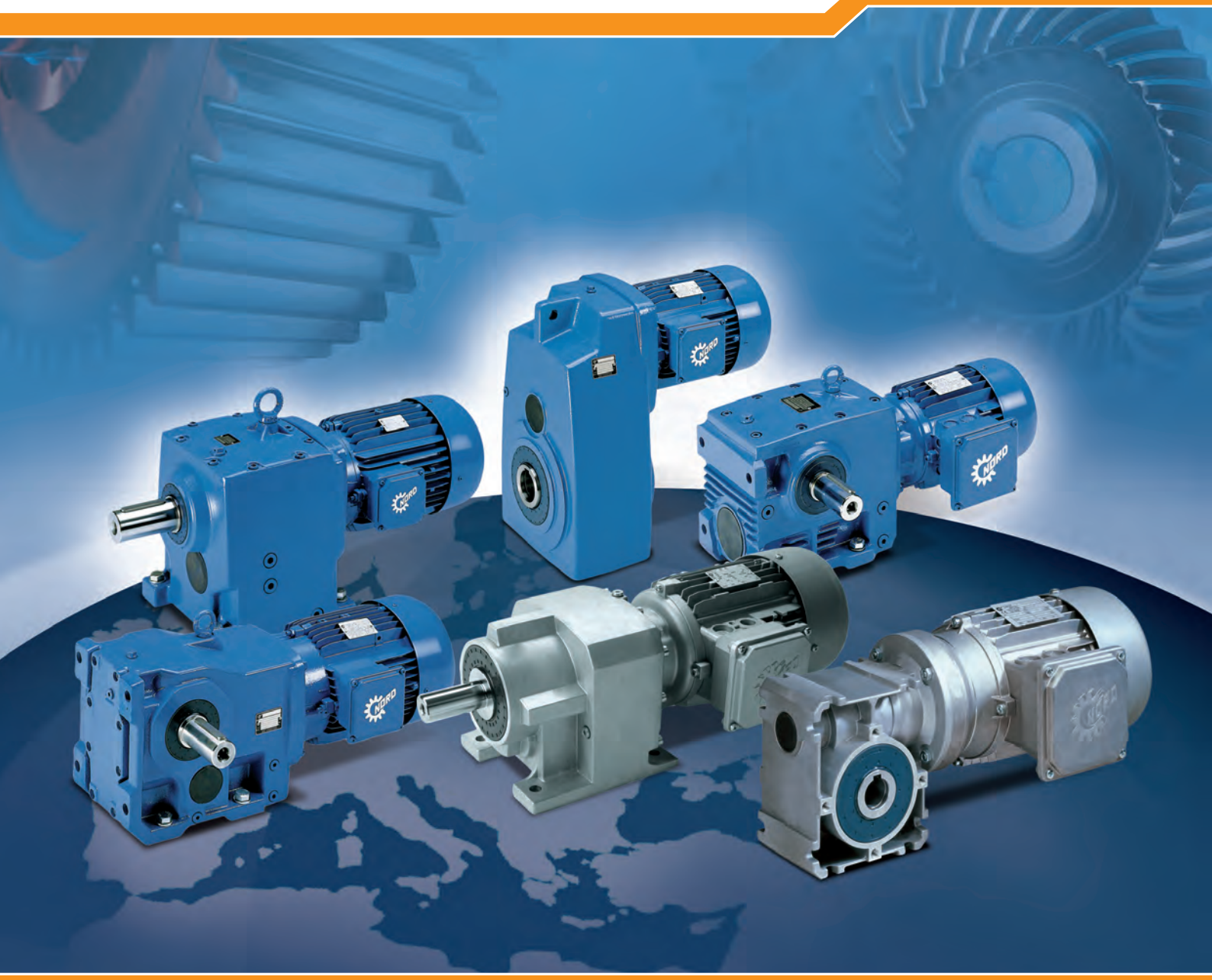
Intelligent Drivesystems, Worldwide Services



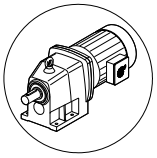
GB

B1000

Operating and Assembly Instructions for Gear Units and Geared Motors

NORD DRIVESYSTEMS

Contents



1. Notes

1.1 General information

Read the Operating Manual carefully prior to performing any work on or putting the gear unit into operation. Strict compliance with the instructions in this Operating Manual is essential. Getriebebau NORD accepts no liability for damage to persons, materials or assets as a result of the non-observance of this Operating Manual, operating errors or incorrect use. General wearing parts, e.g. radial seals are excluded from the warranty.

If additional components are attached to or installed in the gear unit (e.g. motor, cooling system, pressure sensor etc.) or components (e.g. cooling system) are supplied with the order, the operating instructions for these components must be observed.

If geared motors are used, compliance with the Motor Operating Manual is also necessary.

If you do not understand the contents of this Operating Manual or additional operating instructions, please consult Getriebebau NORD!

1.2 Safety and information symbols

Please always observe the following safety and information symbols!

	**Danger!**
	Risk of fatalities and injury
	**Attention!**
	Machine may be damaged
	**Note!**
	Useful information

1.3 Correct use

These gear units generate a rotational movement and are intended for use in commercial systems. The gear unit must only be used according to the information in the technical documentation from Getriebebau NORD.

	**Danger!**
	Use in explosion hazard areas is prohibited.

Strict compliance with the technical data on the rating plate is essential.

The documentation must be observed.

Appropriate safety measures must be taken for applications where failure of a gear unit or geared motor may result in injury.

1.4 Safety information

All work including transportation, storage, installation, electrical connection, commissioning, servicing, maintenance and repair must be performed **only by qualified specialist personnel**. It is recommended that repairs to NORD Products are carried out by the NORD Service department.

	**Danger!**
	Installation and maintenance work must only be performed when gear units are at a standstill and have cooled down. The drive must be isolated and secured to prevent accidental start-up. **CAUTION!** Depending on the operating conditions, the temperature of the gear unit may exceed 60°C. Danger of burns! Protection against accidental contact may need to be installed. Tighten the drive elements or secure the parallel key before switching on.

	**Danger!**
	Only use the eyebolts attached to the gear unit for transport. No additional loads may be attached. Transportation aids and lifting gear must have an adequate load-bearing capacity.

If geared motors have an additional eyebolt attached to the motor, this must also be used. Avoid pulling the eyebolts at an angle. The thread of the eyebolt must be fully screwed in.

Observe all safety information, including that provided in the individual sections of this Operating Manual. All national and other regulations on safety and accident prevention must also be observed.

	**Danger!**
	Serious physical and property damage may result from inappropriate installation, non-designated use, incorrect operation, non-compliance with safety information, unauthorised removal of housing components or safety covers and structural modifications to the gear unit.

1.5 Other documents

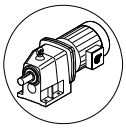
Further information may be obtained from the following documents:

- Gear unit catalogues (G1000, G2000, G1011, G1012, G1034, G1035)
- Operating and maintenance instructions for the electric motor
- if applicable, operating instructions for attached or supplied options

1.6 Disposal

Observe the current local regulations. In particular, lubricants must be collected and disposed of correctly.

Gear unit components:	**Material:**
Toothed wheels, shafts, rolling bearings, parallel keys, locking rings, …	Steel
Gear unit housing, housing components, …	Grey cast iron
Light alloy gear unit housing, light alloy gear unit housing components, …	Aluminium
Worm gears, bushes, ...	Bronze
Radial seals, sealing caps, rubber components,…	Elastomers with steel
Coupling components	Plastic with steel
Flat seals	Asbestos-free sealing material
Gear oil	Additive mineral oil
Synthetic gear oil (rating plate code: CLP PG)	Polyglycol-based lubricants
Cooling spiral, embedding material of the cooling spiral, screw fittings	Copper, epoxy, yellow brass



2. Description of gear units

2.1 Type designations and gear unit types

Helical gear units
SK 11E, SK 21E, SK 31E,SK 41E, SK 51E (single-stage)
SK 02, SK 12, SK 22, SK 32, SK 42, SK 52, SK 62N (2-stage)
SK 03, SK 13, SK 23, SK 33N, SK 43, SK 53 (3-stage)
SK 62, SK 72, SK 82, SK 92, SK 102 (2-stage)
SK 63, SK 73, SK 83, SK 93, SK 103 (3-stage)

NORDBLOC helical gear units
SK 320, SK 172, SK 272, SK 372, SK 472, SK 572, SK 672, SK 772, SK 872, SK 972 (2-stage)
SK 273, SK 373, SK 473, SK 573, SK 673, SK 773, SK 873, SK 973 (3-stage)
SK 072.1, SK 172.1, SK 372.1, SK 572.1, SK 672.1, SK 772.1 SK 872.1, SK 972.1 (2-stage)
SK 373.1, SK 573.1, SK 673.1, SK 773.1, SK 873.1, SK 973.1 (3-stage)

Standard helical gear units
SK 0, SK 01, SK 20, SK 25, SK 30, SK 33 (2-stage)
SK 010, SK 200, SK 250, SK 300, SK 330 (3-stage)

Parallel shaft gear units
SK 0182NB, SK 0282NB, SK 1282, SK 2282, SK 3282, SK 4282, SK 5282, SK 6282, SK 7282, SK 8282, SK 9282, SK 10282, SK 11282 (2-stage)
SK 1382NB, SK 2382, SK 3382, SK 4382, SK 5382, SK 6382, SK 7382, SK 8382, SK 9382, SK 10382, SK 11382, SK 12382 (3-stage)

Bevel gear units
SK 92072, SK 92172, SK 92372, SK 92672, SK 92772
SK 92072.1, SK 92172.1, SK92372.1, SK 92672.1, SK 92772.1, SK 93072.1, SK 93172.1, SK 93372.1, SK93672.1, SK 93772.1 (2-stage)
SK 9012.1, SK 9016.1, SK 9022.1, SK 9032.1, SK 9042.1, SK 9052.1, SK 9062.1, SK 9072.1, SK 9082.1, SK 9086.1, SK 9092.1, SK 9096.1 (3-stage)
SK 9013.1, SK 9017.1, SK 9023.1, SK 9033.1, SK 9043.1, SK 9053.1 (4-stage)

Contrate worm gear unit
SK 02040, SK 02050, SK 12063, SK 12080, SK 32100,SK 42125 (2-stage)
SK 13050, SK 13063, SK 13080, SK 33100, SK 43125 (3-stage)

MINIBLOC worm gear units
SK1 S32, SK1 S40, SK 1S50, SK 1S63, SK 1SU...
SK 1SM31, SK 1SM40, SK 1SM50, SK 1SM63 (single-stage)
SK 2S32NB, SK 2S40NB, SK 2S50NB, SK 2S63NB, SK 2SU…,
SK 2SM40, SK 2SM50, SK 2SM63 (2-stage)

UNIVERSAL worm gear units
SK 1SI31, SK 1SI40, SK 1SI50, SK 1SI63, SK 1SI75,
SK 1SIS31,…, SK 1SIS75,
SK 1SID31,…, SK 1SID63,
SK 1SMI31,…, SK 1SMI75,
SK 1SMID31,…, SK 1SMID63,
SK 1SIS-D31,…, SK 1SIS-D63 (single-stage),
SK 2SMID40, SK2SMID50, SK2SMID63,
SK 2SID40,…, SK 2SID63 (2-stage)

Versions / Options

-	Foot mounting with solid shaft
A	Hollow shaft version
V	Solid shaft version
L	Solid shaft both sides
Z	Drive flange B14
F	Output flange B5
X	Foot mounting
XZ	Base and output flange B14
XF	Base and output flange B5
AL	Reinforced axial drive bearings
5	Reinforced output shaft (Standard helical gear unit)
V	Reinforced drive shaft (Standard helical gear unit)
D	Torque support
K	Torque console
S	Shrink disc
VS	Reinforced shrink disc
EA	Hollow shaft with internal spline
G	Rubber buffer
VG	Reinforced rubber buffer
R	Back stop
B	Fixing element
H	Covering cap as contact guard
H66	Covering cap IP66
VL	Reinforced bearings
VL2	Agitator design
VL3	Drywell agitator design
IEC	Standard motor mounting
NEMA	Standard motor mounting
W	With free drive shaft
VI	Viton radial seals
OA	Oil expansion vessel
OT	Oil level tank
SO1	Synthetic oil ISO VG 220
CC	Casing cover with cooling spiral
DR	Spring Loaded Breather
H10	Modular contrate pre-stage
/31	Worm pre-stage
/40	Worm pre-stage

Double gear units consist of two single gear units. They are to be treated as per the instructions in this Manual, i.e. as two individual gear units. Type designation of double gear units: e.g. SK 73/22 (consisting of single gears SK 73 and SK 22)

2.2 Name plate

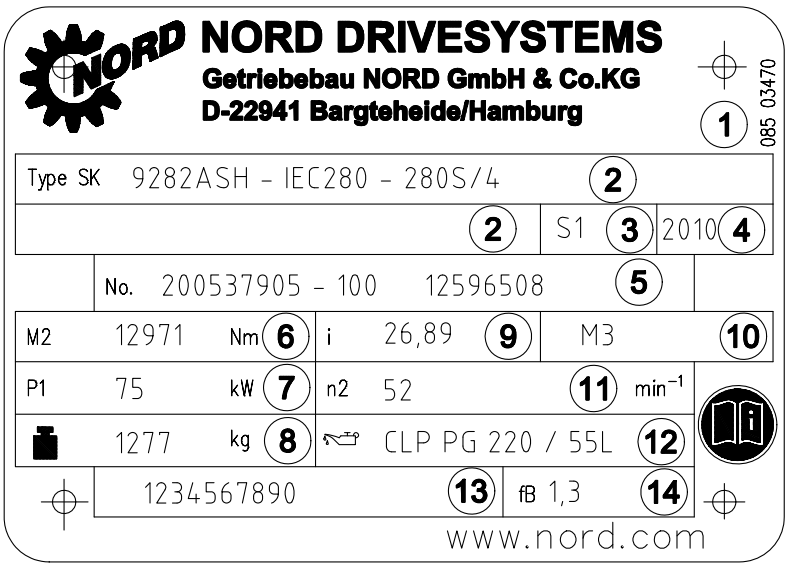


Figure 2-1: Name plate (example)

Explanation of the Name Plate

1 Matrix – Barcode
2 NORD gear unit type
3 Operating mode
4 Year of manufacture
5 Serial number
6 Rated torque of gear unit output shaft
7 Drive power
8 Weight according to ordered version
9 Overall gear unit ratio
10 Installation orientation
11 Rated speed of gear unit output shaft
12 Lubricant type, viscosity and quantity
13 Customer's part number
14 Operating factor

3. Assembly instructions, storage, preparation, installation

Please observe all of the general safety information in Section 1.4, 1.3 and in the individual sections.

3.1 Storing the gear unit

For short-term storage before commissioning, please observe the following:

- Store in the fitting position (see Section 6.1) and secure gear units against falling
- Lightly grease bare metal housing surfaces and shafts
- Store in dry rooms
- Temperature must not fluctuate beyond the range of –5 °C to +50 °C
- Relative humidity less than 60%
- No direct exposure to sunlight or UV light
- No aggressive, corrosive substances (contaminated air, ozone, gases, solvents, acids, alkalis, salts, radioactivity etc.) in the immediate vicinity
- No vibration or oscillation

3.2 Long-term storage

	Note!
	For storage or standstill periods in excess of 9 months, Getriebebau NORD recommends the long-term storage option. With the long-term storage option and the use of the measures listed below, storage for up to 2 years is possible. As the actual influences on the unit greatly depend on the local conditions, these times should only be regarded as guide values.

Conditions of the gear unit and storage area for long-term storage prior to commissioning:

- Store in the fitting position (see Section 6.1) and secure gear units against falling
- Transportation damage to the external paint must be repaired. Check that a suitable rust inhibitor is applied to the flange bearing surfaces. If necessary apply a suitable rust inhibitor to the surfaces.
- Gear units with the long-term storage option are completely filled with lubricant or have VCI corrosion protection agents added to the gear oil. (See label on gear unit)
- The sealing band in the vent plug must not be removed during storage. The gear unit must remain sealed tight.
- Store in a dry place.
- In tropical regions, the drive unit must be protected against damage by insects
- Temperature must not fluctuate beyond the range of –5 °C to +40 °C
- Relative humidity less than 60%
- No direct exposure to sunlight or UV light
- No aggressive, corrosive substances (contaminated air, ozone, gases, solvents, acids, alkalis, salts, radioactivity etc.) in the immediate vicinity
- No vibration or oscillation

Measures during storage or standstill periods

- If the relative humidity is <50% the gear unit can be stored for up to 3 years.

Measures before commissioning

- If the storage or standstill period exceeds 2 years or the temperature during short-term storage greatly deviates from the standard range, the lubricant in the gear unit must be replaced before commissioning.
- If the gear unit is completely filled, the oil level must be reduced before commissioning.

3.3 Transporting the gear unit

	**Danger!**
	To prevent injury, **the danger area must be generously cordoned off.** Standing under the gear unit during transport is **extremely dangerous.**

	**Attention!**
	Avoid damage to the gear unit. Impacts to the free ends of the shafts may cause internal damage to the gear unit. Use adequately dimensioned and **suitable means of transportation**. Lifting tackle must be designed for the weight of the gear unit. The weight of the gear unit can be obtained from the dispatch documents.

3.4 Preparing for installation

The drive unit must be inspected and may only be installed if no transportation damage or leaks are visible. In particular the radial seals and the sealing caps must be inspected for damage.

All bare metal surfaces and shafts of the gear unit are protected against corrosion with oil, grease or corrosion protection agents before shipping.

Thoroughly remove all oil, grease or corrosion protection agents and any dirt from the shafts and flange surfaces before assembly.

In applications where an incorrect rotational direction may result in damage or potential risk, the correct rotational direction of the drive shaft is to be established by test running the drive when uncoupled and guaranteeing such for subsequent operation.

