.

Standard disassembly procedure:

WARNING

Danger of injury due to sudden mechanical release

The elements of the shrink disc are under great mechanical tension. Sudden release of the outer rings produces high separating forces and can result in uncontrolled detachment of shrink disc components.

- Do not remove any tensioning bolts if you have not ensured that the external outer rings of the shrink disc have been released from the inner ring.

1. Loosen the tensioning bolts of the shrink disc with approx. $\frac{1}{4}$ rotation of the bolt per turn **in sequence** in a clockwise direction by several turns. Do not remove the tensioning bolts from their thread.
2. Loosen the clamping flanges from the cone of the inner ring.
3. Remove the gear unit from the solid shaft of the machine.

If a shrink disc has been in use for a long period or is dirty, dismantle it and clean it before refitting. Check the shrink disc for damage or corrosion. Replace the damaged elements if they are not in perfect condition.

3.9 Fitting a hollow shaft with GRIPMAXX™ (Option: M)

NOTICE

Damage to the gear unit due to incorrect installation

- Do not tighten the tensioning bolts of the shrink disc until the solid shaft and the torque bush are in the correct position.

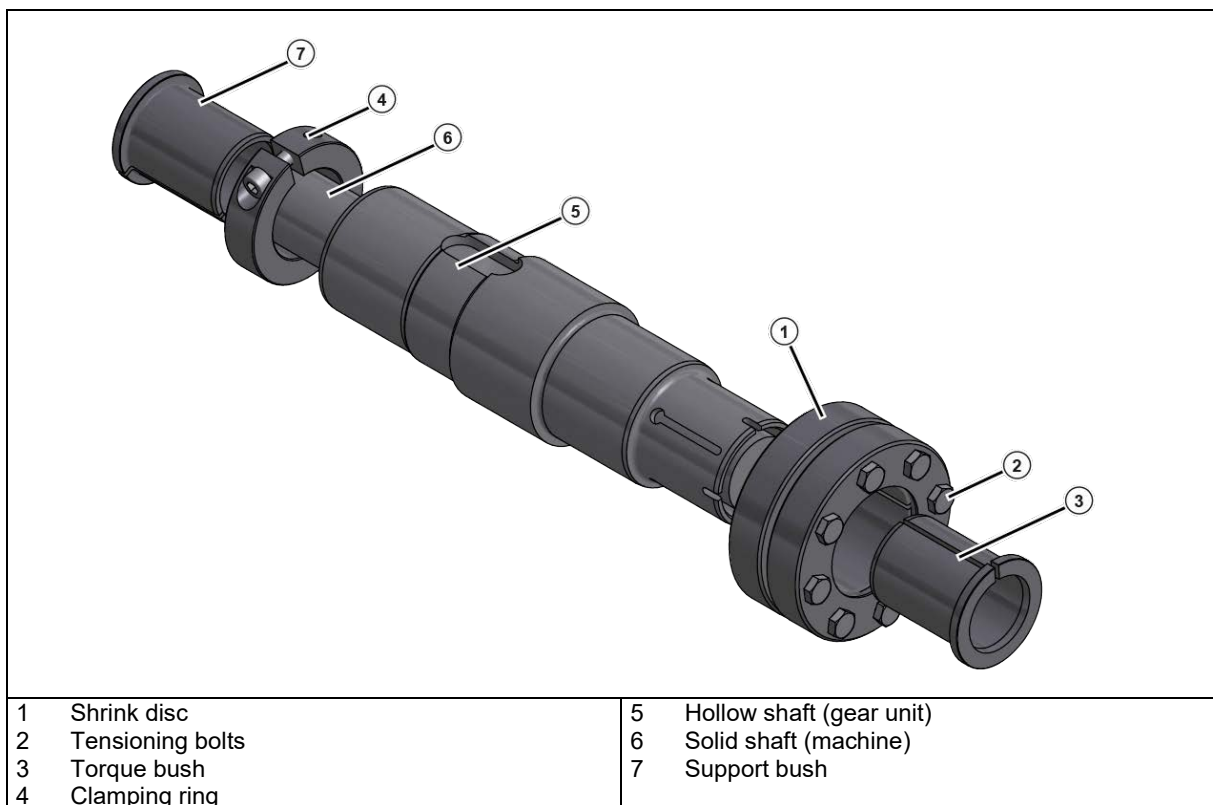


Figure 13: GRIPMAXX™, exploded diagram

Take all expected peak loads into account when dimensioning the solid shaft or the machine shaft.

The solid shaft material must have a minimum yield strength of 360N/mm². This ensures that no permanent deformation occurs due to the clamping force.

Do not use any lubricants, corrosion protection agents, assembly paste or other coatings on the mating surfaces of the shaft, the bushes, the clamping rings or the shrink disc.

Prerequisites

- The solid shaft [6] must be free from burrs, corrosion, lubricants or other foreign bodies.
- The hollow shaft [5], the bushes [3], [7], the clamping ring [4] and the shrink disc [1] must be free from dirt, grease or oil.
- The solid shaft diameter must be within the following tolerances:

Metric machine shafts		
From	To	ISO 286-2 Tolerance h11(-)
Ø [mm]	Ø [mm]	[mm]
10	18	-0.11
18	30	-0.13
30	50	-0.16
50	80	-0.19
80	120	-0.22
120	180	-0.25

Imperial machine shafts		
From	To	ISO 286-2 Tolerance h11(-)
Ø [in]	Ø [in]	[in]
0.4375	0.6875	-0.004
0.7500	1.0625	-0.005
1.1250	1.9375	-0.006
2.0000	3.1250	-0.007
3.1875	4.6875	-0.008
4.7500	7.0625	-0.009

Table 7: Permissible machine shaft tolerances

Fitting procedure

1. Determine the correct installation position of the shrink disc [1] on the gear unit. Ensure that the position of the hollow shaft [5] corresponds to the details in the order.
2. Slide the support bush [7] and the clamping ring [4] onto the solid shaft [6]. Ensure that the support bush is correctly positioned. Secure the support bush [7] with the clamping ring [4] by tightening the clamping ring bolt with the appropriate torque (see chapter 7.3 "Screw tightening torques").
3. Push the gear unit onto the secured support bush [7], up to the stop against the clamping ring.
4. Slightly loosen the tensioning bolts [2] and push the shrink disc [1] onto the solid shaft.
5. Push the torque bush [3] onto the solid shaft.
6. Tighten the 3 or 4 tensioning bolts [2] until finger-tight and ensure that the outer rings of the shrink disc are pulled together parallel. Then tighten the remaining bolts.
7. Tighten the tensioning bolts successively in a clockwise direction by several turns – **not crosswise** – with approx. $\frac{1}{4}$ rotation of the bolt per turn. Use a torque wrench to achieve the tightening torque specified on the shrink disc.

