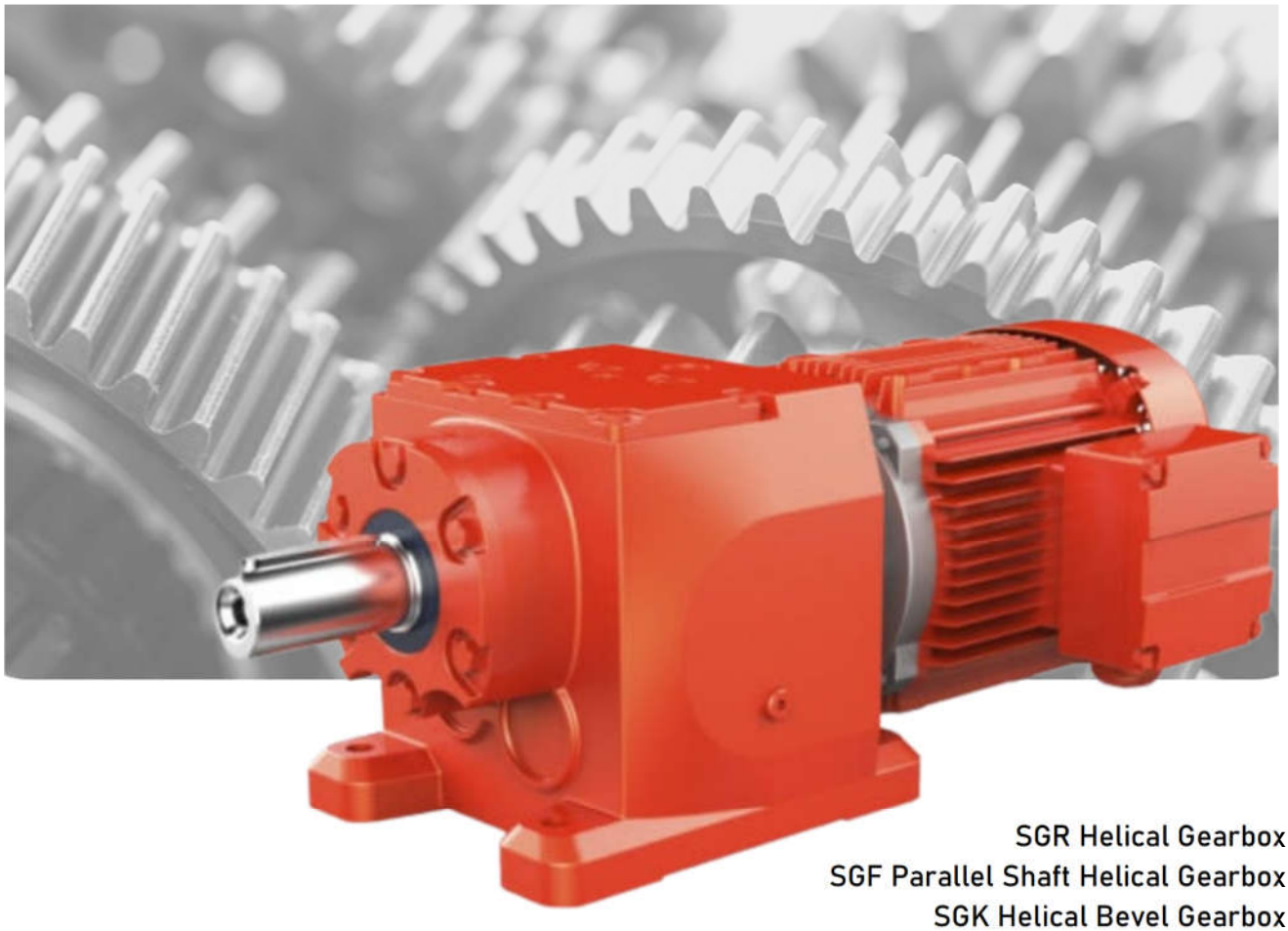
SUPERIOR GEARBOX COMPANY

SG Series Helical Gearbox

P.O. BOX 645 STOCKTON, MO 65785 1.800.346.5745



SGR Helical Gearbox
SGF Parallel Shaft Helical Gearbox
SGK Helical Bevel Gearbox
SGS Helical Worm Gearbox

Operating Instructions

SUPERIOR GEARBOX COMPANY

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www.superiorgearbox.com

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1. Important Notes

Safety and warning instructions

Always follow the safety and warning instructions in this publication!