Gears with integrated return stops are marked with arrows on the driven/driving sides. The arrows point in the rotation direction of the gear unit. It must be ensured, when connecting the motor and during motor control, that the gear unit can only operate in the rotation direction, e.g. by means of a rotary field test. (For further details, please refer to Catalogue G1000 and WN 0-000 40)

	**Attention!**
	With gear units with an integrated back stop, switching the drive motor to the blocked rotation direction, i.e. incorrect rotation direction, can lead to gear damage.

Ensure that no aggressive or corrosive substances are present in the area surrounding the installation site or are subsequently expected during operation, which attack metal, lubricants or elastomers. In case of doubt, please contact Getriebebau NORD and take the recommended action.

Oil expansion tanks (Option OA) must be fitted in accordance with works standard WN 0-530 04. For gear units with an M10x1 vent plug, works standard WN 0-52135 must be observed.

Oil expansion tanks (Option OT) must be fitted in accordance with works standard WN 0-521 30.

If venting of the gear unit is provided, the vent or the pressure vent must be activated before commissioning. To activate, remove the transport securing devices (sealing cord). Position of the vent plug: see Section 6.1.

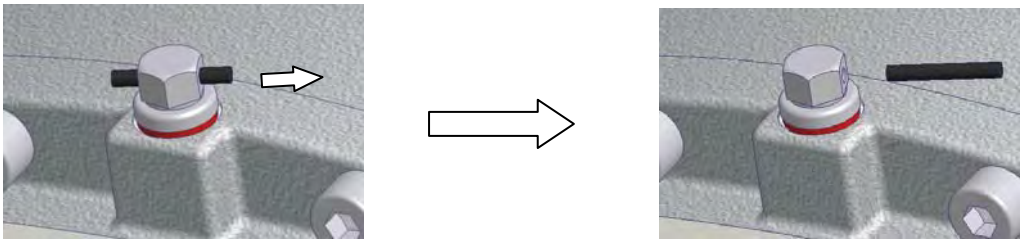


Figure 3-1: Activating the vent plug

Special pressure vents are supplied as loose parts. Before commissioning, the vent plug must be replace with the pressure vent which is supplied as a loose part. This is achieved by screwing out the vent fitting and replacing it with the pressure vent and seal (refer to Section 6.2 for torque values). Double gear units consist of two single units and are equipped with 2 oil chambers and 2 pressure vents.

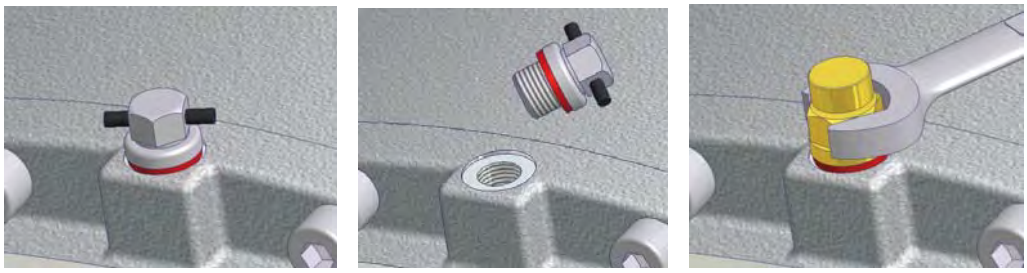


Figure 3-2: Removing vent plug and fitting the pressure vent

3.5 Installing the gear unit

The eyebolts screwed into the gear units must be used during installation. The safety notes in Section 1.4 must be observed.

The base and/or flange to which the gear unit is fitted should be vibration-free, torsionally strong and flat. The smoothness of the mating surface on the base or flange must be according to tolerance clad K of DIN ISO 2768-2. All contamination to the bolting surfaces of gear unit and base and/or flange must be thoroughly removed.

The gear unit must be precisely aligned with the drive shaft of the machine in order to prevent additional forces from being imposed on the gear unit due to tension.

Welding of the gear unit is prohibited. The gear unit must not be used as the earth connection for welding work, as this may cause damage to the bearings and gear wheels.

The gear unit must be installed in the correct configuration (see Section 6.1) (UNIVERSAL gear unit types SI and SMI are independent of the configuration). Changes to the installation position after delivery require adjustment of the quantity of oil, and often other measures such as e.g. the installation of encapsulated roller bearings. **Damage may result if the stated installation position is not observed.**

All gear unit feet and/or all flange bolts on each side must be used. Bolts must have a minimum quality of 8.8. The bolts must be tightened to the correct torques (refer to Section 6.2 for torque values). Tension-free bolting must be ensured, particularly for gear units with a foot and flange.

Danger!

To ensure that the gearbox does not get too warm and to avoid injury to persons, observe the following during installation:

- The surfaces of gear units or geared motors may become hot during or shortly after operation. **Attention: danger of burns!!** Protection against accidental contact may need to be installed.
- With geared motors, the **cooling air of the motor fan** must be able to flow **unobstructed** onto the gear unit.

3.6 Fitting hubs on the gear shafts

Attention!

Do not subject the gear unit to harmful axial forces when fitting the hubs.

Drive and driven elements, e.g. coupling and chain-wheel hubs must be mounted onto the drive and driven shaft of the gear unit using suitable pullers that will not apply damaging axial forces onto the gear unit. In particular, do not hit the hubs with a hammer.

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

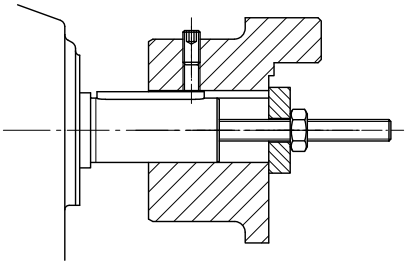


Figure 3-3: Example of a simple pulling device

Danger!

Drive and driven elements, such as belt drives, chain drives and couplings **must be fitted with contact protection.**

Driven elements may only subject the drive units to the maximum radial force F_R and axial force F_A as specified in the catalogue. Observe the correct tension, particularly on belts and chains. Additional loads due to unbalanced hubs are not permitted. The radial force must be applied to the gear unit as closely as possible.

3.7 Fitting push-on gear units

STOP	**Attention!**
	The bearings, gear wheels, shafts and housing may be damaged by incorrect fitting.

The push-on gear unit must be fitted onto the shaft using a suitable puller, which will not exert damaging axial forces on the gear unit. In particular, do not hit the gear unit with a hammer.

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

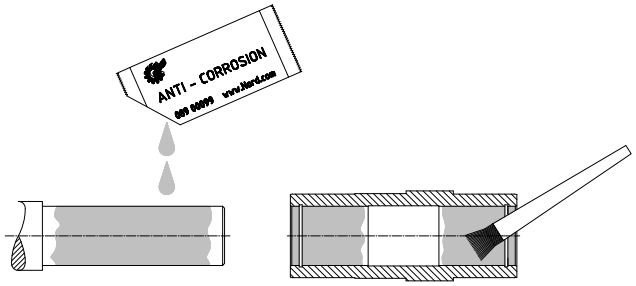


Figure 3-4: Applying lubricant to the shaft and the hub

	Note!
	The gear unit can be fitted to shafts with and without a shoulder using the fastening element (Option B). Tighten the bolt of the fastening element to the correct torque. (See Chapter 6.2 for torque values) For gear units with option H66, the factory-fitted closing cap must be removed before assembly.

For shaft mounted gear units with option H66 and fastening element (Option B) the pressed-in closing cap must be pushed out before fitting the gear unit. The pressed-in closing cap may be destroyed during dismantling. As standard a second closing cap is supplied as a loose spare part. After fitting the gear unit, fit the new / new condition closing cap as described in Section 3.11.

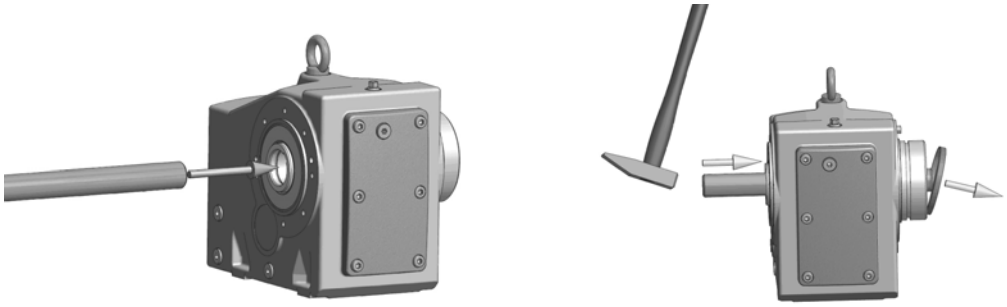


Figure 3-5: Removing the factory-fitted closing cap

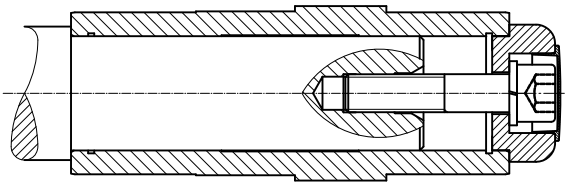


Figure 3-6: Gear unit mounted to shaft with a shoulder using the fastening element

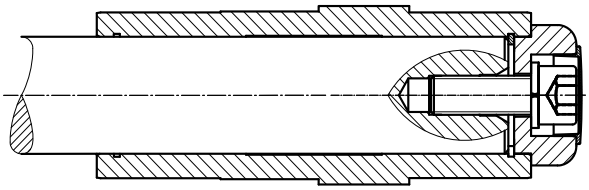


Figure 3-7: Gear unit mounted to shaft without a shoulder using the fastening element

A gear unit can be dismantled from a shaft with shoulder using the following device, for example.

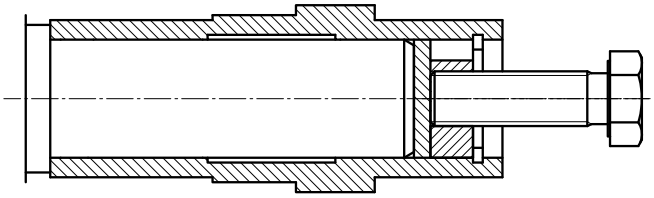


Figure 3-8: Dismantling using dismantling device

When mounting push-on gears with torque supports, the support must not be distorted. Tension-free mounting is aided by the rubber buffer (Option G and/or VG).

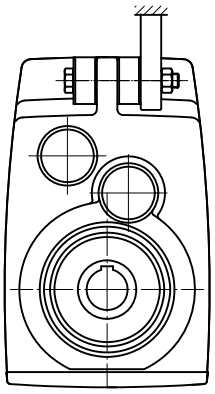


Figure 3-9: Mounting the rubber buffer (Option G and/or VG) on parallel shaft gear units

To fit the rubber buffer, tighten the screw fastening until there is no play between the contact surfaces when there is no load. Then turn the fastening nut (only applies for screw fastenings with adjusting threads) half a turn in order to pre-tension the rubber buffer. Greater pre-tension is not permissible. Secure the screw fastening from coming loose, e.g. with Loctite 242 or a second nut.

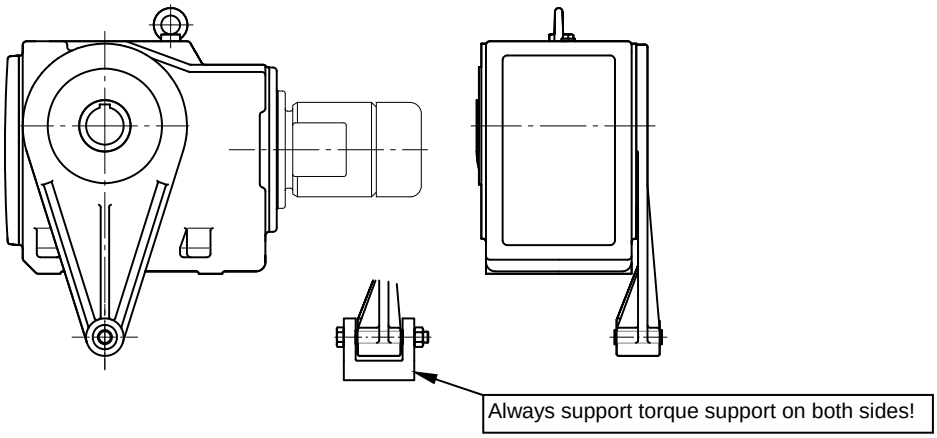


Figure 3-10: Attaching the torque support on bevel gear and worm gear units

Tighten the bolts on the torque support to the correct torque (see Section 6.2 for torque values) and secure to prevent loosening (e.g. Loctite 242, Loxeal 54-03).

3.8 Fitting shrink discs

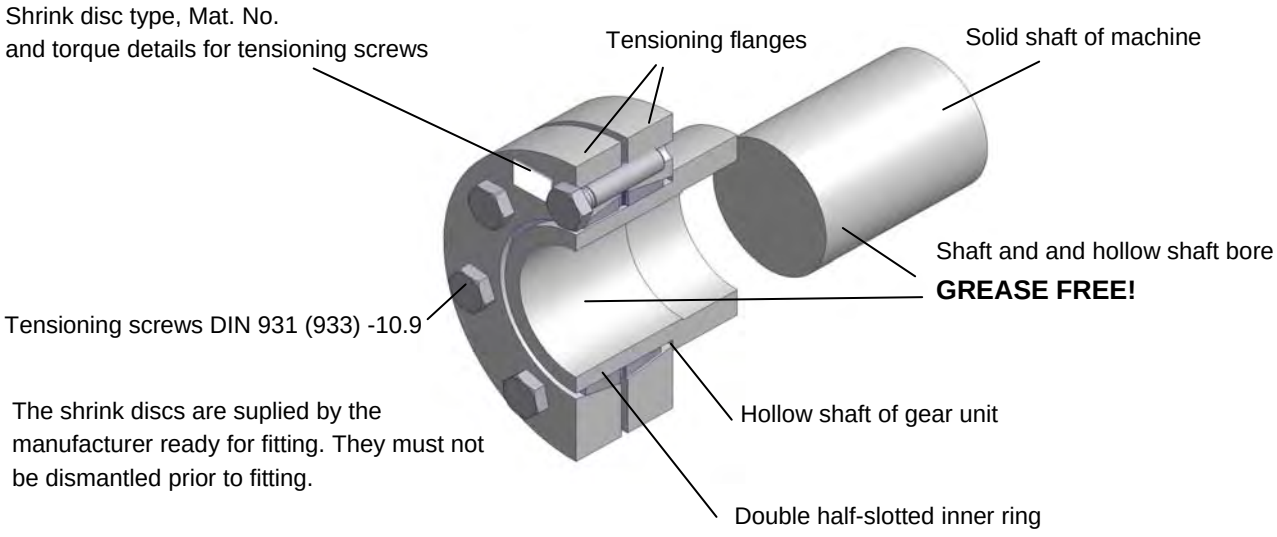


Figure 3-11: Hollow shaft with shrink disc

STOP	**Attention!**
	Do not tighten bolts if the solid shaft is not inserted!

Assembly sequence:

1. Remove any transport securing devices.
2. Loosen but do not remove tightening bolt and tighten gently by hand until there is no play between the flanges and the inner ring.

3. Slide the shrink disc onto the hollow shaft until the outer clamping flange is flush with the hollow shaft. The shrink disc is easier to slide on if the bore of the inner ring is lightly greased.
4. Prior to mounting, grease the solid shaft only in the area which will later come into contact with the bronze bush in the hollow shaft of the gear unit. Do not grease the bronze bush, in order to prevent grease penetrating the area around the shrink connection.
5. The hollow shaft of the gear unit must be completely de-greased and **completely free of grease.**
6. In the area of the shrink connection the solid shaft of the machine must be degreased and **completely free of grease**.
7. Insert the solid shaft of the machine into the hollow shaft so as to completely fill the area around the shrink connection.
8. Position the clamping flange by gently tightening the bolts.
9. Tighten the bolts successively in a clockwise direction by several turns – not crosswise – with approx. ¼ rotation per turn. Tighten the bolts with a torque wrench to the torque indicated on the shrink disc.
10. When the tensioning bolts have been tightened, there must be an even gap between the clamping flanges. If this is not the case, the gear unit must be dismantled and the shrink disc connection checked for correct fit.

	**Danger!**
	Risk of injury from incorrect mounting and dismantling of the shrink disc.

Dismantling sequence:

1. Loosen the bolts successively in a clockwise direction by several turns with approx. ¼ rotation per turn. Do not remove the 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.

3.9 Fitting the covers

	**Danger!**
	Shrink discs and exposed rotating shaft ends require contact guards in order to prevent injuries. A cover (Option H and Option H66) can be used as a guard. If this does not achieve sufficient protection against contact according to the required protection type, the machinery and plant constructor must ensure this be means of special attached components.

All fixing screws must be used and tightened to the correct torque. (See Section 6.2 for torque values) For covers with option H66, press in the new / new condition closing cap by tapping it lightly with a hammer.