After tightening the tensioning bolts, there must be an even gap between the clamping flanges. If this is not the case, dismantle the shrink disc connection and check the fit.

Dismantling procedure



Danger of injury due to sudden mechanical release

The elements of the shrink disc are under great mechanical tension. Sudden release of the outer rings produces high separating forces and can result in uncontrolled detachment of shrink disc components.

- Do not remove any tensioning bolts if you have not ensured that the external outer rings of the shrink disc have been released from the inner ring.

1. Unscrew the tensioning bolts [2] of the shrink disc in sequence, with approximately half a turn (180°), until the inner ring of the shrink disc can be moved.
2. Pull the shrink disc [1] with the torque bush [3] off from the shaft.
3. Remove the outer rings of the shrink disc from the conical inner ring. For this it may be necessary to lightly tap the bolts with a soft-face hammer or to lightly lever the outer rings apart.
4. Pull the gear unit off the machine shaft.

Clean all individual components before refitting. Check the bushes and the shrink disc for damage or corrosion. Replace the bushes and the shrink disc if they are not in perfect condition. Coat the conical

seat of the outer rings and the outside of the clamping ring with MOLYKOTE® G-Rapid Plus or a similar product. Place some multi-purpose grease on the screw thread and the contact surfaces of the screw heads.

3.10 Fitting the covers (option: H, H66)

Use all fastening screws. Secure the fastening screws by coating them with securing lubricant, e.g. Loctite 242, Loxeal 54-03. Tighten the fastening screws with the correct torque (see chapter 7.3 "Screw tightening torques").

For covers with Option H66, press in the new condition closing cap by tapping it lightly with a hammer.

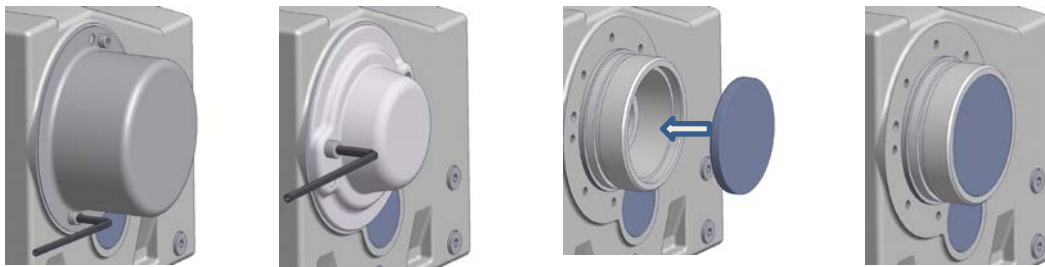


Figure 14: Fitting the covers, Option SH, Option H, and Option H66

3.11 Subsequent painting

For retrospective painting of the drive, the radial shaft seals, rubber elements, vent screws, hoses, name plates, adhesive labels and motor coupling components must not come into contact with paints, lacquers or solvents, as otherwise the components may be damaged or made illegible.

3.12 Electrical connection

⚠ WARNING

Electric shock

Touching live components causes an electric shock. This may result in severe injuries or death.

- Installation of the drive may only be carried out by qualified personnel (qualified electricians).
- The drive must be disconnected.
- The electrical installation must be implemented as per the applicable regulations, e.g. with regard to cable cross-sections, fuses, earth lead connections).

The drive is exclusively intended for operation with frequency inverters. Pay attention to the operating instructions of the frequency inverter.

3.12.1 Motor option with motor plug connection

As standard, the drive is equipped with a motor plug connection.

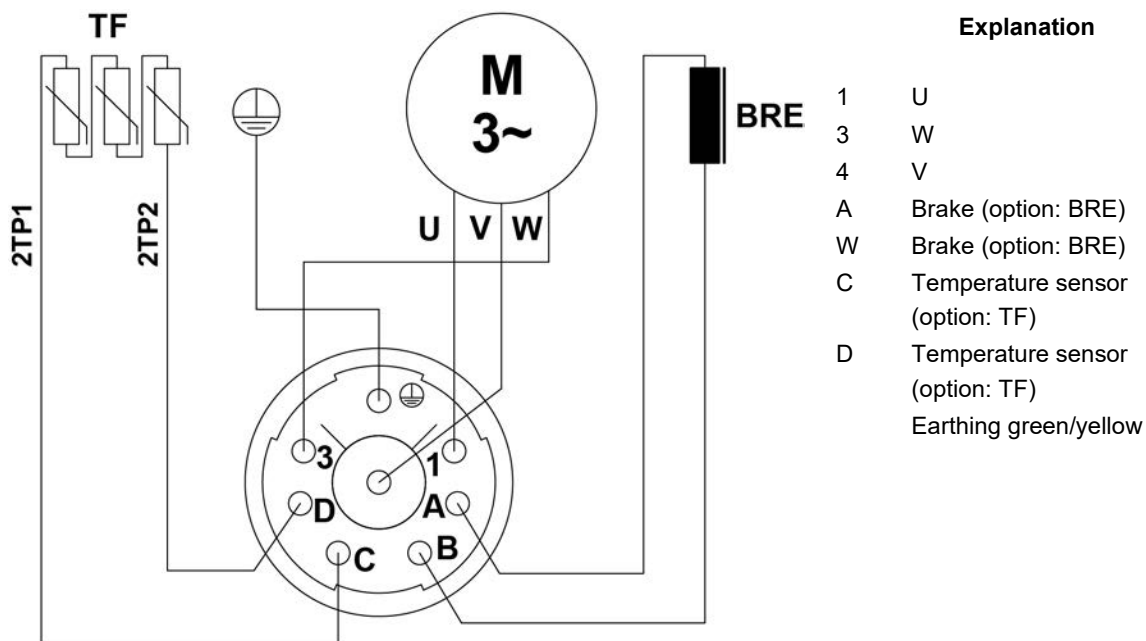


Figure 15: Plug connections for Hummel M23 (MSR)