Electrical hazard
Possible consequences: Severe or fatal injuries

Hazard
Possible consequences: Severe or fatal injuries

Hazardous situation
Possible consequences: Slight or minor injuries

Harmful situation
Possible consequences: Damage to the drive and the environment

Tips and useful information:

You must adhere to the operating instructions to ensure:

- Trouble-free operation
- Fulfillment or any rights claim under guarantee

Consequently, read the operating instruction before you start working with the gearbox and/or gearmotor.

The operating instructions contain important information about servicing. Therefore, Keep these instruction close to the gearbox.

Waste Disposal

Dispose of the following the materials in accordance with the regulations in force:
Steel scrap:
Housing parts Gear / Shafts / Anti-friction Bearing / Gray-cast Iron
Parts of the worm gears are made of non-ferrous metals.
Dispose of the worm gears as appropriate.
Collect waste oil and dispose of it correctly.

Adjust the lubricant fill volume and position of the breather valve.
Accordingly, in the event of a change of mounting position. (see Sec “lubricants and mounting positions”) Follow the instructions in sec. “Mechanical Installation"/"Installing the gearboxes”.

2. Safety Notes

Preface

The following safety notes are primarily concerned with the use of gearboxes. If using gearmotors, please also refer to the safety notes for motors in the relevant operating instructions. Please also consider the supplementary safety notes in the individual sections of these operating instructions.

General information

During and after operation, gearmotors, gearboxes, and motors have:

- Live parts
- Moving parts
- Hot surfaces (may be the case)

Only qualified personnel may carry out the following work:

- Transportation
- Putting into storage
- Installation / assembly
- Connection
- Startup
- Maintenance
- Servicing

The following information and documents must be observed during these processes:

- Relevant operating instructions and wiring diagrams.
- Warning and safety signs on the gearbox / gearmotor.
- System-specific regulations and requirements.
- National/Regional regulations governing safety and the prevention of accidents.

Serious injuries and property damage may result from:

- Improper use
- Incorrect installation or operation
- Unauthorized removal of necessary protection covers or the housing.

Designated Use

Gearmotors / gearboxes from Superior Gearbox Company are intended for industrial systems. They correspond to the applicable standards and regulations. Technical data and information about the permitted conditions can be found on the nameplate and in the documentation.

It is essential that you follow all the instructions!

Transportation

Inspect the shipment for any damage that may have occurred in transit as soon as you receive the delivery. Inform the shipping company immediately. It may be that you are not permitted to startup the drive due to the damage. Use suitable sufficiently rated handling equipment if necessary. Remove any transportation fixtures prior to startup.

Installation/Assembly

Follow all instructions in the section “Installation” & “Assembly/Removal” sections.

Inspection/Maintenance

Follow the instructions in the section “Inspection and Maintenance”.

Startup/Operation

1. Check that direction of rotation is correct decoupled status. Listen for unusual grinding noises as the shaft rotates.
2. Secure the shaft keys for test mode without drive component. Do not render monitoring and protection equipment inoperative even for test mode.

Switch off the gearmotor, if in doubt whenever changes occur in relation to normal operation (e.g. increased temperature, noise, vibration). Determine the cause; contact Superior Gearbox Company if necessary.

3. Installation

3.1 Prerequisites for Assembly

Check that the following conditions have been met:

- The data on the nameplate of the gearmotor matches the voltage supply system.
- The drive has not been damaged during transportation or storage.
- Ensure that the following requirements have been met:

  For standard gearboxes :

  Ambient temperature according to the lubricant table in sec. "Lubricants" (see standard) The drive must not be assembled in the following ambient conditions:

  - Potentially explosive atmosphere
  - Oil
  - Acids
  - Gas Vapors
  - Radiation

  For special versions:

  The drive configured in accordance with the ambient conditions.

  For helical-worm gearboxes:

  No large external mass moments of inertia which could exert a driving load on the gearbox.

3.2 Work for assembly

You must clean the output shafts and flange surfaces thoroughly to ensure are free of anti-corrosion agents, contamination or similar. Use a commercially available solvent. Do not let the solvent come into contact with the sealing lips of the oil seals —danger of damage to the material!

When the drive is installed in abrasive ambient conditions, protect the output end oil seals against wear.

3.3 Installing the gearbox.

The gearbox or gearmotor is only allowed in the specified mounting position.

The oil checking and drain screws and the breather valves must be freely accessible.

At the same time, also check that the oil fill is as specified for the mounting position.

The gearbox is filled with the required oil volume at the factory. There may be slight deviations at the oil level plug as a result of the mounting position, which are permitted within the manufacturing tolerances.