Figure 3-12: Fitting the covers, Option SH, Option H, and Option H66

3.10 Fitting a standard motor

The maximum permitted motor weights indicated in the table below must not be exceeded when attaching the motor to an IEC- / NEMA adapter

Maximum permitted motor weights														
IEC motor size	63	71	80	90	100	112	132	160	180	200	225	250	280	315
NEMA Motor size		56C	143T	145T	182T	184T	210T	250T	280T	324T	326T	365T		
Max. motor weight [kg]	25	30	40	50	60	80	100	200	250	350	500	700	1000	1500

Assembly procedure to attach a standard motor to the IEC adapter (Option IEC)/NEMA adapter

1. Clean motor shaft and flange surfaces of motor and IEC /NEMA adapter and check for damage. Mounting dimensions and tolerances of the motor must conform to DIN EN 50347/NEMA MG1 Part 4.
2. Push the coupling sleeve onto the motor shaft so that the motor parallel key engages into the groove in the sleeve on tightening.
3. Tighten the coupling sleeve on the motor shaft in accordance with the motor manufacturer's instructions until it touches the collar. With motor sizes 90, 160, 180 and 225, any spacer bushes must be positioned between the coupling sleeve and the collar. With standard helical gear units, dimension B between the coupling sleeve and the collar must be observed (see Figure 3-13). Certain **NEMA adapters** require the adjustment of the coupling in accordance with the specifications indicated on the adhesive plate.
4. If the coupling half contains a threaded pin, the coupling must be secured axially on the shaft. The threaded pin must be coated prior to use with a securing lubricant e.g. Loctite 242, Loxeal 54-03 and tightened to the correct torque. (See Chapter 6.2 for torque values)
5. Sealing of the flange surfaces of the motor and the IEC /NEMA adapter is recommended if the motor is installed outdoors or in a humid environment. **The flange surfaces** of motor and adapter must be completely coated with **surface sealant** Loctite 574 or Loxeal 58-14 prior to mounting so that the flange seals after mounting.
6. Mount the motor to the IEC /NEMA adapter, do not forget to fit the gear rim or the sleeve. (See Figure 3-13)
7. Tighten the IEC /NEMA adapter bolts to the correct torque. (See Chapter 6.2 for torque values)

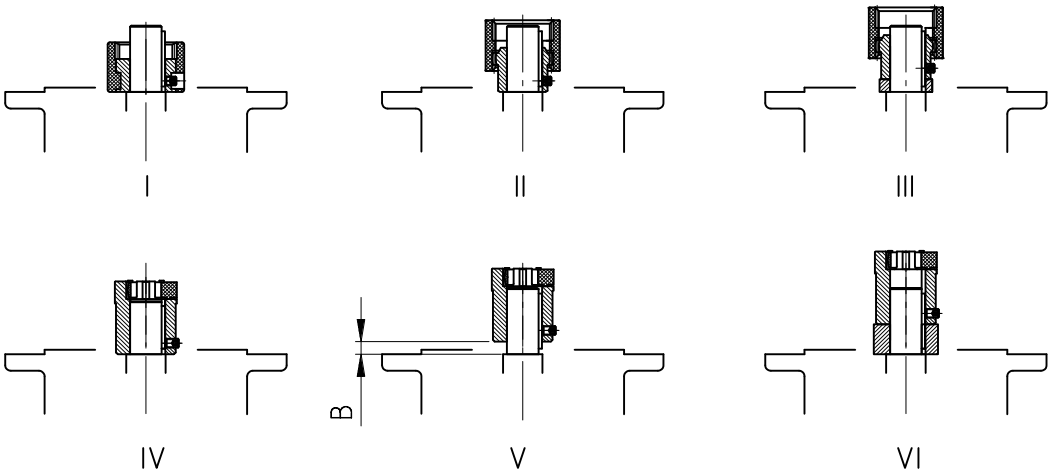


Figure 3-13: Fitting the coupling onto the motor shaft - various types of coupling

I Gear coupling, one-part

II Gear coupling, two-part

III Gear coupling, two-part with spacer bush

IV Claw coupling, two-part

V Claw coupling, two-part, observe dimension B:

Standard helical gear unit:	SK0, SK01, SK20, SK25, SK30, SK33 (2-stage) SK010, SK200, SK250, SK300, SK330 (3-stage)	
	IEC size 63	IEC size 71
Dimension B (Fig. 3-13V)	B = 4.5mm	B = 11.5 mm

VI Claw coupling, two-part with spacer bush

3.11 Retrospective paintwork

	Attention!
STOP	For retrospective painting of the gear unit, the radial seals, rubber elements, pressure venting valves, hoses, type plates, adhesive labels and motor coupling components must not come into contact with paints, lacquers or solvents, as otherwise components may be damaged or made illegible.

3.12 Fitting the cooling coil to the cooling system

Cutting ring screw threads (see Item 1, Figs. 3-14) are located at the casing cover for the connection of a pipe with an external diameter of 10 mm according to DIN 2353. **Remove the drain plug from the screw neck prior to assembly to avoid any contamination of the cooling system**. The screw necks should be connected with the coolant circuit, which must be provided by the operator. The flow direction of the coolant is irrelevant.

Make sure not to twist the screw necks during or after assembly as the cooling coil may be damaged (see Item 3, Fig. 3-14). You must ensure that no external forces act on the cooling coil.

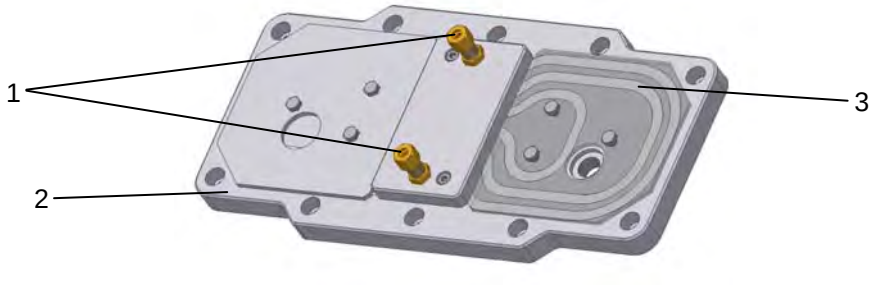


Figure 3-14: Cooling cover

	Danger!
	The pressure released from the cooling circuit before carrying out any work on the gear unit.

4. Commissioning

4.1 Checking the oil level

The oil level must be checked prior to commissioning. See Section 5.2.

4.2 Activating the automatic lubricant dispenser

Some gear unit types with standard motor (Option IEC/NEMA) have an automatic lubricant dispenser for the rolling bearings. This dispenser must be activated prior to commissioning. The cartridge case cover has a red information sign for the activation of the lubricant dispenser.

Activating the Automatic Lubricant Dispenser:

1. Loosen and remove cylinder bolts M8x16 **(1)**
2. Lift off cartridge case cover **(2)**
3. Insert activation screw **(3)** into the lubricant dispenser **(5)** until the lug **(4)** breaks off at the defined fracture point
4. Refit cartridge case cover **(2)** and fasten using cylinder bolt **(1)**. (See Chapter 6.2 for torque values)
5. Mark activation date on the adhesive plate **(6)** indicating month/year

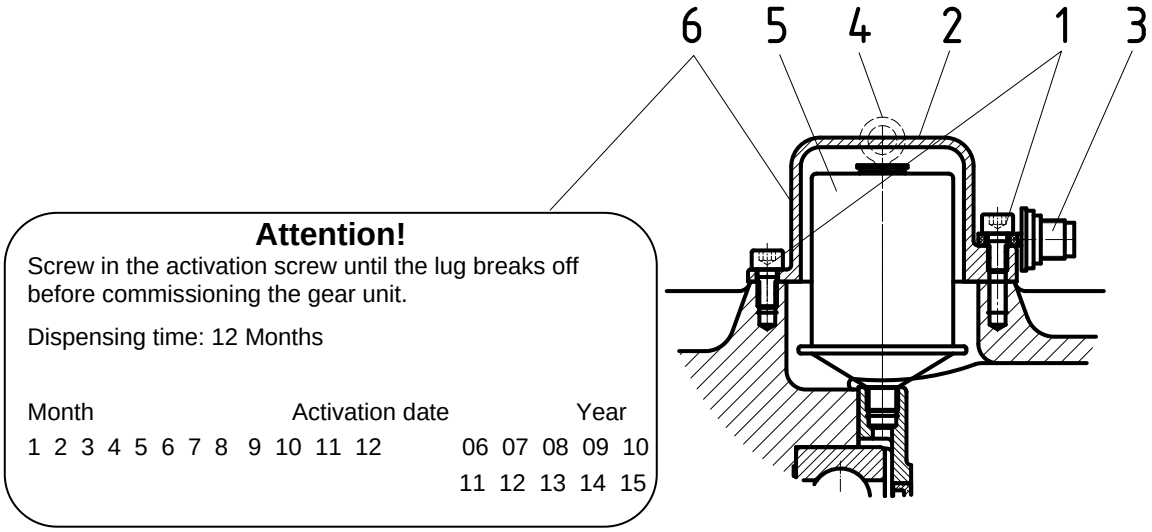


Figure 4-1: Activating the automatic lubricant dispenser with standard motor mounting

4.3 Operation with lubricant cooling

Water cooling

	**Caution!**
	The drive may only be commissioned after the cooling spiral has been connected to the cooling circuit, and the cooling circuit has been put into operation.

The coolant must have a similar thermal capacity as water (specific thermal capacity at 20°C c=4.18 kJ/kgK). Industrial water without any air bubbles or sediments is recommended as a coolant. The water hardness must be between 1° dH and 15° dH, and the pH value must be between pH 7.4 and pH 9.5. No aggressive liquids should be added to the coolant!

The **coolant pressure** must not exceed **8 bar**. The required **quantity of coolant** is **10 litres/minute**, and the **coolant inlet temperature** should not exceed 40°C; we recommend **10°C**.

We also recommend fitting a pressure reducer at the coolant inlet to avoid any damage due to excessive pressure.

If there is a danger of frost the operator should add a suitable anti-freeze solution to the cooling water.

The **temperature of the cooling water** and the **cooling water flow rate** must be **supervised** and **ensured** by the operator.

Air/Oil cooler

This version and all important data concerning the air/oil cooler can be obtained from Catalogue G1000, or contact the manufacturer of the cooling unit.

4.4 Running-in time for the worm gear unit

	**Note!**
	In order to achieve maximum efficiency of the worm gear unit, the gear unit must be subjected to a running-in period of approx. 25 h – 48 h under maximum load. There may be a reduction in efficiency before the running-in period is complete.

4.5 Checklist

Checklist		
Object of the check	**Checked on:**	**Information – see Section**
Is the vent plug activated or the pressure vent screwed in?		Sec. 3.4
Does the required configuration conform with the actual installation?		Sec. 6.1
Are the external gear shaft forces within permitted limits (chain tension)?		Sec. 3.6
Is the torque support correctly fitted?		Sec. 3.7
Are contact guards fitted to rotating components?		Sec. 3.9
Is the automatic lubricant dispenser activated?		Sec. 4.2
Is the cooling cover connected to the cooling circuit?		Sec. 3.12/4.3

5. Service and maintenance

5.1 Service and maintenance intervals

Service and Maintenance Intervals	Service and Maintenance Work	Information – see Section
At least every six months	- Visual inspection	5.2
	- Check for running noises	5.2
	- Check oil level	5.2
	- Re-grease (applicable only to free drive shaft / Option W and on agitator bearings / Option VL2 / VL3)	5.2
	- Replace automatic lubricator (for operating times < 8 h/day: a replacement interval for the lubricant dispenser of 1 year is permissible) (only with IEC/NEMA standard motors)	5.2
For operating temperatures up to 80°C Every 10000 operating hours at least every 2 years (The interval is double this if the unit is filled with synthetic products) For higher temperatures or extreme operating conditions (high humidity, aggressive environments and large temperature fluctuations) the oil change intervals must be halved.	- Change the oil	5.2
	- Clean or replace the vent plug.	5.2
Every 25000 operating hours, at least every 5 years	- Replace shaft sealing rings if worn	5.2
	- Re-lubrication of the bearings in the gear unit	5.2
At least every 10 years	- General overhaul	5.2

5.2 Service and maintenance work

Servicing and maintenance work must only be performed by qualified specialist personnel.

Installation and maintenance work must only be performed when gear units are at a standstill. The drive must be isolated and secured to prevent accidental start-up.

Visual inspection

The gear unit must be checked for leaks. In addition, the gear unit must be inspected for external damage and cracks in the hoses, hose connections and rubber buffers. Have the gear unit repaired in case of leaks, e.g. dripping gear oil or cooling water, damage or cracks. Please contact the NORD service department.

	Note!
	Shaft sealing rings are rubbing seals and have sealing lips made from an elastomer material. These sealing lips 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.

Check for running noises

If the gear unit produces unusual running noises and/or vibrations, this could indicate damage to the gear unit In this case the gear should be shut down and a general overhaul carried out.

Check the oil level

Section 6.1 describes the versions and the corresponding oil level screws. With double gear units, the oil level must be checked on both units. The pressure vent must be at the position marked in Section 6.1.

The oil level does not need to be checked on gear units without oil level screw (see Section 6.1).

Gear unit types that are not supplied full of oil must be filled before the oil level is checked. (see “Changing the oil”)

Checking the oil level:

1. The oil level may only be checked when the gear unit is **at a standstill and has cooled down**. The gear unit must be secured to prevent accidental switch-on.
2. The oil level screw corresponding to the version must be screwed out. (See Section 6.1)

	Note!
	At the first oil level check a small amount of oil may escape, as the oil level may be below the lower edge of the oil level hole.

3. Gear units with oil level screw: The maximum oil level is the lower edge of the oil level hole. The minimum oil level is 4 mm below the oil level hole. If the oil level is too low, this must be corrected using the correct type of oil. An oil level glass is available instead of the oil level screw
4. Gear units with an oil level vessel: The oil level must be checked **in the oil level vessel** with the aid of the dipstick plug (thread G1 1/4). The oil level must be between the upper and lower mark when the dipstick is completely screwed in (see Fig. 5-2). The oil level must be corrected with the correct type of oil if necessary. These gearboxes may only be operated in the configuration stated in Section 6.1.
5. The oil level screw or the cap screw with dipstick and all other loosened screws must be correctly re-tightened.

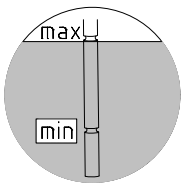


Figure 5-2: Check the oil level with a dipstick

Regreasing

Some gear unit designs (free drive shaft, Option W, agitator designs VL2 and VL3) are equipped with a regreasing device.

For agitator versions VL2 and VL3, the vent screw located opposite to the grease nipple must be unscrewed before regreasing. Grease should be injected until a quantity of 20-25g escapes from the vent hole. After this, the vent plug must be reinserted and tightened.

For Option W and some IEC adapters, the outer roller bearing must be regreased with approx. 20-25g of grease via the grease nipple provided

Recommended grease: Petamo GHY 133N (see Section 6.4: Klüber Lubrication).

Replacing the automatic lubricant dispenser

Screw-off the cartridge case cover (2), (see Fig. 4-1). The lubrication dispenser (5) is screwed out and replaced with a new component (Part No. 283 0100). Then activate (see Chapter 4.2)!

Changing the oil

The figures in Section 6.1 show the oil drain screw, the oil level screw and the pressure vent screw for various designs.

Sequence:

1. Place the drip tray below the oil drain screw or the oil drain cock
2. Completely remove oil level screw, screwed sealing plug with dipstick if an oil level tank is being used and oil drain screw.

	Danger!
	Warning: Hot oil!

3. Drain all the oil from the gear unit.
4. If the screw lock coating of the oil drain screw or oil level screw is damaged in the thread, a new oil level screw must be used or the thread cleaned and coated with securing lubricant, e.g. Loctite 242, Loxeal 54-03 prior to inserting. Check the sealing ring for damage. Replace with a new sealing ring in case of damage.
5. Support the seal ring, insert the oil drain screw into the hole and tighten to the correct torque! (See Section 6.2 for torque values)
6. Using a suitable filling device, refill with oil of the same type through the oil level hole until oil emerges from the oil level hole. (The oil can also be filled through the pressure vent screw or a sealing plug located higher than the oil level). If an oil level vessel is used, fill the oil through the upper inlet (thread G1¼) until the oil level is set as described in Section 5.2.
7. Wait at least 15 minutes, or at least 30 minutes if an oil level tank is used, and then check the oil level. Proceed as described in Section 5.2.

	Note!
	The oil does not need to be changed on gear units without oil level screw (see Section 6.1). These gear units are lubricated for life. Standard helical gear units have no oil level screw. Here, the oil is topped up through the pressure vent bolt using the quantities listed in the table in Section 6.5.

Cleaning or replacing the vent plug

Unscrew the vent screw and thoroughly clean it (e.g. with compressed air) and fit the vent screw in the same place, If necessary, use a new vent screw with a new sealing ring.

Replacing the shaft sealing ring

Shaft sealing rings are rubbing seals made from an elastomer material and according to their principle are subject to natural wear. The wearing life of shaft sealing rings depends on many factors and cannot be calculated in advance. 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 shaft sealing ring must then be replaced.** To reduce the risk of leaks due to worn shaft sealing rings we recommend that as a precaution, the shaft sealing rings are replaced after every 25,000 operating hours or every 5 years. 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 shaft sealing ring does not run in the old wear track.

Re-lubricating bearings

For bearings which are not oil-lubricated and whose holes are completely above the oil level, replace the roller bearing grease (recommended grease: PETAMO GHY 133N). Please contact the NORD service department.

General overhaul

The gear units must be completely dismantled The following work must be carried out:

- Clean all gear unit components
- Examine all gear unit components for damage
- All damaged components must be replaced
- All roller bearings must be replaced
- Replace back stops if fitted
- Replace all seals, radial seals and Nilos rings
- Replace plastic and elastomer components of the motor coupling

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

6. Appendix

6.1 Versions and maintenance

Explanation of symbols for the following version illustrations:

Vent

Oil level

Oil drain

	Note!
	SK 320, SK 172, SK 272, SK 372K, SK 273 and SK373 as well as SK 01282 NB, SK 0282 NB, SK 1382 NB and UNIVERSAL / Minibloc gear units are lubricated for life. These gear units do not have an oil filler screw.

UNIVERSAL / MiniBloc worm gear units

NORD UNIVERSAL / MiniBloc worm gear units are suitable for all installation positions. They have an oil filler which is independent of the the version.

As an option, types SI and SMI can be equipped with a vent screw. Gear units with vents must be installed in the stated position (see section 6.5)

Types SI, SMI, S, SM and SU as 2-stage gear unit types and types SI, SMI as worm gear units for direct motor mounting have an oil filler which depends on the version and must be installed in the stated position.