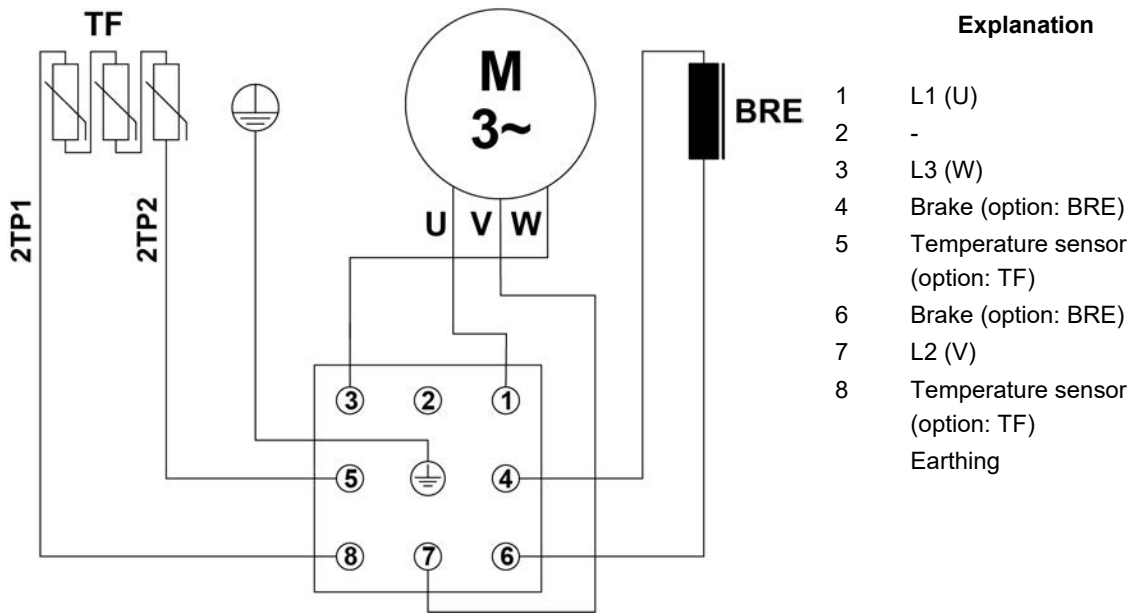


Figure 16: Plug connections for Harting HAN Q8 (MS21)

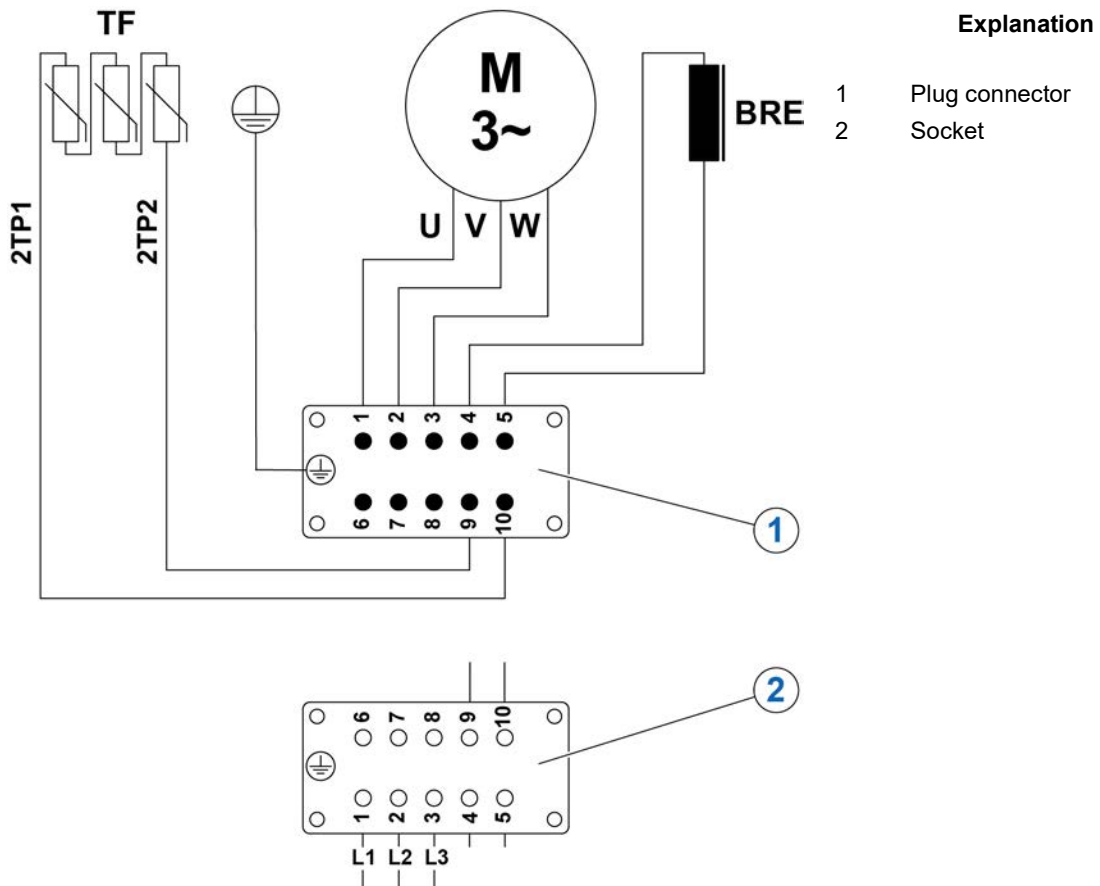


Figure 17: Plug connections for Harting HAN 10 (MS31/MS32)

3.12.2 Motor option without motor plug connection

Insert the connection cable with cable glands into the terminal box.

Establish the connection and configuration of the jumpers according to the circuit diagram in the terminal box.