Parallel shaft gear units with oil level vessel

The following applies for SK 9282, SK 9382, SK 10282, SK 10382, SK 11282, SK 11382 parallel gear units and SK 12382 in the M4 configuration with oil level vessels:

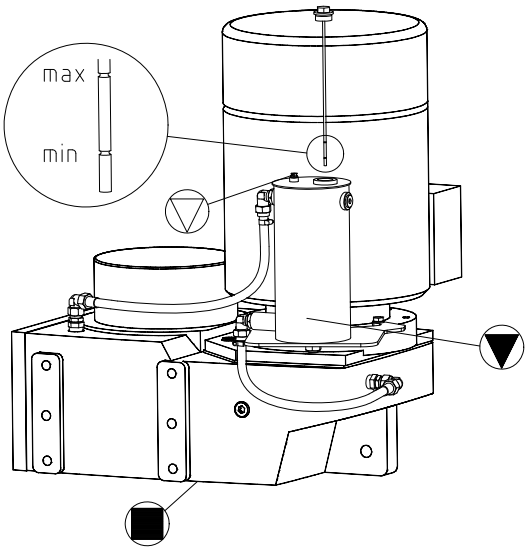
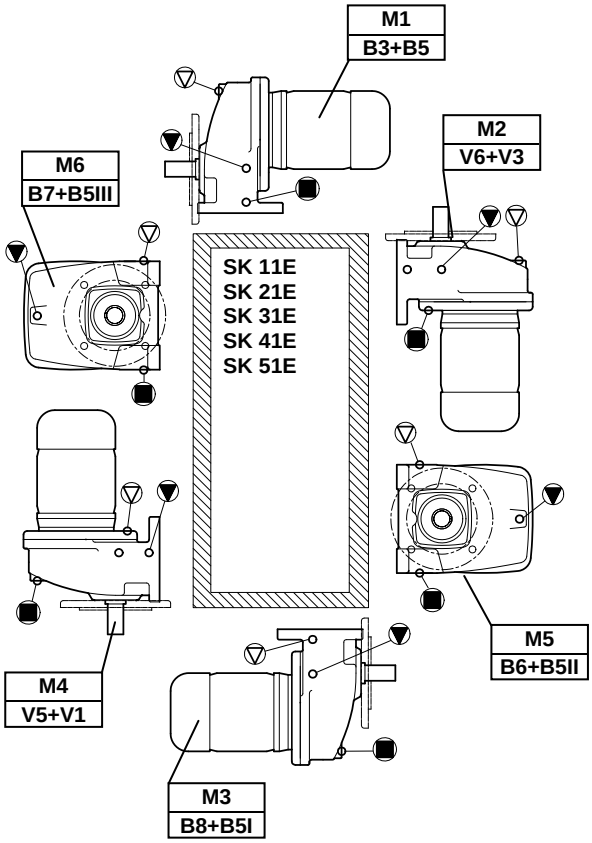


Figure 6-1: Oil level check with oil level tank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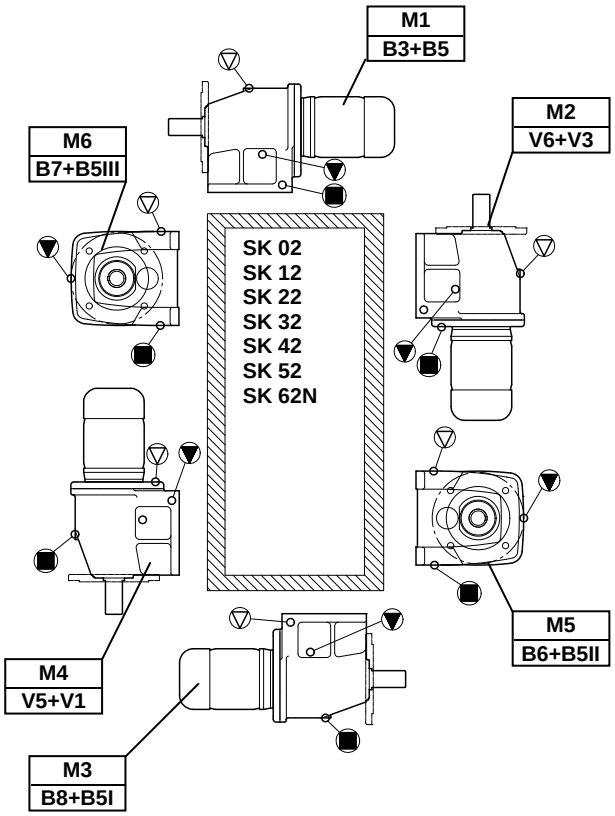
M4
V5+V1
M3
B8+B5I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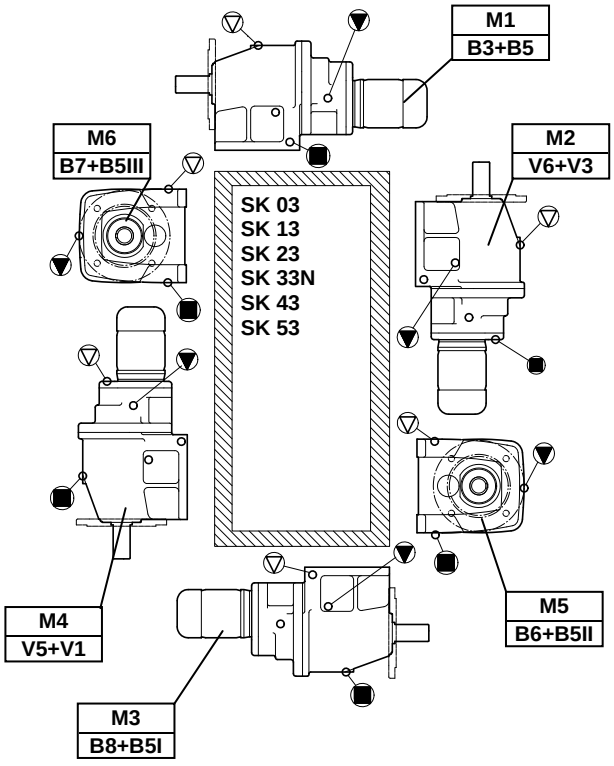
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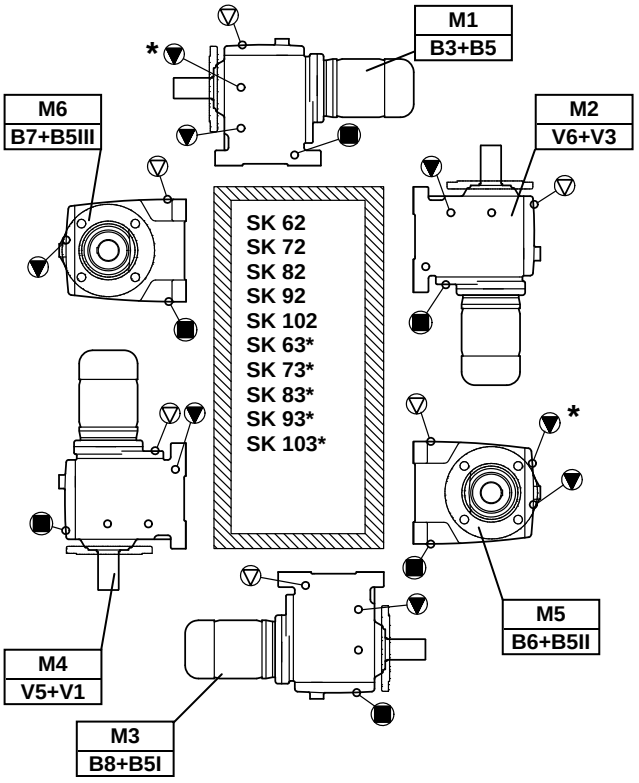
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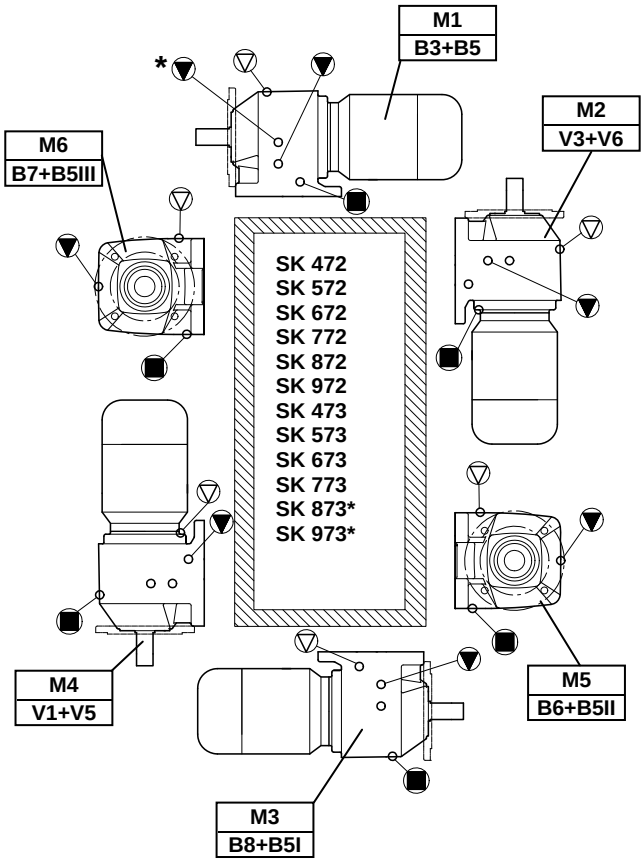
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SK 473
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SK 873*
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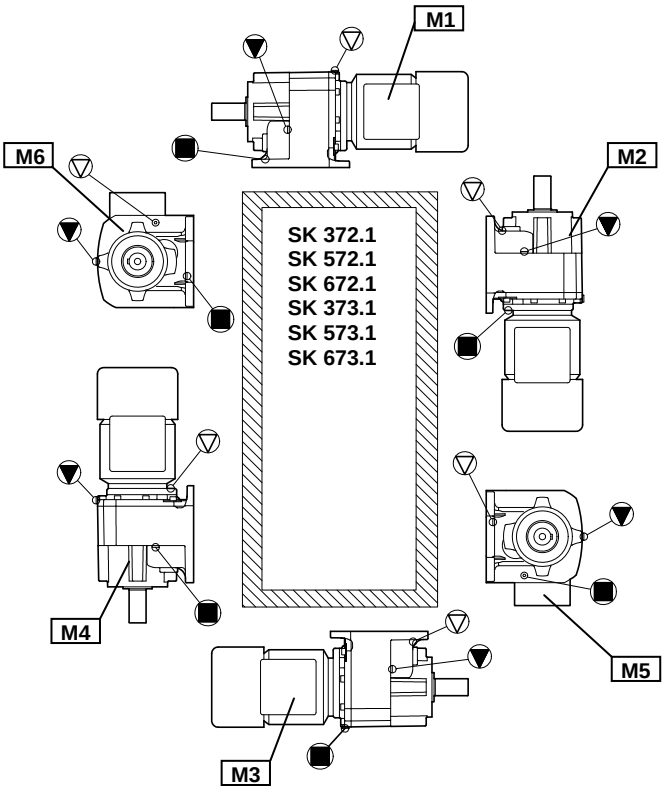
M5
B6+B5II
M3
B8+B5I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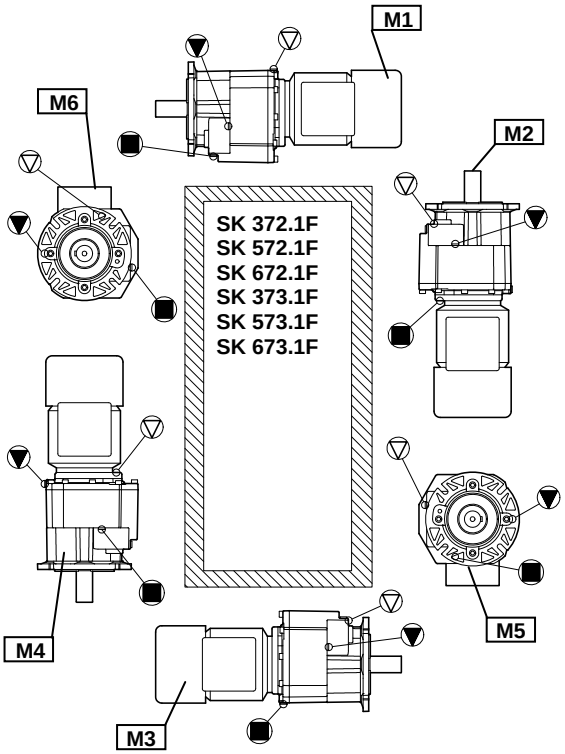
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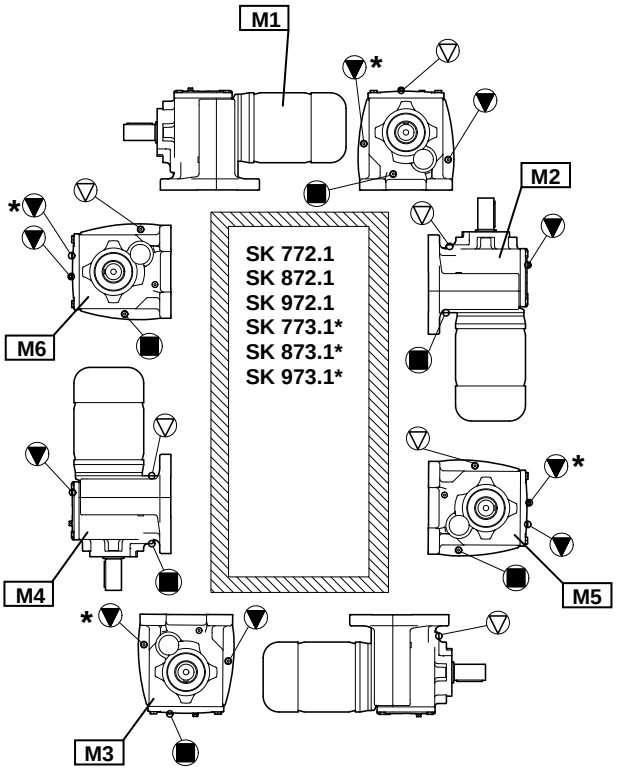
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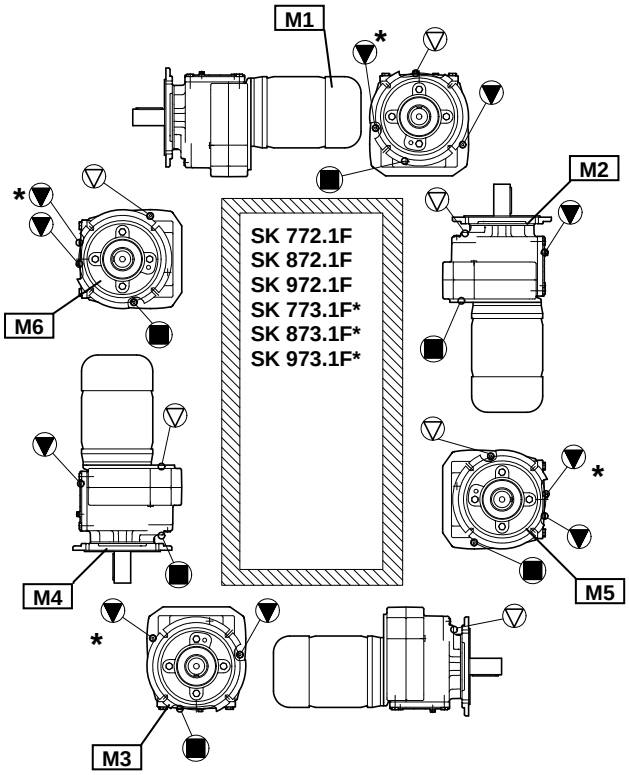
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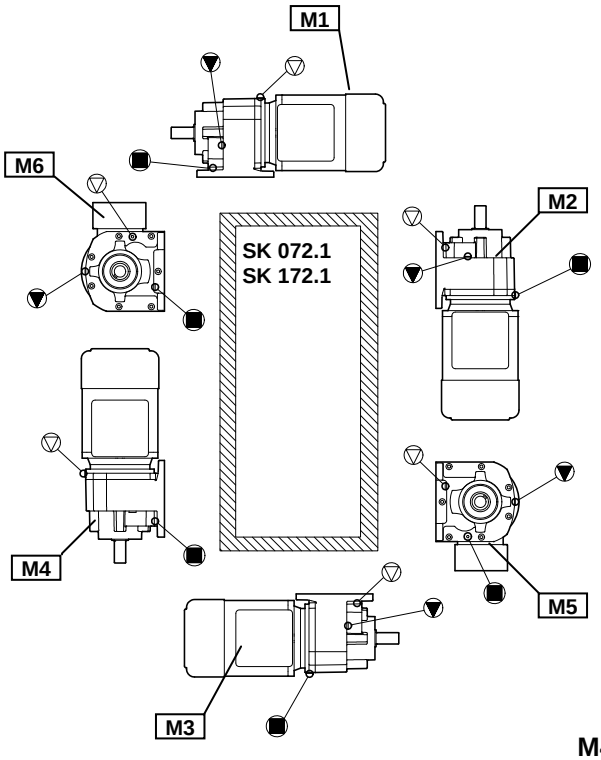
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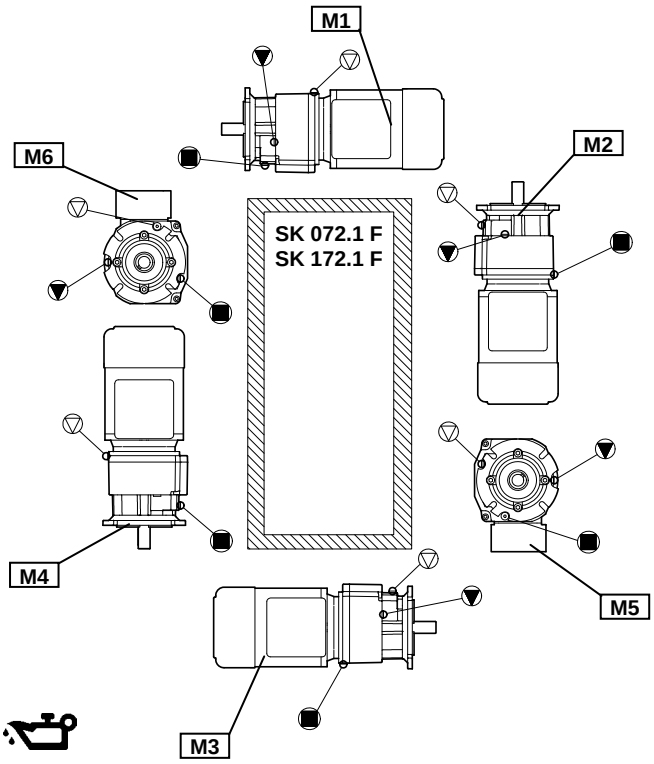
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M4

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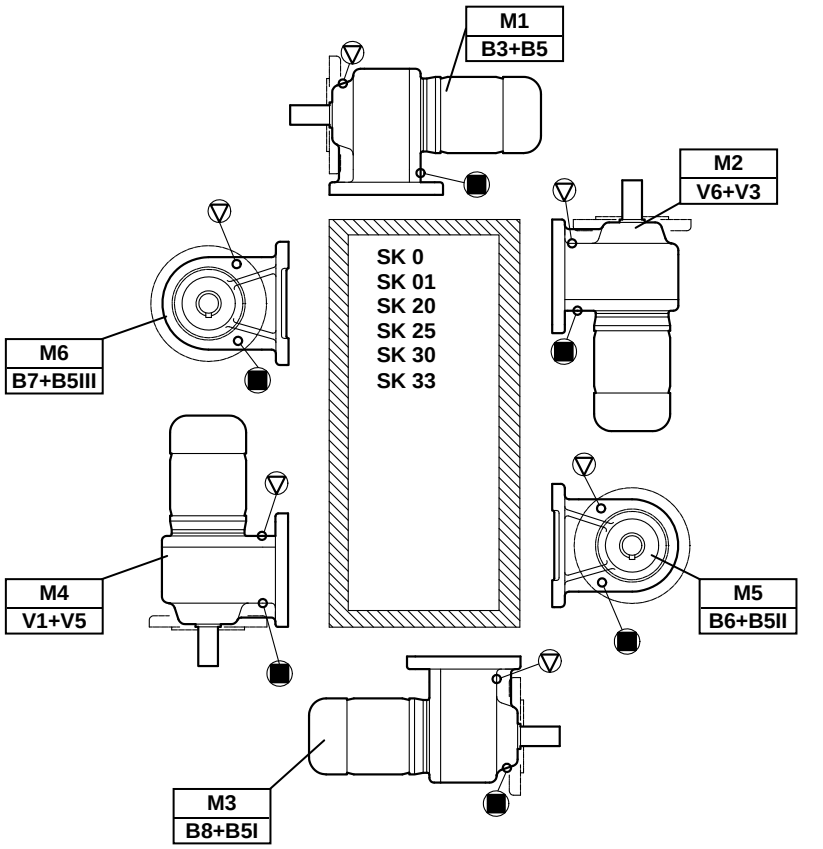
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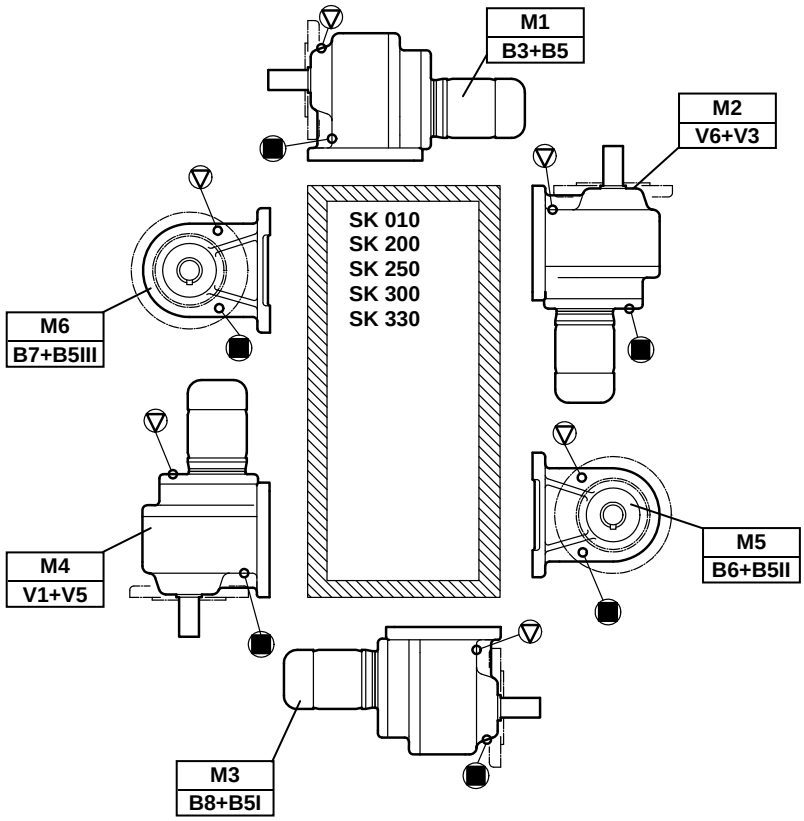
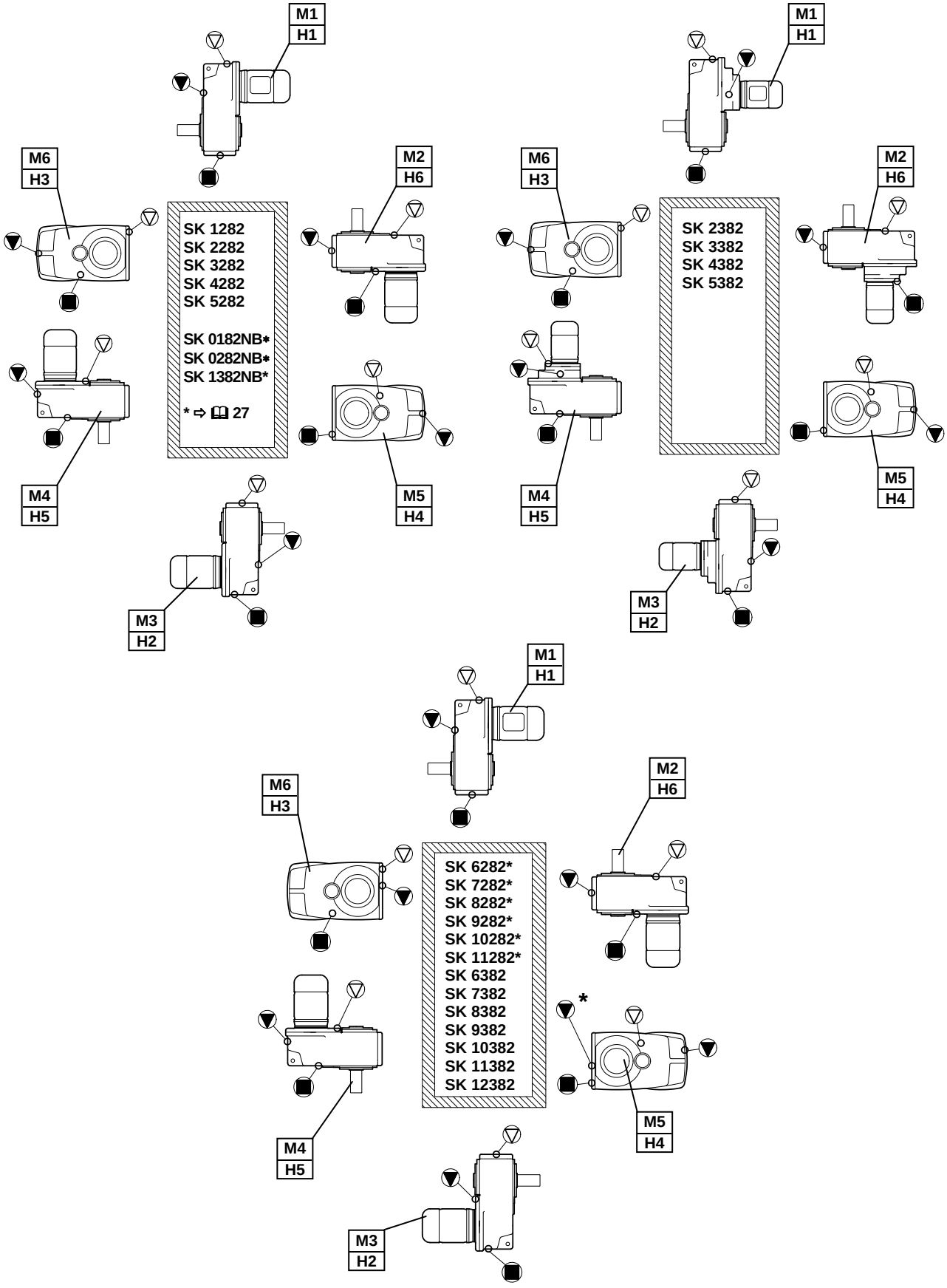
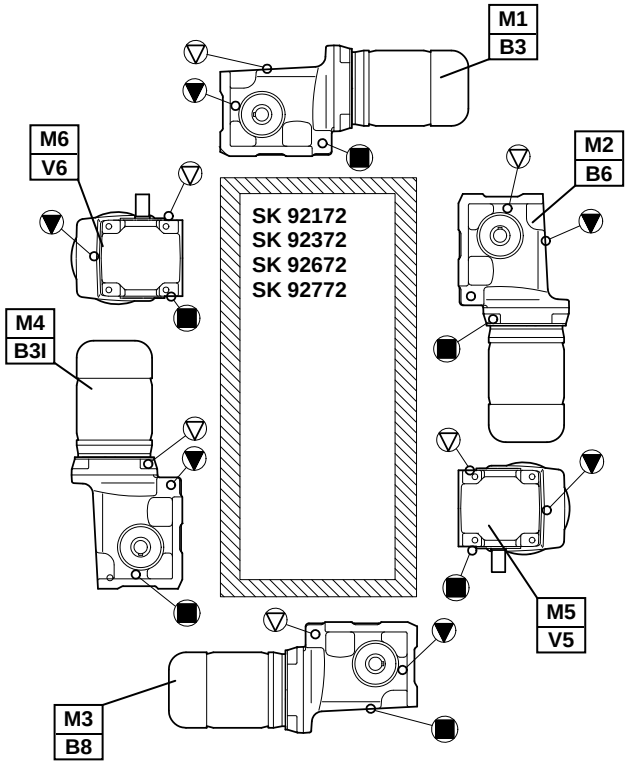
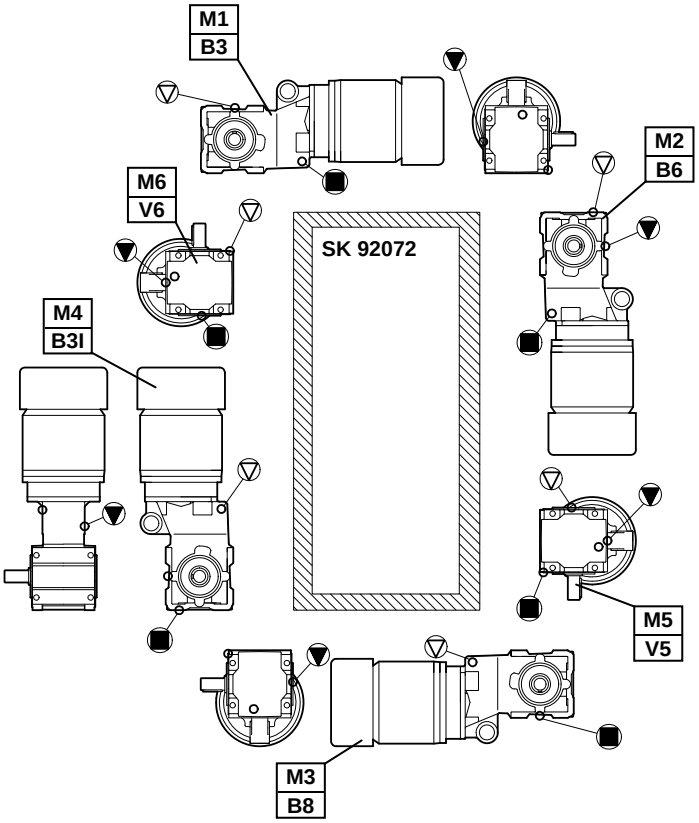
M5
B6+B5II
M3
B8+B5I

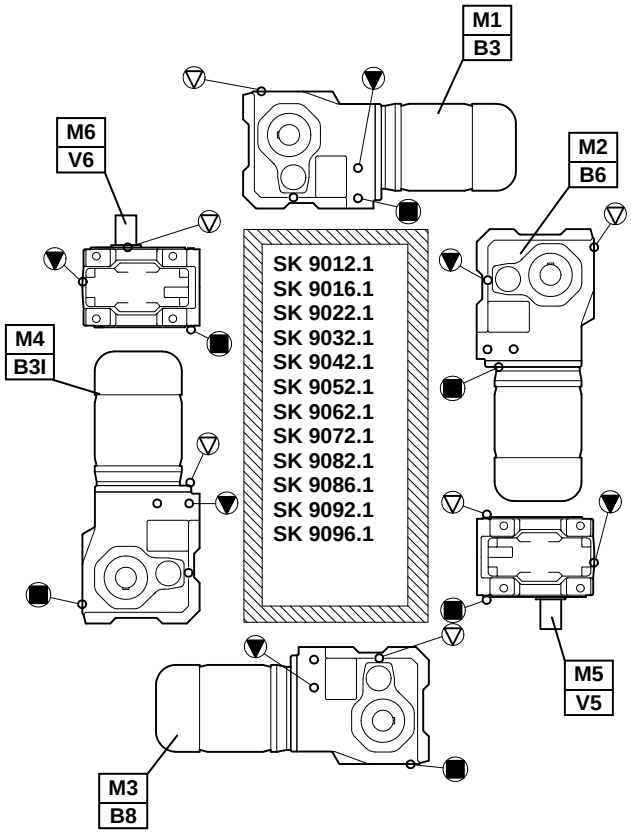

M1
B3+B5
M2
V6+V3
SK 010
SK 200
SK 250
SK 300
SK 330
M6
B7+B5III
M4
V1+V5
M5
B6+B5II
M3
B8+B5I

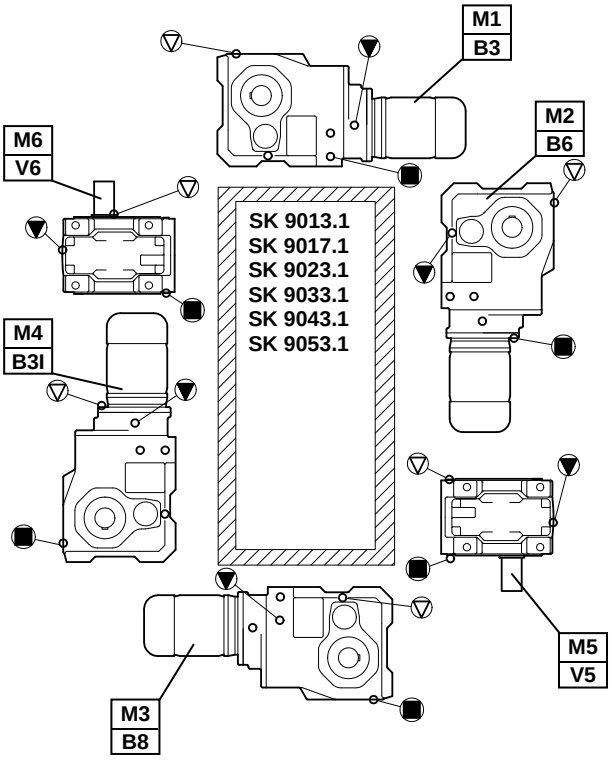
⇨ 🕮 44

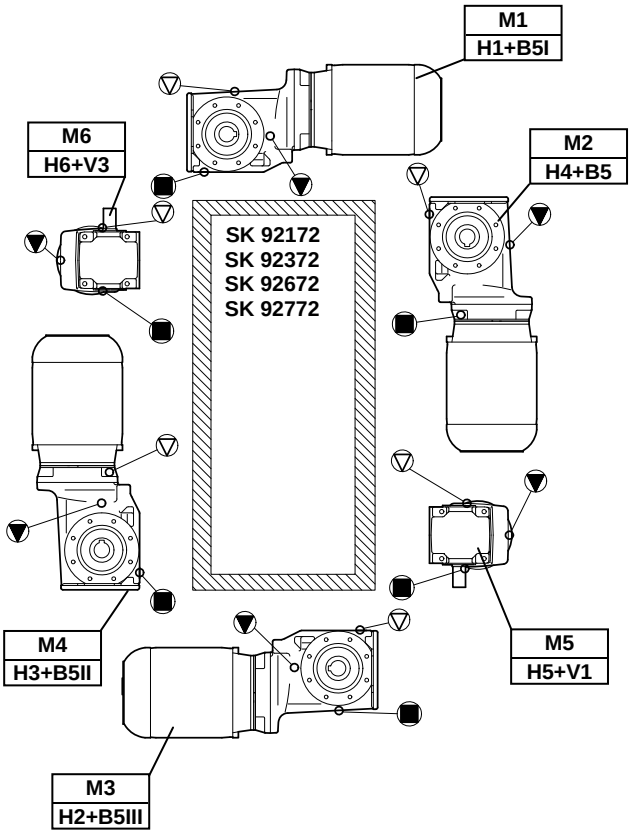

M1
H1
M6
H3
M2
H6
SK 1282
SK 2282
SK 3282
SK 4282
SK 5282
SK 0182NB*
SK 0282NB*
SK 1382NB*
* ⇨ 🕮 27
M4
H5
M5
H4
M3
H2
M1
H1
M6
H3
M2
H6
SK 2382
SK 3382
SK 4382
SK 5382
M4
H5
M5
H4
M3
H2
M1
H1
M6
H3
M2
H6
SK 6282*
SK 7282*
SK 8282*
SK 9282*
SK 10282*
SK 11282*
SK 6382
SK 7382
SK 8382
SK 9382
SK 10382
SK 11382
SK 12382
*
M4
H5
M5
H4
M3
H2