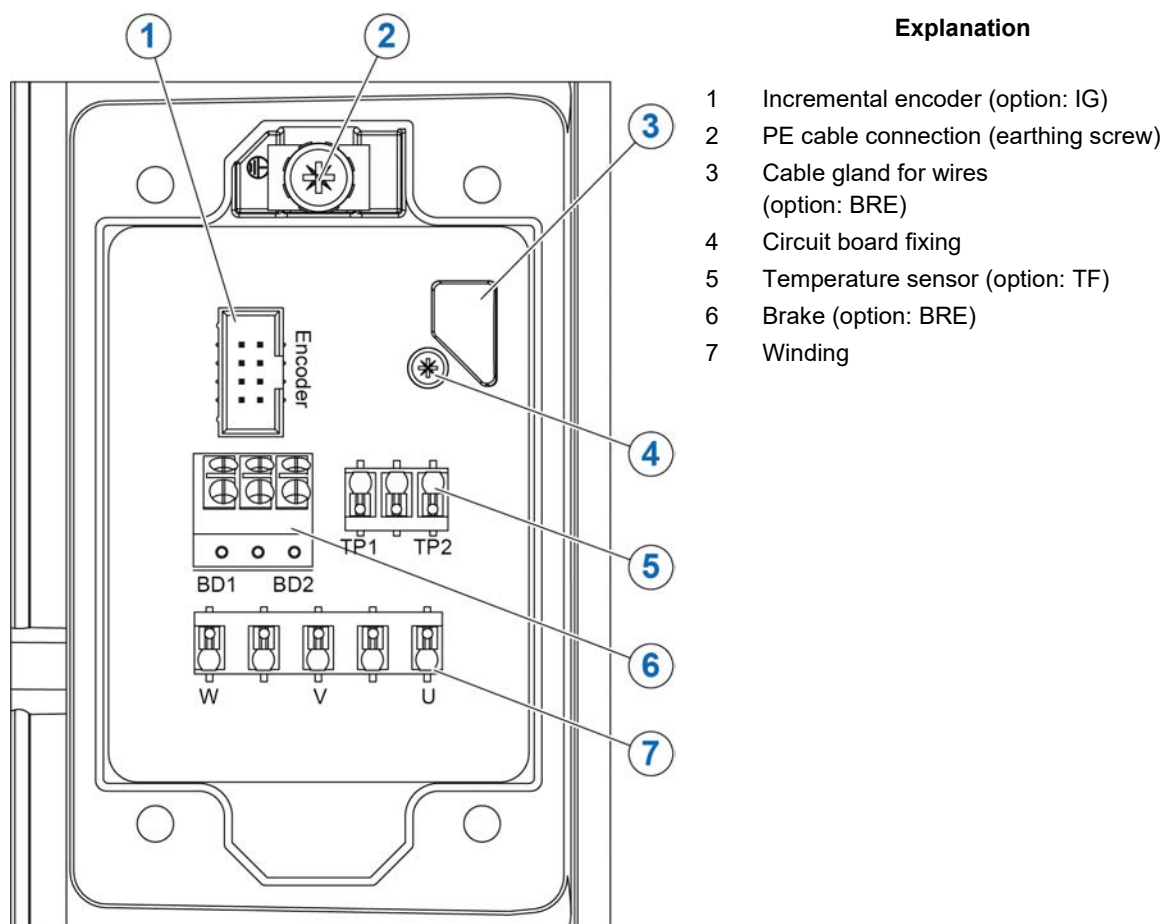


Figure 18: Connections at the drive

3.12.3 Auxiliary terminals

Please refer to the following table for the designations of the auxiliary terminals.

Auxiliary terminal designation		
Additional equipment	Labelling of auxiliary terminals New: EN 60034-8	Comment
Thermistor Option: TF	TP1 – TP2	Switch-off
PT100	1R1 – 1R2 2R1 – 2R2 3R1 – 3R2	Winding 1 (Phase U) Winding 1 (Phase V) Winding 1 (Phase W)
KTY Silicon temperature sensor	(+) 4R1 – 4R2 (-) (+) 5R1 – 5R2 (-)	Winding 1 Winding 2
Direct current brake Option: BRE...	BD1 – BD2	

Table 8: Auxiliary terminal designations

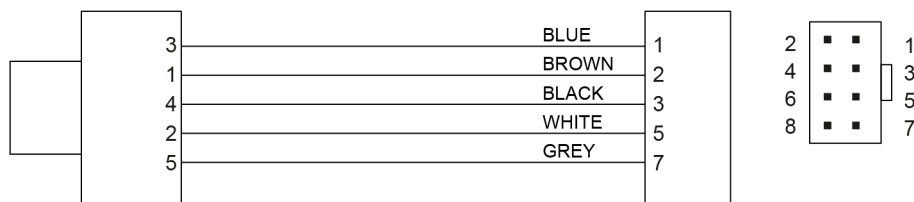
3.12.4 Tighten earthing screw

Tighten the earthing screw with a torque according to the following table.

Rated thread diameter	Tightening torque of earthing screw [Nm]
M4	0.8 – 1.2
M5	1.8 – 2.5
M6	2.7 – 4.0
M8	5.5 – 8.0

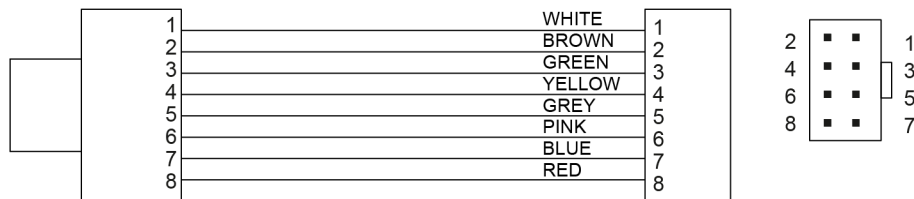
Table 9: Tightening torque of earthing screw

3.12.5 Connect rotary encoder (option: IG)



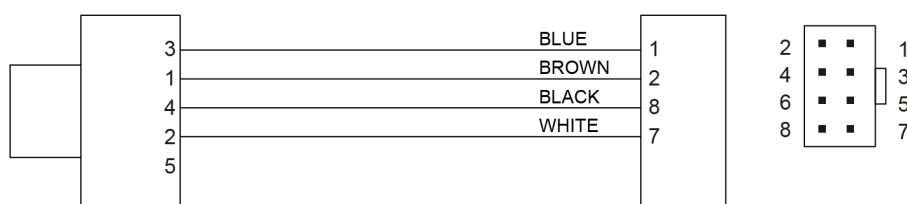
Pin	Wire colour	Signal
1	Brown	+V
2	White	B+
3	Blue	0 V
4	Black	A+
5	Green	N+

Figure 19: Encoder connection 1



Pin	Wire colour	Signal
1	White	0 V
2	Brown	+V
3	Green	A+
4	Yellow	A\
5	Grey	B+
6	Pink	B\
7	Blue	N+
8	Red	N\

Figure 20: Encoder connection 2



Pin	Wire colour	Signal
1	Brown	+V
2	White	RS485A
3	Blue	0 V
4	Black	RS485B

Figure 21: Encoder connection 3

3.12.6 Connect magnetic encoder (option: MGZ)

Colour	Connection
Black	GND
Red	Ub
Brown	Channel A
Orange	Channel B
Green	Channel Z

Table 10: Sensor configuration for magnetic encoder

3.12.7 Cable glands

When connecting, take care that the permissible clearance and creepage distances of at least 8 mm between the electrically live components or between the electrically live components and components with the same potential as the housing are maintained.