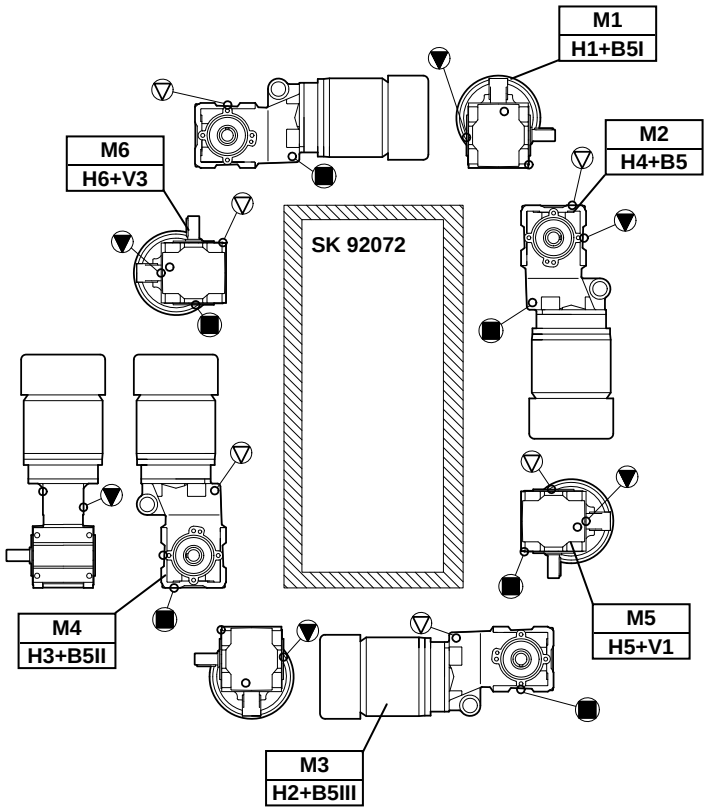

M1
B3
M6
V6
M2
B6
SK 92172
SK 92372
SK 92672
SK 92772
M4
B3I
M5
V5
M3
B8

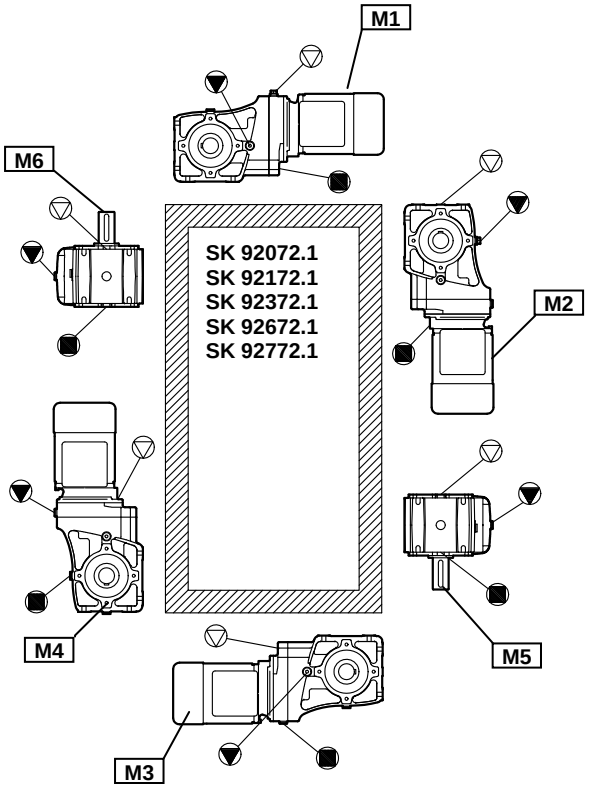

M1
B3
M6
V6
M2
B6
SK 92072
M4
B3I
M5
V5
M3
B8

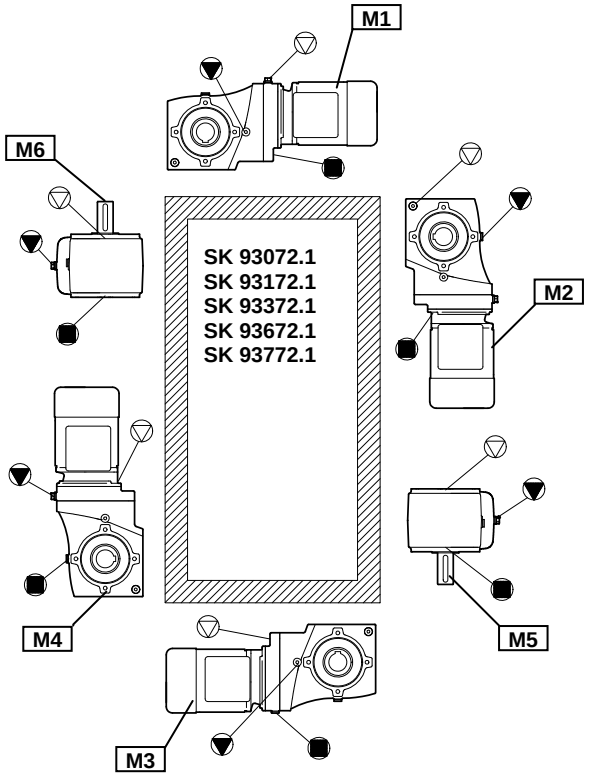

M1
B3
M6
V6
M2
B6
SK 9012.1
SK 9016.1
SK 9022.1
SK 9032.1
SK 9042.1
SK 9052.1
SK 9062.1
SK 9072.1
SK 9082.1
SK 9086.1
SK 9092.1
SK 9096.1
M4
B3I
M5
V5
M3
B8

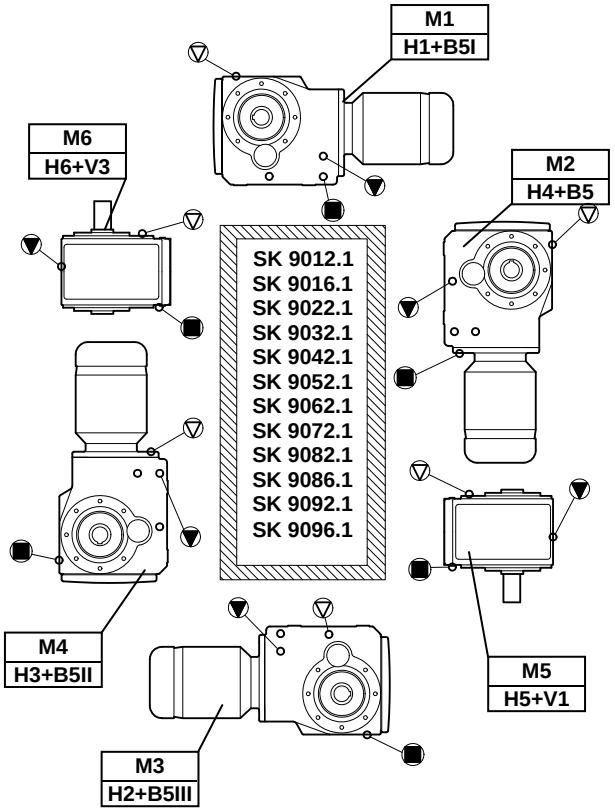

M1
B3
M6
V6
M2
B6
SK 9013.1
SK 9017.1
SK 9023.1
SK 9033.1
SK 9043.1
SK 9053.1
M4
B3I
M5
V5
M3
B8

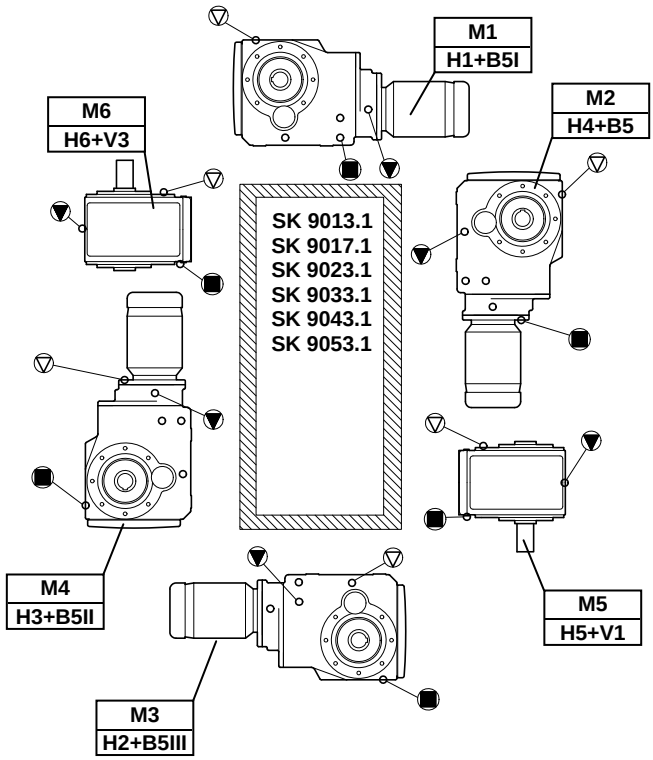

M1
H1+B5I
M6
H6+V3
M2
H4+B5
SK 92172
SK 92372
SK 92672
SK 92772
M4
H3+B5II
M5
H5+V1
M3
H2+B5III

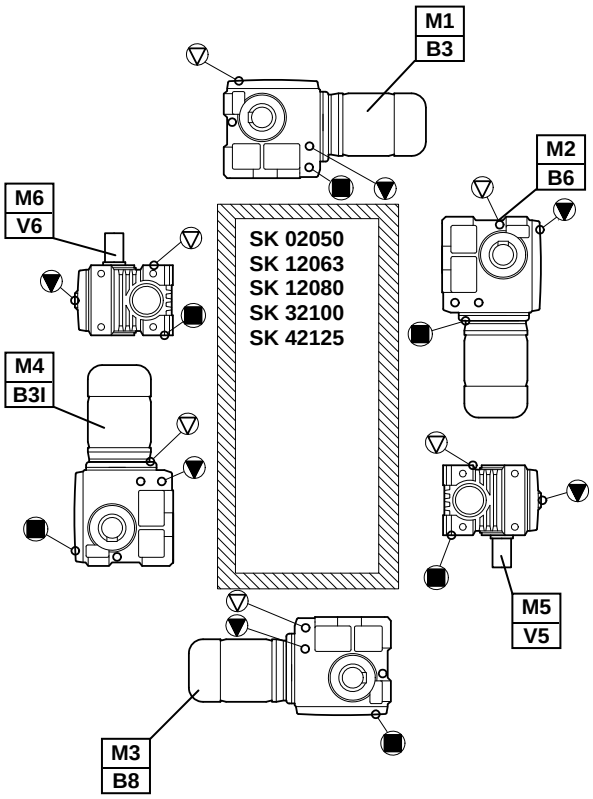

M1
H1+B5I
M6
H6+V3
M2
H4+B5
SK 92072
M4
H3+B5II
M5
H5+V1
M3
H2+B5III

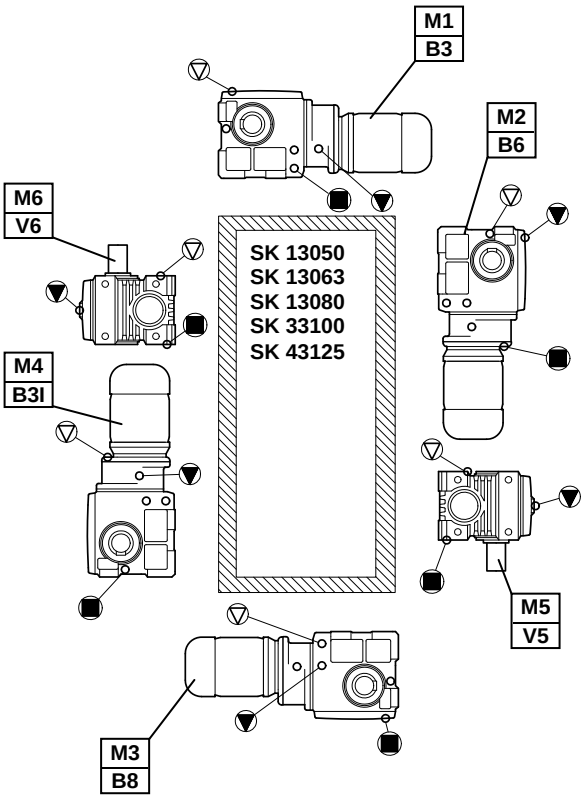

M1
M6
SK 92072.1
SK 92172.1
SK 92372.1
SK 92672.1
SK 92772.1
M2
M4
M5
M3

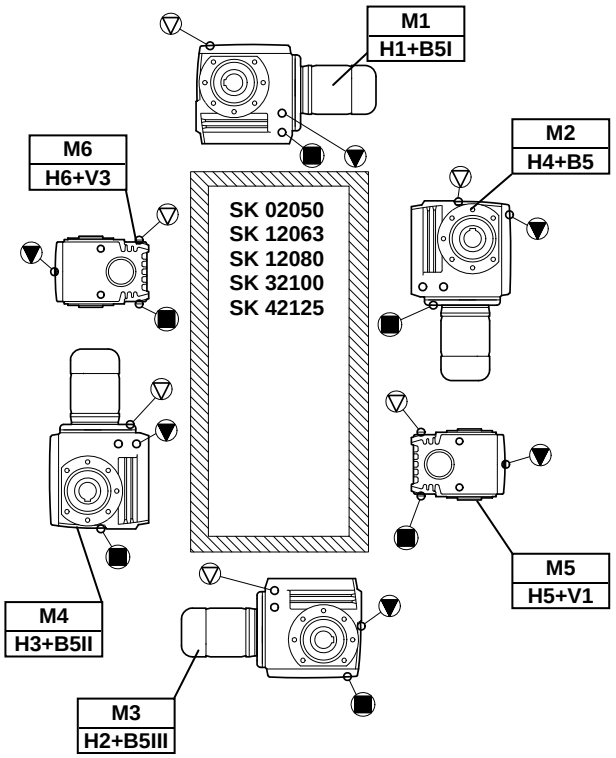

M1
M6
SK 93072.1
SK 93172.1
SK 93372.1
SK 93672.1
SK 93772.1
M2
M4
M5
M3

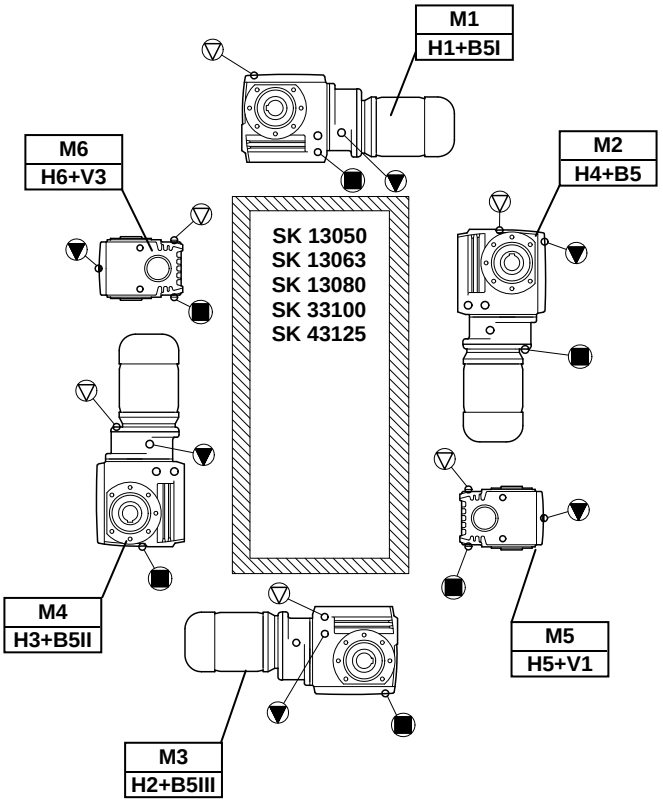

M1
H1+B5I
M6
H6+V3
M2
H4+B5
SK 9012.1
SK 9016.1
SK 9022.1
SK 9032.1
SK 9042.1
SK 9052.1
SK 9062.1
SK 9072.1
SK 9082.1
SK 9086.1
SK 9092.1
SK 9096.1
M4
H3+B5II
M5
H5+V1
M3
H2+B5III

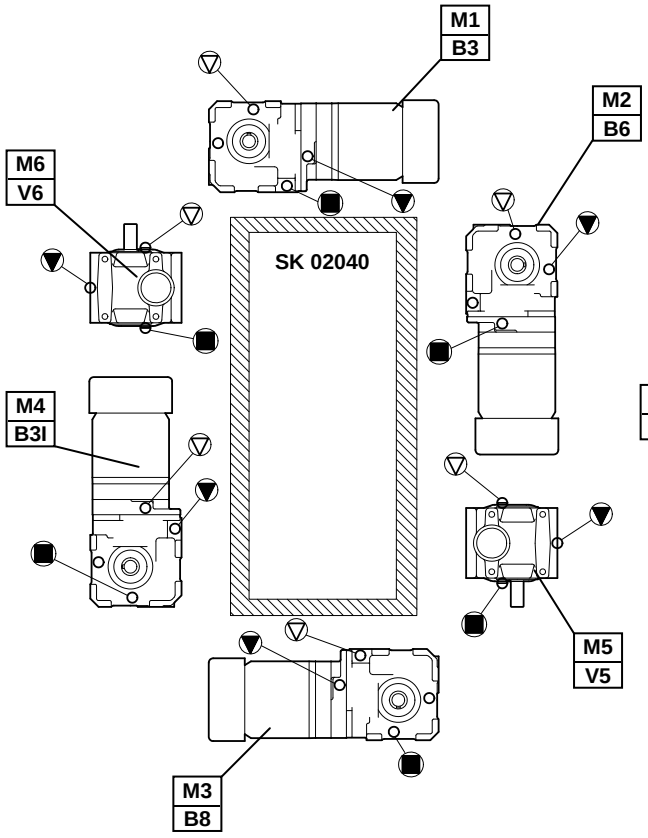

M1
H1+B5I
M6
H6+V3
M2
H4+B5
SK 9013.1
SK 9017.1
SK 9023.1
SK 9033.1
SK 9043.1
SK 9053.1
M4
H3+B5II
M5
H5+V1
M3
H2+B5III

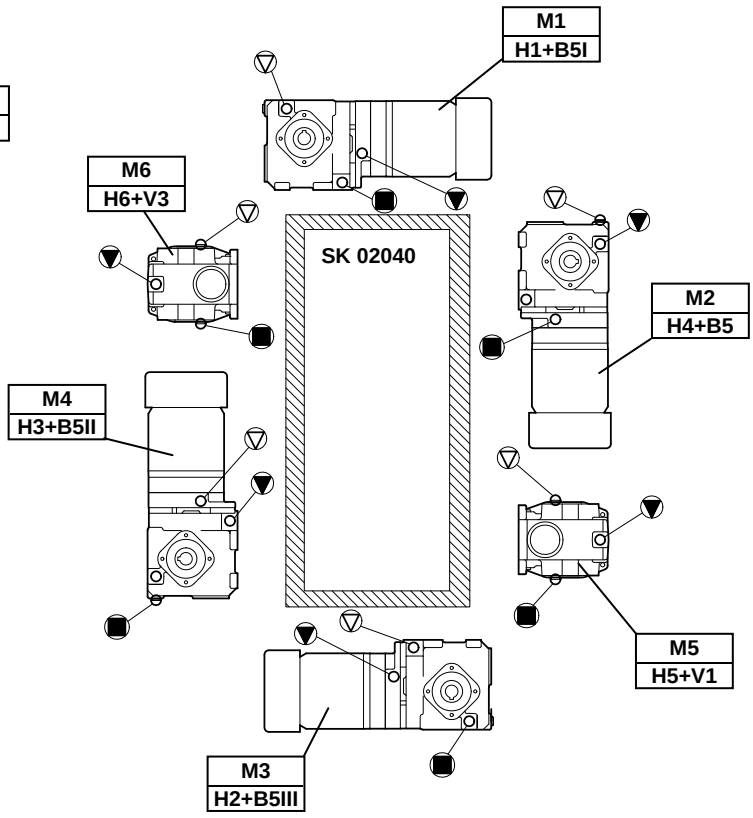

M1
B3
M2
B6
M6
V6
SK 02050
SK 12063
SK 12080
SK 32100
SK 42125
M4
B3I
M5
V5
M3
B8


M1
B3
M2
B6
M6
V6
SK 13050
SK 13063
SK 13080
SK 33100
SK 43125
M4
B3I
M5
V5
M3
B8

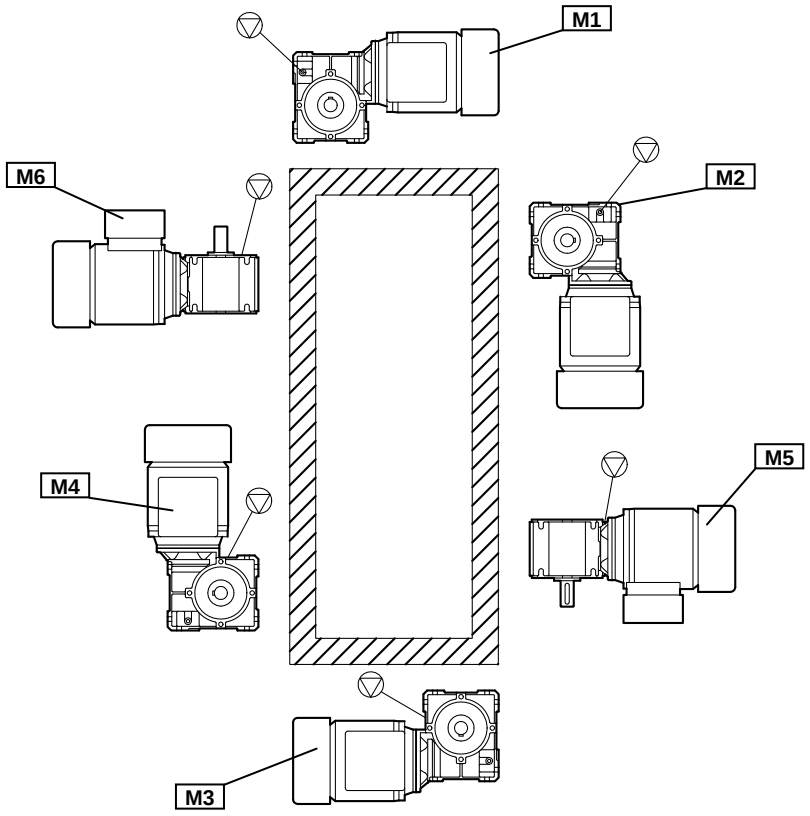

M1
H1+B5I
M2
H4+B5
M6
H6+V3
SK 02050
SK 12063
SK 12080
SK 32100
SK 42125
M5
H5+V1
M4
H3+B5II
M3
H2+B5III


M1
H1+B5I
M6
H6+V3
M2
H4+B5
SK 13050
SK 13063
SK 13080
SK 33100
SK 43125
M4
H3+B5II
M5
H5+V1
M3
H2+B5III


M1
B3
M2
B6
M6
V6
SK 02040
M4
B3I
M5
V5
M3
B8


M1
H1+B5I
M6
H6+V3
SK 02040
M2
H4+B5
M4
H3+B5II
M5
H5+V1
M3
H2+B5III

SK 1S32 – SK 1S63
SK 1SU32 – SK 1SU63
SK 1SM31 – SK 1SM63
SK 1SI31 – SK 1SI75
SK 1SIS31 – SK 1SIS75
SK 1SMI31 – SK 1SMI75
SK 1SID31 – SK 1SID75
SK 1SIS-D31 – SK 1SIS-D63
SK 1SMID31 – SK 1SMID75
SK 2S32NB – SK 2S63NB
SK 2SU32NB- SK 2SU63NB
SK 2SM40 – SK 2SM63
SK 2SIS-D40 – SK 2SIS-D63
SK 2SID40 – SK 2SID63
SK 2SMID40 – SK 2SMID63



⇨🕮 26

6.2 Torque values

Bolt Torques [Nm]						
Size	Screw connections in the strength classes			Sealing screws	Threaded pin on coupling	Screw connections on protective covers
	8.8	10.9	12.9			
M4	3.2	5	6	-	-	
M5	6.4	9	11	-	2	
M6	11	16	19	-	-	6.4
M8	27	39	46	11	10	11
M10	53	78	91	11	17	27
M12	92	135	155	27	40	53
M16	230	335	390	-	-	92
M20	460	660	770	-	-	230
M24	790	1150	1300	80	-	460
M30	1600	2250	2650	170	-	
M36	2780	3910	4710	-	-	
M42	4470	6290	7540	-	-	
G1¼	-	-	-	20	-	

6.3 Troubleshooting

Gear unit malfunctions		
Fault	Possible cause	Remedy
Unusual running noises, vibrations	Oil too low or bearing damage or toothed wheel damage	Consult NORD Service
Oil escaping from gear unit or motor	Defective seal	Consult NORD Service
Oil escaping from pressure vent	Incorrect oil level or incorrect, contaminated oil or unfavourable operating conditions	Oil change Use oil expansion tank (Option OA)
Gear unit becomes too hot	Unfavourable installation conditions or gear unit damage	Consult NORD Service
Shock when switched on, vibrations	Defective motor coupling or loose gear unit mounting or defective rubber element	Replace elastomer gear rim, tighten motor and gear unit fastening bolts, replace rubber element
Drive shaft does not rotate although motor is running	Fracture in gear unit or defective motor coupling or shrink disc slippage	Consult NORD Service

	Attention!
STOP	**Warning: shut down the gear unit immediately should any of the above faults occur!**

6.4 Lubricants

With the exception of type SK 11282, SK 11382, SK 12382 and SK 9096.1 gear units, all gear units are filled with lubricant ready for operation in the required installation position when delivered. This initial filling corresponds to a lubricant from the column for the ambient temperatures (normal version) in the lubricant table.

Roller bearing greases

This table shows comparable roller bearing greases from various manufacturers. The manufacturer can be changed for a given grease type. Getriebebau NORD must be contacted in case of change of grease type or ambient temperature range, as otherwise no warranty for the functionality of our gear units can be accepted.

Lubricant type	Ambient temperature	bp	Castrol	FUCHS	KLÜBER LUBRICATION	Mobil	Shell
Mineral oil-based grease	-30 … 60°C	Energrease LS 2 Energrease LS-EP 2	Longtime PD 2	RENOLIT GP 2 RENOLIT LZR 2 H	-	Mobilux EP 2	Gadus S2 V100 2
	-50 … 40°C	-	Optitemp LG 2	RENOLIT JP 1619	-	-	-
Synthetic grease	-25 … 80°C	Energrease SY 2202	Tribol 4747	RENOLIT HLT 2 RENOLIT LST 2	PETAMO GHY 133 N Klüberplex BEM 41-132	Mobiltemp SHC 32	Cassida EPS2
Biodegradable grease	-25 … 40°C	Biogrease EP 2	-	PLANTOGEL 2 S	Klüberbio M 72-82	Mobil SHC Grease 102 EAL	Naturelle Grease EP2
Foodstuff-compatible grease	-25 … 40°C	-	Obeen UF 2	RENOLIT G 7 FG 1	Klübersynth UH1 14-151	Mobilgrease FM 222	Cassida RLS2

Lubricant table

This table shows comparable lubricants from various manufacturers. The manufacturer can be changed within a particular viscosity or lubricant type. Getriebebau NORD must be contacted in case of change of viscosity or lubricant type, as otherwise no warranty for the functionality of our gearboxes can be accepted.

Lubricant type	Details on type plate	DIN (ISO) / Ambient temperature	bp	Castrol	FUCHS	KLÜBER LUBRICATION	Mobil	
Mineral oil	CLP 680	ISO VG 680 0...40°C	Energol GR-XP 680	Alpha EP 680 Alpha SP 680 Optigear BM 680 Tribol 1100/680	RENOLIN CLP 680 RENOLIN CLP 680 Plus	Klüberoil GEM 1-680 N	Mobilgear 600 XP 680	Omala S2 G 680
	CLP 220	ISO VG 220 -10…40°C	Energol GR-XP 220	Alpha EP 220 Alpha SP 220 Optigear BM 220 Tribol 1100/220	RENOLIN CLP 220 RENOLIN CLP 220 Plus	Klüberoil GEM 1-220 N	Mobilgear 600 XP 220	Omala S2 G 220
	CLP 100	ISO VG 100 -15…25°C	Energol GR-XP 100	Alpha EP 100 Alpha SP 100 Optigear BM 100 Tribol 1100/100	RENOLIN CLP 100 RENOLIN CLP 100 Plus	Klüberoil GEM 1-100 N	Mobilgear 600 XP 100	Omala S2 G 100
Synthetic oil (Polyglycol)	CLP PG 680	ISO VG 680 -20...40°C	-	Alphasyn GS 680 Tribol 800/680	RENOLIN PG 680	Klübersynth GH 6-680	Mobil Glygoyle 680	Omala S4 WE 680
	CLP PG 220	ISO VG 220 -25…80°C	Enersyn SG-XP 220	Alphasyn GS 220 Alphasyn PG 220 Tribol 800/220	RENOLIN PG 220	Klübersynth GH 6-220	Mobil Glygoyle 220	Omala S4 WE 220
Synthetic oil (hydrocarbon)	CLP HC 460	ISO VG 460 -30…80°C	-	Alphasyn EP 460 Tribol 1510/460 Optigear Synthetic X 460	RENOLIN Unisyn CLP 460	Klübersynth GEM 4-460 N	Mobil SHC 634	Omala S4 GX 460
	CLP HC 220	ISO VG 220 -40…80°C	-	Alphasyn EP 220 Tribol 1510/220 Optigear Synthetic X 220	RENOLIN Unisyn CLP 220	Klübersynth GEM 4-220 N	Mobil SHC 630	Omala S4 GX 220
Bio-degradable oil	CLP E 680	ISO VG 680 -5…40°C	-	-	PLANTOGEAR 680 S	-	-	-
	CLP E 220	ISO VG 220 -5…40°C	-	Tribol BioTop 1418/220	PLANTOGEAR 220 S	Klübersynth GEM 2-220	-	Naturelle Gear Fluid EP 220
Food grade oil	CLP PG H1 680	ISO VG 680 -5…40°C	-	Tribol FoodProof 1800/680	-	Klübersynth UH1 6-680	Mobil Glygoyle 680	Cassida Fluid WG 680
	CLP PG H1 220	ISO VG 220 -25…40°C	-	Tribol FoodProof 1800/220	-	Klübersynth UH1 6-220	Mobil Glygoyle 220	Cassida Fluid WG 220
	CLP HC H1 680	ISO VG 680 -5…40°C	-	Optileb GT 680	GERALYN SF 680	Klüberoil 4 UH1-680 N	-	Cassida Fluid GL 680
	CLP HC H1 220	ISO VG 220 -25…40°C	-	Optileb GT 220	GERALYN SF 220	Klüberoil 4 UH1-220 N	Mobil SHC Cibus 220	Cassida Fluid GL 220
Gear unit liquid grease		-25 … 60°C	Energrease LS-EP 00	Longtime PD 00 Tribol 3020/1000-00	RENOLIT DURAPLEX EP 00 RENOLIT LST 00	MICROLUBE GB 00 Klübersynth GE 46-1200	Mobil Chassis Grease LBZ Mobil Glygoyle Grease 00	Alvania EP(LF)2 -

6.5 Lubricant quantities

	Note!
	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 filling quantities stated in the following tables are for guidance only. The precise quantities vary depending on the exact gear ratio. When filling, always observe the oil level screw hole as an indicator of the precise quantity of oil.

* Type SK11282, SK11382, SK12382 and SK 9096.1 gear units are normally supplied without oil.

[L]												
⇨📖 6.1	M1	M2	M3	M4	M5	M6	M1	M2	M3	M4	M5	M6
⇨📖 6.1	B3	V6	B8	V5	B6	B7	B5	V3	B5I	V1	B5II	B5III
SK11E	0,25	0,50	0,55	0,40	0,35	0,35	0,30	0,35	0,50	0,30	0,40	0,40
SK21E	0,60	1,20	1,20	1,00	1,00	1,00	0,50	1,40	1,10	0,70	0,90	0,90
SK31E	1,10	2,70	2,20	2,30	1,70	1,70	0,80	1,30	1,65	1,10	2,00	2,00
SK41E	1,70	2,60	3,30	2,50	2,60	2,60	1,00	2,60	2,80	1,60	3,30	3,30
SK51E	2,20	4,40	4,70	4,00	3,40	3,40	1,80	3,50	4,10	3,00	3,80	3,80
[L]												
SK02	0,15	0,60	0,70	0,60	0,40	0,40	0,25	0,60	0,60	0,60	0,50	0,50
SK12	0,25	0,75	0,85	0,75	0,50	0,50	0,35	0,85	0,90	0,90	0,60	0,60
SK22	0,50	1,80	1,80	1,80	1,35	1,35	0,70	2,00	2,00	1,80	1,55	1,55
SK32	0,90	2,50	2,50	2,90	2,00	2,00	1,30	2,90	3,30	3,10	2,40	2,40
SK42	1,30	4,50	4,50	4,30	3,20	3,20	1,80	4,40	4,50	4,00	3,70	3,70
SK52	2,50	7,00	6,80	6,80	5,10	5,10	3,00	6,80	6,20	7,40	5,60	5,60
[L]												
SK62	6,50	15,00	13,00	16,00	15,00	15,00	7,00	15,00	14,00	18,50	16,00	16,00
SK72	10,00	23,00	18,00	26,00	23,00	23,00	10,00	23,00	18,50	28,00	23,00	23,00
SK82	14,00	35,00	27,00	44,00	32,00	32,00	15,00	37,00	29,00	45,00	34,50	34,50
SK92	25,00	73,00	47,00	76,00	52,00	52,00	26,00	73,00	47,00	78,00	52,00	52,00
SK102	36,00	79,00	66,00	102,00	71,00	71,00	40,00	81,00	66,00	104,00	72,00	72,00
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SK03	0,30	1,00	0,80	0,90	0,60	0,60	0,50	0,80	0,90	1,10	0,80	0,80
SK13	0,60	1,25	1,10	1,20	0,70	0,70	0,85	1,20	1,20	1,20	0,95	0,95
SK23	1,30	2,40	2,30	2,35	1,60	1,60	1,50	2,60	2,50	2,80	2,80	2,80
SK33N	1,60	2,90	3,20	3,70	2,30	2,30	2,50	3,40	3,50	4,40	2,60	2,60
SK43	3,00	5,60	5,20	6,60	3,60	3,60	3,50	5,70	5,00	6,10	4,10	4,10
SK53	4,50	8,70	7,70	8,70	6,00	6,00	5,20	8,40	7,00	8,90	6,70	6,70
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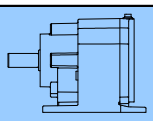
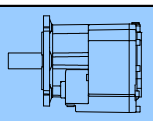
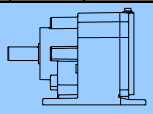
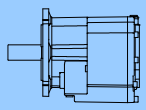
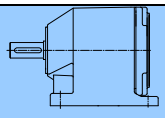
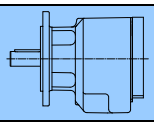
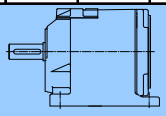
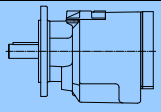
SK63	13,00	14,50	14,50	16,00	13,00	13,00	13,50	14,00	15,50	18,00	14,00	14,00
SK73	20,50	20,00	22,50	27,00	20,00	20,00	22,00	22,50	23,00	27,50	20,00	20,00
SK83	30,00	31,00	34,00	37,00	33,00	33,00	31,00	34,00	35,00	40,00	34,00	34,00
SK93	53,00	70,00	59,00	72,00	49,00	49,00	53,00	70,00	59,00	74,00	49,00	49,00
SK103	74,00	71,00	74,00	97,00	67,00	67,00	69,00	78,00	78,00	99,00	67,00	67,00