Tighten the cable glands in accordance with the manufacturer's instructions.

Seal unused openings with approved blind plugs in accordance with the manufacturer's instructions.

3.12.8 Sealing the terminal box

Before sealing the terminal box, ensure that all wires are correctly engaged in the push-in terminals and that the earthing screw is tightened.

The terminal box must be sealed against dust and water. Because of this, take care that the seals of the cable glands and the terminal box seals are free from dirt, are correctly seated and are not damaged. Replace damaged seals.

The terminal box cover seal is captively mounted on the terminal box cover. Only use an original seal when replacing the seal.

If the terminal box has been opened during installation, maintenance, repair, troubleshooting or overhaul, re-fit the terminal box cover after the work is complete.

4 Commissioning

4.1 Checking the oil level

Check the oil level before commissioning (see chapter 5.2 "Service and maintenance work").

4.2 Activating the vent

If venting of the gear unit is provided, the vent or the pressure vent must be activated before commissioning. Double gear units consist of two single units, are equipped with 2 oil chambers and possibly 2 vents.

To activate, remove the sealing cord in the vent screw. For the vent screw position, see Section 7.1 "Versions and mounting position".

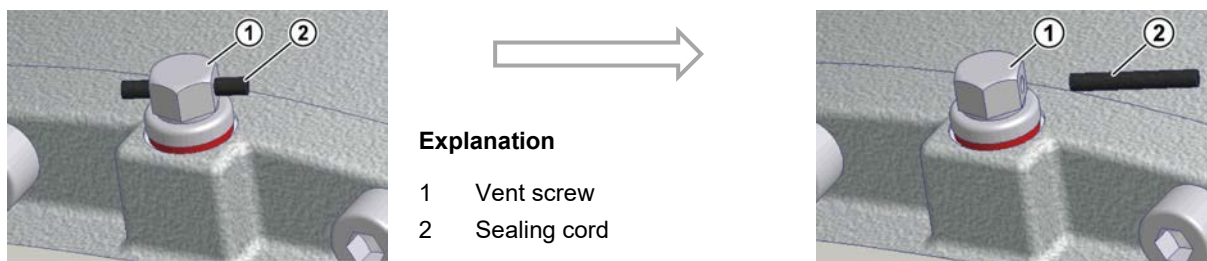


Figure 22: Activating the vent screw

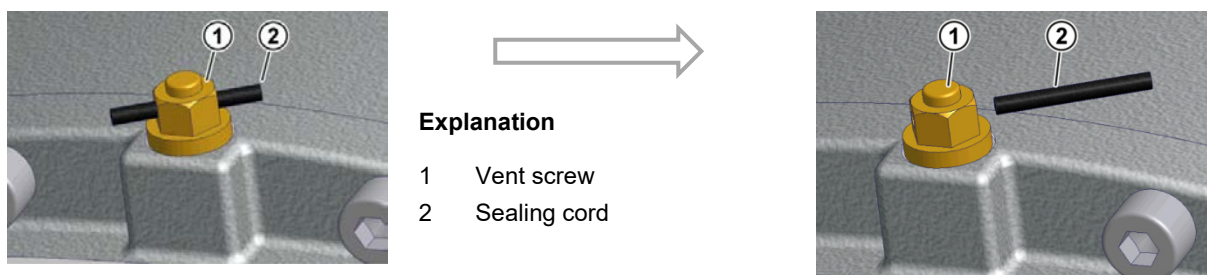
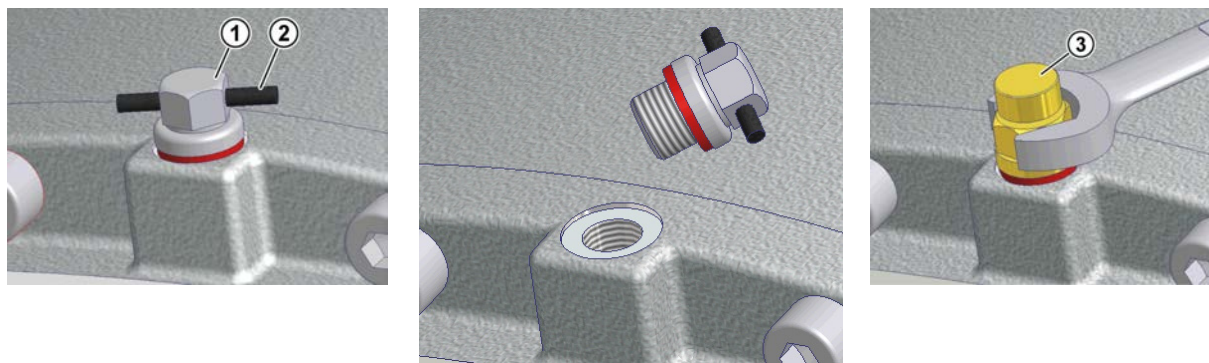


Figure 23: Activating the pressure vent screw

Special pressure vents are supplied as loose parts. Unscrew the vent screw and replace it with the special pressure vent and seal.



Explanation

1 Vent screw

2 Sealing cord

3 Special vent screw

Figure 24: Removing the vent plug and fitting the special pressure vent

4.3 Check insulation resistance

WARNING

Danger of electric shock

The motor terminals still carry hazardous voltages also after the insulation resistance has been checked.

- Do not touch the terminals during or shortly after the check.

Prior to initial commissioning of the motor and after a long period of storage or standstill (approx. 6 months) the insulation resistance of the windings must be checked.

The insulation resistance of new, cleaned, repaired windings against the housing and against each other is $> 200 \text{ M}\Omega$.

Measure the insulation of the windings against the housing for operation voltages up to 400 V with 500 V DC. For operation voltages up to 725 V, measure with 1000 V DC. The temperature of the windings should be $25^\circ\text{C} \pm 15^\circ\text{C}$.

For new or cleaned windings or repaired motors, which have been stored or not used for long periods, the insulation resistance of the winding against earth can be less than $10 \text{ M}\Omega$. This may be due to moisture. Dry the windings.

The insulation resistance may reduce after long periods of operation. As long as the measured value does not fall below the calculated value for the critical insulation resistance of $< 50 \text{ M}\Omega$, operation of the motor may continue. If this value is undershot, determine the cause. Repair, clean and dry the windings or winding parts, if necessary.

4.4 Check the motor

Before commissioning, check the motor for correct function after installation.

If a change in the power consumption, higher temperatures or vibrations, unusual noises or odours etc. occur or a monitoring system responds, the motor function is impaired. Immediately inform the maintenance personnel responsible to avoid personal injury or material damage.

If in doubt, switch off the motor without delay.

4.5 Check the brake (option: BRE)

Check the correct function of the brake.

4.6 Checklist

Checklist		
Subject of check	Date of check:	Information see Section
Is the vent screw activated or the pressure vent screwed in?		4.2
Does the required orientation comply with the actual installation position?		7.1
Are the external gear shaft forces within permitted limits (chain tension)?		3.6
Is the torque arm installed correctly?		3.7
Are rotating parts covered with a contact guard?		3.10
Is the insulation resistance sufficiently high?		4.3
Checked the electrical connection?		
Checked earthing?		
Compared the parameterisation of the inverter with the name plate?		2.2

Table 11: Checklist

5 Service and maintenance

5.1 Service and maintenance intervals

The service and maintenance intervals highly depend on the ambient and operating conditions. They must therefore be individually adapted for the driven machine during project planning.

Service and maintenance intervals	Service and maintenance work	Information see Section
Regularly, depending on the amount of dirt	<ul style="list-style-type: none"> Visual inspection for soiling, clean the drive surface from dust deposits and other contaminants. 	
Every 100 operating hours, at least weekly	<ul style="list-style-type: none"> Check running noises 	5.2.3
At least every six months	<ul style="list-style-type: none"> Visual inspection 	5.2.1 5.2.2
For operating temperatures up to 80°C every 10000 operating hours, at least every 2 years	<ul style="list-style-type: none"> Change the oil (if filled with synthetic products, the interval is doubled, with the use of SmartOilChange the interval is specified by SmartOilChange) Clean or replace the vent screw as necessary Replacing the radial shaft seals; see Chapter 5.2.2 for further information 	5.2.5 5.2.6 5.2.7
every 10000 operating hours, at least every 2 years	<ul style="list-style-type: none"> Check electrical connections, cables and wires for strength and damages. Replace damaged cables, if necessary. 	
	<ul style="list-style-type: none"> Checking the function of the insulation system 	4.3
At least every 5 years, can be considerably more often under special ambient conditions	<ul style="list-style-type: none"> General overhaul 	5.2.9

Table 12: Service and maintenance intervals

Information

The oil change intervals apply for normal operating conditions and operating temperatures up to 80°C. The oil change intervals are reduced in the case of extreme conditions (operating temperatures higher than 80°C, high humidity, aggressive environment and frequent fluctuations in the operating temperature).

5.2 Service and maintenance work

5.2.1 Visual inspection

Check the drive thoroughly considering valid standards and regulations. Pay special attention to any mechanical damage, free path of the cooling air, abnormal noises and correct electrical connection.

Only use original spare parts or standardised, customary and equivalent parts.

Changing parts from identical drives is not permissible.

5.2.2 Visual inspection for leaks

The gear unit must be checked for leaks. Attention should be paid to escaping gear oil and traces of oil on the exterior or underneath the gear unit. In particular, the radial shaft seals, cover caps, screw fittings, hoses and housing joints should be checked.



Information

Radial shaft seals are components with a limited life and are subject to wear and ageing. The service life of radial shaft seals depends on various ambient conditions. Temperature, light (especially UV light), ozone and other gases and liquids affect the ageing process of radial shaft seals. Some of these influences may change the physical or chemical properties of the radial shaft seals and result in a significant reduction of their service life. Foreign matter (e.g. dust, sludge, sand, metallic particles) and excess temperature (excessive speed or external heating) accelerate the wear of the sealing lip. These sealing lips are made of an elastomer material and are lubricated with a special grease at the factory. This reduces the wear due to their function and ensures a long service life. An oil film in the region of the rubbing sealing lip is therefore normal and is not due to leakage (see chapter 7.5 "Leakage and leak-tightness").

The following applies to radial shaft seals on gear unit output shafts: "Under moderate operating conditions (up to 80 °C oil temperature), the manufacturers of radial shaft seals state non-binding typical lifetimes of up to 10,000 operating hours."

NOTICE

Damage to the radial shaft seals through unsuitable cleaning agents

Unsuitable cleaning agents may damage the radial shaft seals, which may then cause an increased risk of leaks.

- Do not clean the gear unit with cleaning agents which contain acetone or benzol.
- Avoid contact with hydraulic oils.

If leaks are suspected, the gear unit should be cleaned, the oil level checked and checked again for leaks after approx. 24 hours. If a leak is confirmed (dripped oil), the gear unit must be repaired immediately. Please contact the NORD service department.

5.2.3 Check for running noises

If the geared motor produces unusual running noises or vibrations, this could indicate damage to the gear unit or motor. In this case, the geared motor must be repaired immediately. Please contact the NORD Service department.

5.2.4 Visual inspection of rubber elements

Gear units with torque support have rubber elements. If these show damage such as tears to the surface, the rubber elements must be replaced. In this case, please contact NORD Service.

5.2.5 Change the oil

On the figures in Section 7.1 "Versions and mounting position" the positions of the oil drain screw and the vent screw, if available, are shown depending on the mounting position.