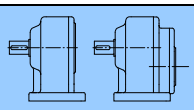
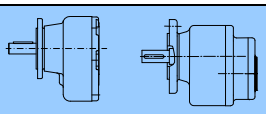
[L]						
⇨🕮 6.1	M1	M2	M3	M4	M5	M6
SK072.1	0,16	0,32	0,21	0,23	0,18	0,20
SK172.1	0,27	0,59	0,42	0,45	0,32	0,39
SK372.1	0,45	1,05	0,75	1,00	0,60	0,65
SK572.1	0,75	1,90	1,50	2,00	1,10	1,15
SK672.1	1,10	2,60	2,15	2,70	1,55	1,65
SK772.1	1,35	3,65	2,25	3,15	1,35	2,15
SK872.1	3,20	8,00	5,30	7,00	2,80	4,60
SK972.1	4,50	12,90	8,10	12,70	4,60	7,80
SK772.1VL	2,00	3,65	2,25	3,15	1,35	2,15
SK872.1VL	5,00	8,00	5,30	7,00	2,80	4,60
SK972.1VL	8,50	12,90	8,10	12,70	4,60	7,80

[L]						
⇨🕮 6.1	M1	M2	M3	M4	M5	M6
SK072.1 F	0,16	0,32	0,21	0,23	0,18	0,20
SK172.1 F	0,27	0,59	0,42	0,45	0,32	0,39
SK372.1 F	0,45	1,05	0,75	1,00	0,60	0,65
SK572.1 F	0,75	1,90	1,50	2,00	1,10	1,15
SK672.1 F	1,10	2,60	2,15	2,70	1,55	1,65
SK772.1 F	1,35	3,65	2,25	3,15	1,35	2,15
SK872.1 F	3,20	8,00	5,30	7,00	2,80	4,60
SK972.1 F	4,50	12,90	8,10	12,70	4,60	7,80
SK772.1VL F	2,00	3,65	2,25	3,15	1,35	2,15
SK872.1VL F	5,00	8,00	5,30	7,00	2,80	4,60
SK972.1VL F	8,50	12,90	8,10	12,70	4,60	7,80

[L]						
⇨🕮 6.1	M1	M2	M3	M4	M5	M6
SK373.1	0,45	1,05	0,75	1,00	0,60	0,65
SK573.1	0,75	1,90	1,50	2,00	1,10	1,15
SK673.1	1,10	2,60	2,15	2,70	1,55	1,65
SK773.1	1,95	3,50	3,20	2,90	2,25	2,95
SK873.1	4,05	7,60	6,85	6,55	5,00	6,55
SK973.1	7,40	12,20	11,10	11,60	8,00	10,90
SK773.1VL	1,95	3,50	3,20	2,90	2,25	2,95
SK873.1VL	4,05	7,60	6,85	6,55	5,00	6,55
SK973.1VL	7,40	12,20	11,10	11,60	8,00	10,90

[L]						
⇨🕮 6.1	M1	M2	M3	M4	M5	M6
SK373.1 F	0,45	1,05	0,75	1,00	0,60	0,65
SK573.1 F	0,75	1,90	1,50	2,00	1,10	1,15
SK673.1 F	1,10	2,60	2,15	2,70	1,55	1,65
SK773.1 F	1,95	3,50	3,20	2,90	2,25	2,95
SK873.1 F	4,05	7,60	6,85	6,55	5,00	6,55
SK973.1 F	7,40	12,20	11,10	11,60	8,00	10,90
SK773.1VL F	1,95	3,50	3,20	2,90	2,25	2,95
SK873.1VL F	4,05	7,60	6,85	6,55	5,00	6,55
SK973.1VL F	7,40	12,20	11,10	11,60	8,00	10,90

[L]												
⇨🕮 6.1	M1	M2	M3	M4	M5	M6	M1	M2	M3	M4	M5	M6
⇨🕮 6.1	B3	V6	B8	V5	B6	B7	B5	V3	B5I	V1	B5II	B5III
SK172	0,35	0,50	0,50	0,50	0,50	0,50	0,35	0,50	0,50	0,50	0,50	0,50
SK272	0,60	1,00	1,00	1,00	1,00	1,00	0,60	1,00	1,00	1,00	1,00	1,00
SK372	0,60	1,00	1,00	1,00	1,00	1,00	0,60	1,00	1,00	1,00	1,00	1,00
SK472	1,00	1,90	1,90	2,00	1,80	1,80	1,00	1,90	1,90	1,90	1,90	1,50
SK572	1,00	1,90	1,90	2,00	1,80	1,80	1,00	1,90	1,90	1,90	1,90	1,50
SK672	1,40	3,40	3,10	3,15	1,45	3,15	1,15	3,40	2,70	2,80	1,25	2,70
SK772	2,00	3,30	3,50	4,20	2,70	3,30	1,60	3,30	3,50	3,30	3,10	3,10
SK872	3,70	9,60	9,10	7,30	4,70	8,00	3,50	9,00	7,90	7,70	3,90	7,20
SK972	6,50	16,00	15,70	14,70	8,50	14,00	6,50	15,00	13,00	13,50	6,50	12,00
[L]												
SK273	0,62	1,10	1,10	1,10	1,10	1,10	0,62	1,10	1,10	1,10	1,10	1,10
SK373	0,55	1,10	1,10	1,10	1,10	1,10	0,55	1,10	1,10	1,10	1,10	1,10
SK473	1,30	2,50	2,10	2,40	2,10	2,10	1,25	2,40	2,10	2,50	2,10	2,10
SK573	1,30	2,50	2,10	2,40	2,10	2,10	1,25	2,40	2,10	2,50	2,10	2,10
SK673	1,80	3,80	3,20	3,40	2,90	3,00	1,70	3,80	3,00	3,20	3,00	3,00
SK773	2,50	4,50	3,70	4,60	3,30	3,30	2,30	5,00	3,60	4,50	3,90	3,90
SK873	6,20	8,40	7,50	9,10	7,50	7,50	5,00	8,80	7,60	8,00	8,00	8,00
SK973	11,00	15,80	13,00	16,00	13,30	13,00	10,30	16,50	13,00	16,00	14,00	14,00

[L]							[L]						
⇨🕮 6.1	M1	M2	M3	M4	M5	M6	⇨🕮 6.1	M1	M2	M3	M4	M5	M6
SK20	0,55	1,00	0,55	1,00	0,55	0,55	SK20 F	0,35	0,60	0,35	0,60	0,35	0,35
SK0	0,13	0,22	0,13	0,22	0,13	0,13	SK0 F	0,13	0,22	0,13	0,22	0,13	0,13
SK01	0,22	0,38	0,22	0,38	0,22	0,22	SK01 F	0,22	0,38	0,22	0,38	0,22	0,22
SK25	0,50	0,90	0,50	0,90	0,50	0,50	SK25 F	0,50	0,90	0,50	0,90	0,50	0,50
SK33	0,80	1,60	1,00	1,60	0,80	1,00	SK33 F	1,00	1,60	1,00	1,60	0,80	1,00
SK30	0,80	1,40	0,70	1,40	0,70	0,70	SK30 F	0,80	1,40	0,70	1,10	0,70	0,70
SK300	1,40	1,50	1,40	1,50	1,40	1,40	SK300 F	1,40	1,50	1,40	1,50	1,40	1,40
SK330	1,50	1,58	1,50	1,58	1,50	1,50	SK330 F	2,00	1,58	1,50	2,80	1,50	1,50
SK200	0,80	1,30	0,80	1,30	0,80	0,80	SK200 F	0,60	1,04	0,60	1,04	0,60	0,60
SK010	0,38	0,60	0,38	0,60	0,38	0,38	SK010 F	0,38	0,60	0,38	0,60	0,38	0,38
SK250	1,20	1,50	1,40	1,50	1,40	1,40	SK250 F	1,40	1,50	1,40	1,50	1,40	1,40
SK000	0,24	0,41	0,24	0,41	0,24	0,24	SK000 F	0,24	0,41	0,24	0,41	0,24	0,24

[L]							[L]						
⇨🕮 6.1	M1	M2	M3	M4	M5	M6	⇨🕮 6.1	M1	M2	M3	M4	M5	M6
⇨🕮 6.1	H1	H6	H2	H5	H4	H3	⇨🕮 6.1	H1	H6	H2	H5	H4	H3
SK0182NB A	0,40	0,55	0,60	0,55	0,35	0,35							
SK0282NB A	0,70	1,00	0,80	1,10	0,90	0,90							
							SK1382NB A	1,30	2,30	1,40	2,10	2,00	1,90
[L]							[L]						
SK1282 A	0,90	1,30	0,90	1,20	0,95	0,95	**SK2382 A**	2,30	2,60	1,90	3,10	1,50	1,50
SK2282 A	1,65	2,40	1,90	2,00	1,80	1,80	**SK3382 A**	4,10	4,90	3,30	5,60	3,30	3,30
SK3282 A	3,15	4,10	3,25	4,10	3,15	3,15	**SK4382 A**	5,90	6,80	4,90	8,30	4,90	4,90
SK4282 A	4,70	6,10	4,75	5,40	4,70	4,70	**SK5382 A**	12,50	12,00	6,70	13,50	8,30	8,30
SK5282 A	7,50	8,80	7,50	8,80	7,20	7,20	**SK1382 A**	1,45	1,60	1,15	1,70	1,10	1,10
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SK6282 A	17,00	14,00	12,00	17,50	10,00	14,00	**SK6382 A**	16,50	13,00	9,60	18,00	14,00	12,50
SK7282 A	25,00	21,00	20,00	27,00	16,00	21,00	**SK7382 A**	22,00	20,00	16,00	25,00	23,00	22,00
SK8282 A	37,00	33,00	30,00	41,00	31,00	31,00	**SK8382 A**	34,00	32,00	25,00	38,00	35,00	30,00
SK9282 A	74,00	70,00	55,00	80,00	65,00	59,00	**SK9382 A**	73,00	70,00	45,00	74,00	65,00	60,00
[L]							[L]						
SK10282 A	90	90	40	90	60	82	**SK10382 A**	85	100	73	100	80	80
SK11282 A	165	160	145	195	100	140	**SK11382 A**	160	155	140	210	155	135
							SK12382 A	160	155	140	210	155	135

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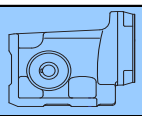
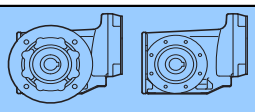
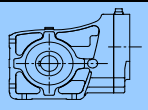
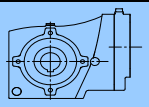
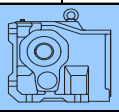
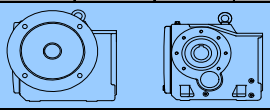
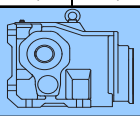
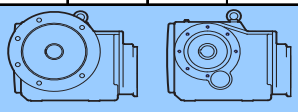
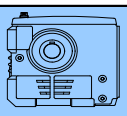
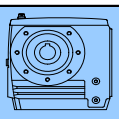
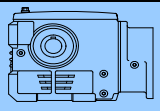
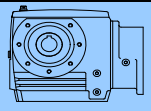
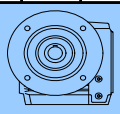
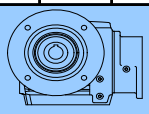
[L]												
⇨🕮 6.1	M1	M2	M3	M4	M5	M6	M1	M2	M3	M4	M5	M6
⇨🕮 6.1	B3	B6	B8	B3I	V5	V6	B5I	B5	B5III	B5II	V1	V3
							H1	H4	H2	H3	H5	H6
SK92072	0,40	0,60	0,50	0,50	0,40	0,40	0,40	0,60	0,50	0,50	0,40	0,40
SK92172	0,55	0,90	0,95	1,10	0,75	0,62	0,50	0,92	0,87	1,05	0,75	0,65
SK92372	0,90	1,30	1,45	1,60	1,20	1,20	1,15	1,50	1,20	1,75	1,15	1,15
SK92672	1,80	3,50	3,20	3,40	2,60	2,60	1,55	2,80	2,50	3,30	2,40	2,40
SK92772	2,30	4,50	4,60	5,30	4,10	4,10	2,75	4,40	4,50	5,85	3,50	3,50
[L]												
SK9x072.1	0,39	0,93	0,79	1,02	0,49	0,62	0,39	0,93	0,79	1,02	0,49	0,62
SK9x172.1	0,60	1,17	0,94	1,37	0,65	0,85	0,60	1,17	0,94	1,37	0,65	0,85
SK9x372.1	1,00	1,97	1,65	2,14	1,12	1,34	1,00	1,97	1,65	2,14	1,12	1,34
SK9x672.1	1,80	3,23	2,71	4,20	2,02	2,45	1,80	3,23	2,71	4,20	2,02	2,45
SK9x772.1	2,72	4,63	3,70	5,40	2,93	3,25	2,72	4,63	3,70	5,40	2,93	3,25
[L]												
SK9012.1	0,70	1,60	1,90	2,40	1,20	1,70	0,70	1,90	1,90	2,20	1,20	1,70
SK9016.1	0,70	1,60	1,90	2,40	1,20	1,70	0,70	1,90	1,90	2,10	1,20	1,70
SK9022.1	1,30	2,60	3,50	4,20	2,00	2,80	1,30	2,60	3,50	4,20	2,00	2,80
SK9032.1	1,70	4,80	6,40	6,70	4,10	5,10	1,90	5,20	6,40	7,30	3,30	5,10
SK9042.1	4,40	8,70	10,00	9,80	6,80	7,50	3,60	9,70	11,40	11,50	6,50	8,20
SK9052.1	6,50	16,00	19,00	21,50	11,00	15,50	7,50	16,50	20,00	23,50	11,50	18,00
SK9062.1	10,00	27,50	32,00	36,00	18,00	24,00	12,00	27,50	33,00	38,50	19,00	26,00
SK9072.1	10,00	27,50	32,00	36,00	18,00	24,00	12,00	27,50	33,00	38,50	19,00	26,00
SK9082.1	17,00	52,00	63,00	72,00	33,00	47,00	21,00	54,00	66,00	80,00	38,00	52,00
SK9086.1	29,00	73,00	85,00	102,00	48,00	62,00	36,00	78,00	91,00	107,00	53,00	76,00
SK9092.1	41,00	157,00	170,00	172,00	80,00	90,00	40,00	130,00	154,00	175,00	82,00	91,00
SK9096.1	70,00	187,00	194,00	254,00	109,00	152,00	80,00	187,00	193,00	257,00	113,00	156,00
[L]												
SK9013.1	1,20	2,00	2,20	3,00	1,40	1,90	1,20	2,30	2,20	3,00	1,40	1,90
SK9017.1	1,20	2,00	2,20	3,00	1,40	1,90	1,20	2,30	2,20	3,00	1,40	1,90
SK9023.1	2,40	3,00	3,80	5,30	2,20	3,10	2,40	3,00	3,80	5,30	2,20	3,10
SK9033.1	3,30	6,60	7,00	7,80	4,30	5,10	3,80	5,70	6,90	8,50	3,60	5,60
SK9043.1	4,60	10,20	10,70	12,80	5,20	6,70	5,70	10,20	14,70	14,70	6,60	9,60
SK9053.1	10,00	17,00	20,00	24,20	11,50	16,50	12,50	18,00	21,50	26,50	13,00	17,00

[L]							[L]						
⇨ 🕮 6.1	M1	M2	M3	M4	M5	M6		M1	M2	M3	M4	M5	M6
⇨ 🕮 6.1	B3	B6	B8	B3I	V5	V6		B5I	B5	B5III	B5II	V1	V3
⇨ 🕮 6.1								H1	H4	H2	H3	H5	H6
SK02040	0,45	0,60	0,60	0,60	0,50	0,50	**SK02040 A**	0,40	0,80	0,65	0,60	0,50	0,50
SK02050	0,40	1,20	0,70	1,15	0,70	0,70	**SK02050 A**	0,45	1,10	0,90	1,10	0,80	0,80
SK12063	0,60	1,70	1,20	1,55	1,00	1,00	**SK12063 A**	0,50	1,45	1,20	1,40	1,10	1,10
SK12080	0,80	2,60	1,70	2,70	1,70	1,70	**SK12080 A**	0,90	3,10	3,00	3,00	2,20	2,20
SK32100	1,60	5,50	3,40	5,40	3,20	3,20	**SK32100 A**	1,50	5,20	3,80	5,30	3,80	3,80
SK42125	2,80	11,00	6,20	10,30	5,80	5,80	**SK42125 A**	3,20	12,90	6,10	10,50	6,30	6,30
[L]							[L]						
SK13050	0,95	1,55	1,10	1,45	0,95	0,95	**SK13050 A**	0,85	1,75	1,25	1,35	1,15	1,15
SK13063	1,30	2,30	1,60	2,00	1,25	1,25	**SK13063 A**	1,05	2,10	1,55	2,10	1,45	1,45
SK13080	1,70	3,20	2,10	3,30	1,95	1,95	**SK13080 A**	1,70	3,45	3,60	3,60	2,55	2,55
SK33100	2,10	7,60	4,00	6,50	3,70	3,70	**SK33100 A**	2,10	6,10	4,80	6,50	4,20	4,20
SK43125	7,80	14,00	7,20	13,50	6,70	6,70	**SK43125 A**	4,80	13,50	7,40	14,50	8,00	8,00
[L]							[L]						
SK02040 F	0,50	0,80	0,75	0,60	0,50	0,50							
SK02050 F	0,45	1,40	0,90	1,25	1,00	1,00	**SK13050 F**	0,90	1,80	1,15	1,75	1,25	1,25
SK12063 F	0,50	1,60	1,40	1,80	1,50	1,50	**SK13063 F**	0,95	2,10	1,65	2,15	1,75	1,75
SK12080 F	0,95	3,20	3,10	3,30	2,50	2,50	**SK13080 F**	1,40	4,20	3,35	3,80	2,75	2,75
SK32100 F	1,50	7,10	4,90	7,10	4,40	4,40	**SK33100 F**	2,30	7,60	5,50	7,80	4,85	4,85
SK42125 F	3,30	11,20	6,10	11,00	6,80	6,80	**SK43125 F**	4,30	14,50	7,10	12,10	7,70	7,70

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