Procedure:

1. Dismantle the geared motor.
2. Place a collection vessel under the oil drain screw.
3. Unscrew the oil drain screw completely.
4. Completely drain the oil from the gear unit.
5. Fill with new oil of the same type through the drain hole using a suitable filling device. The oil quantity depends on the mounting position. The oil quantity is indicated on the name plate.
6. Check the sealing rings of the oil drain screw. If a sealing ring is damaged, replace the corresponding screw. You can also clean the threads and coat them with securing adhesive e.g. Loctite 242 54-03 before screwing them in.
7. Screw the oil drain screw into the hole and tighten to the correct torque (see chapter 7.3 "Screw tightening torques").
8. Mount the geared motor.

5.2.6 Clean and check vent screw

1. Unscrew the vent screw.
2. Thoroughly clean the vent screw, e.g. with compressed air.
3. Check the vent screw and the sealing ring. If the sealing ring is damaged, use a new vent screw.
4. Screw the vent screw back in.

5.2.7 Replacing the shaft sealing ring

Once the shaft sealing ring has reached the end of its service life, the oil film in the region of the sealing lip increases and a measurable leakage with dripping oil occurs. **The radial shaft seal must then be replaced.** The space between the sealing lip and the protective lip must be filled approximately 50 % with grease on fitting (recommended grease: PETAMO GHY 133N). Take care that after fitting, the new radial shaft seal does not run in the old wear track.

5.2.8 Brake (option: BRE)

The brake cannot be adjusted. If maintenance or repair work should be required at the brake, contact the NORD Service department.

5.2.9 General overhaul

The general overhaul must be carried out by a specialist workshop with suitable equipment and be qualified personnel with appropriate equipment in observance of national regulations and laws. We recommend that the general overhaul is carried out by the NORD Service Department.

During general overhaul, the drive is completely dismantled and the following work steps are carried out:

- All components are cleaned.
- All components are checked for damage.
- Damaged parts are replaced.
- All roller bearings are replaced.
- Replace all seals, radial shaft seals and Nilos rings.
- Optional: Replace the elastomers in the coupling.

6 Disposal

NORD products are made of high-quality components and valuable materials. Therefore, have faulty or defective appliances checked to see if they can be repaired and reused.

If repair and reuse is not possible, observe the following disposal notes.

6.1 Disposal according to German law

- The components are marked with the crossed-out waste bin according to the “Electrical and Electronic Equipment Directive – ElektroG3” (dated 20 May 2021, valid from 1 January 2022).



The appliances must therefore not be disposed of as unsorted municipal waste, but must be collected separately and handed to a WEEE (Waste of Electrical and Electronic Equipment) registered collection point.

- The components do not contain any electrochemical cells, batteries or accumulators, which must be separated and disposed of separately.
- In Germany, NORD components can be handed in at the headquarters of Getriebbau NORD GmbH & Co. KG.

WEEE Reg. No.	Name of the manufacturer / authorised representative	Category	Appliance type
DE12890892	Getriebbau NORD GmbH & Co. KG	Appliances where at least one of the outer dimensions exceeds 50 cm (large appliances)	Large appliances for exclusive use in other than private households
		Appliances where none of the outer dimensions exceeds 50 cm (small appliances)	Small appliances for exclusive use in other than private households

- Contact: info@nord.com

6.2 Disposal outside of Germany

Outside Germany, please contact the local subsidiaries or distributors of the NORD DRIVESYSTEM Group.

6.3 Components and materials

NOTICE

Lubricants and oils

Collect the used lubricants and dispose of them properly. Bring them to designated collection points and prevent them from entering the environment.

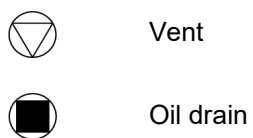
Components	Material
Gearwheels, shafts, roller bearings, keys, circlips, ...	Steel
Gear unit housing, housing components, ...	Aluminium
Radial shaft seals, sealing caps, rubber components, ...	Elastomers with steel
Coupling components	Plastic and steel
Flat seals	Asbestos-free sealing material
Gear oil	Additive mineral oil
Synthetic gear oil (adhesive label: CLP PG)	Polyglycol-based lubricant
Synthetic gear oil (adhesive label: CLP PG)	Poly-alpha-olefin based lubricant
Motor parts	Aluminium, iron, electronic components, plastic, copper, magnets

Table 13: Components and materials

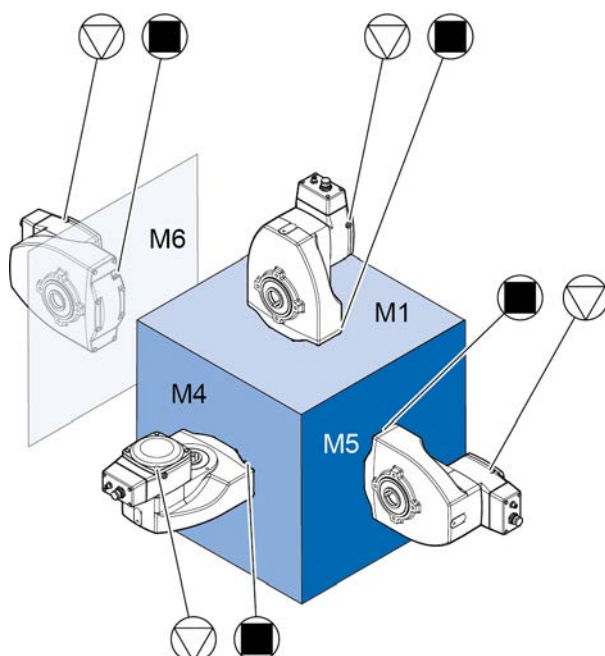
7 Appendix

7.1 Versions and mounting position

7.1.1 Explanation of symbols



7.1.2 Overview of mounting positions



7.2 Lubricants

On delivery, the gear unit is ready for operation and filled with lubricant for the required mounting position. The initial filling corresponds to a lubricant from the column for the ambient temperatures (standard version) in the lubricant table.

The required lubricant quantity and the lubricant type are indicated on the nameplate.

Lubricant table

This table shows comparable lubricants from various manufacturers. The oil manufacturer can be changed within a viscosity and lubricant type. Only change the lubricant type or the viscosity after consultation with Getriebebau NORD.



Lubricant type	Details on name plate	DIN (ISO) / Ambient temperature			
Mineral oil	CLP 220	ISO VG 220 -10...40°C	Alpha SP 220		
Synthetic oil (Polyglycol)	CLP PG 220	ISO VG 220 -25...80°C	Optigear Synthetic 1300/220		
Synthetic oil (hydrocarbons)	CLP HC 220	ISO VG 220 -40...80°C		Renolin Unisyn CLP 220 Renolin Unisyn XT 220	Mobil SHC 630
Food-compatible oil	CLP HC H1 220	ISO VG 220 -25...40°C			Mobil SHC Cibus 220

Table 14: Lubricants

7.3 Screw tightening torques

Screw tightening torques [Nm]							
Dimensions	Screw fastenings in strength classes				Cap screws	Threaded pin on coupling	Screw fastenings on covers
	8.8	10.9	12.9	V2A-70 V4A-70			
M4	3.2	5	6	2.8	-	-	-
M5	6.4	9	11	5.8	-	2	-
M6	11	16	19	10	-	-	6.4
M8	27	39	46	24	11	10	11
M10	53	78	91	48	11	17	27
M12	92	135	155	83	27	40	53
M16	230	335	390	207	35	-	92
M20	460	660	770	414	-	-	230
M24	790	1150	1300	711	80	-	460
M30	1600	2250	2650	1400	170	-	-
M36	2780	3910	4710	2500	-	-	1600
M42	4470	6290	7540	4025	-	-	-
M48	6140	8640	16610	5525	-	-	-
M56	9840	13850	24130	8860	-	-	-
G½	-	-	-	-	75	-	-
G¾	-	-	-	-	110	-	-
G1	-	-	-	-	190	-	-
G1¼	-	-	-	-	240	-	-
G1½	-	-	-	-	300	-	-

Table 15: Screw tightening torques

Tightening torques in the motor area

Unless otherwise specified, connecting screws between motor and gear unit, bearing covers, terminal box covers and other options such as brakes and covers must be tightened to torques according to the following table.

Rated thread diameter	Tightening torque [Nm]
M3	1.2
M4	2.2
M5	5.9
M6	10.1
M6 With precote® thread locking	13.0
M8	24.6
M10	53.0
M12	92.0
M16	230

Table 16: General tightening torques in the motor area

Rated thread diameter Fine thread	Tightening torque [Nm]
M10 x 1	10.1
M12 x 1.5	24.6

Table 17: Tightening torques for screw plugs

7.4 Troubleshooting

NOTICE

Damage to the drive

- Shut down the drive immediately in case of malfunction.

Malfunction	Geared motor malfunctions	
	Possible cause	Remedy
Unusual running noises, vibrations	Oil too low, bearing damage, gear wheel damage or warped motor shaft.	Consult NORD Service
Oil escaping from the gear unit or motor	Defective seal	Consult NORD Service
Oil escaping from pressure vent	Incorrect oil level	Use oil expansion chamber (option OA)
	Incorrect, dirty oil	Change the oil
	Unfavourable operating conditions	Consult NORD Service
Geared motor is too hot	Unfavourable installation conditions or gear unit damage	Consult NORD Service
	To high loads	
	Incorrect parameterisation	Check parameterisation
	Too high ambient temperature	Comply with conditions in accordance with order confirmation
Shock when switching on, vibrations	Motor coupling defective	Replace elastomer ring
	Gear unit fastening loose	Tighten motor and gear unit fastening screws
	Defective rubber element	Replace rubber element
	Incorrect parameterisation	Check parameterisation
	Encoder alignment	Consult NORD Service
Output shaft does not rotate although motor is running	Breakage in gear unit	Consult NORD Service
	Motor coupling defective	
	Shrink disc slip	
	Encoder alignment	
	Defective connections	Check connections
	Incorrect parameterisation	Check parameterisation
	Blocked brake	Check connections

Table 18: Overview of malfunctions

7.5 Leakage and leak-tightness

Gear units are filled with oil or grease to lubricate the moving parts. Seals prevent the escape of lubricants. Full leak-tightness is technically not possible, as a certain film of moisture, for example on the radial shaft seals is normal and advantageous for a long-term sealing effect. In the region of vents, oil moisture may be visible due to the escape of function-related oil mist. In the case of grease-lubricated labyrinth seals such as Taconite sealing systems, the used grease emerges from the sealing gap. This apparent leak is not a fault.

According to the test conditions as per DIN 3761, the leak is determined by the medium to be sealed. In bench tests, it exceeds the function-related moisture on the sealing edge in a defined test period and results in dripping of the medium to be sealed. The measured quantity which is then collected is designated as leakage.

Definition of leakage according to DIN 3761 and its appropriate use					
Term	Explanation	Location of leakage			
		Radial shaft seal	In IEC adapter	Housing joint	Vent
Sealed	No moisture apparent	No fault present			
Damp	Moisture film locally restricted (not an area)	No fault present			
Wet	Moisture film beyond the extent of the component	No fault present		Check, if repair is necessary	No fault present
Measurable leakage	Recognisable stream, dripping	Repair recommended			
Temporary leakage	Temporary malfunction of the sealing system or oil leak due to transport *)	No fault present		Check, if repair is necessary	No fault present
Apparent leakage	Apparent leakage, e.g. due to soiling or sealing systems, which can be re-lubricated	No fault present			

Table 19: Definition of leakage according to DIN 3761

*) Previous experience has shown that moist or wet radial shaft seals stop leaking in the further process. Therefore, under no circumstances can replacement be recommended at this stage. The reason for momentary moisture may be e.g. small particles under the sealing lip.

7.6 Spare parts

Please note our spare parts catalogue PL 5010 under www.nord.com.

We will be pleased to send you the spare parts catalogue on request.

7.7 Repair information

For enquiries to our technical and mechanical service department, please have the exact gear unit type and, if applicable, the order number to hand. You can find this information on the name plate.

7.7.1 Repairs

In case of repair, remove all non-original parts from the gear unit or geared motor. No guarantee can be given for any attached parts, such as rotary encoders or external fans.

Send the device to the following address:

Getriebebau NORD GmbH & Co. KG
Serviceabteilung
Getriebebau-Nord-Straße 1
22941 Bargteheide

Information

If possible, state the reason for returning the component/device. Specify a contact person for queries.

This is important in order to keep repair times as short as possible.

7.7.2 Internet information

In addition, you will find the manuals in the available languages on our website: www.nord.com.

7.8 Warranty

NORD GmbH & Co. KG accepts no liability for damage to persons, materials or assets as a result of failure to observe this operating manual, operating errors or incorrect use. General wearing parts, e.g. radial seals are excluded from the warranty.

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