Use plastic inserts (2~3mm) if there is a risk of electrochemical corrosion between the gearbox and the driven machine. The material used must have an electrical bleeder resistor $< 10^{g}\Omega$. Electrochemical corrosion can occur between various metals, for example, cast iron and high-grade steel. Also install the bolts with plastic washers! Ground the housing additionally use the grounding bolts on the motor.

Installation in damp locations or in the open

Drives are supplied in corrosion-resistant versions for use in damp areas or in the open air. Repair any damage to the paintwork.

Gearbox venting

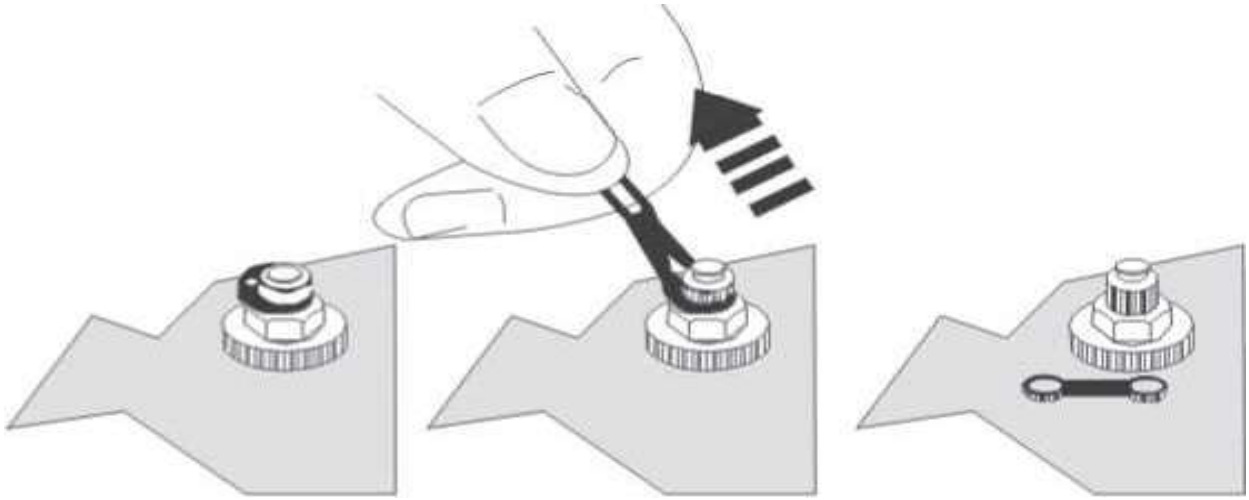
SGR17. SGR27 and SGF27 in mounting positions M1 , M3, M5 and M6 have no breather plug. Superior Gearbox Company supplies all other gearboxes with the breather valve installed and activated according to the particular mounting position.

Exceptions

1. Superior Gearbox Company supplies the following gearboxes with a screw plug on the vent hole provided:
   - gearboxes for extended storage
   - pivoted mounting positions, if possible
   - gearboxes for mounting on a slant
   - the breather valve is located in the motor terminal box. Before start-up, you must replace the highest screw plug with the breather valve supplied.

2. Superior Gearbox Company supplies a breather valve in a plastic bag for gear head unit requiring venting on the input end.

Activating the breather valve



1. Breather valve with transport fixture.

2.Remove the transport fixture.

3. Breather valve activated.

Painting the gearbox

If you paint or respray the drive, ensure that you cover the breather valve and oil seals carefully. Remove the strips of tape after completing the painting work.

4. Mechanical Installation

4.1 Required tools/aids

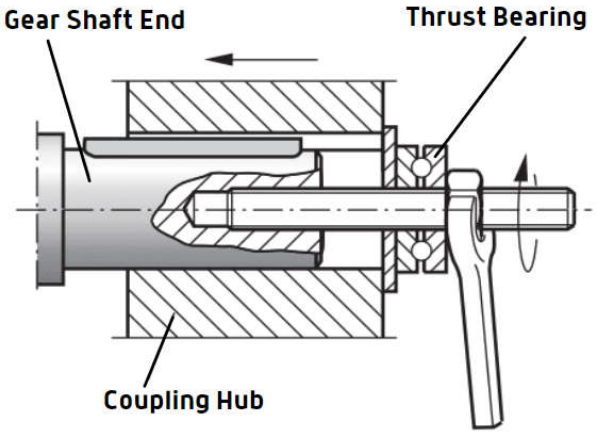
- Set of spanners
- Torque wrench (for shrink discs, AQH motor adapter and input shaft assembly with centering shoulder
- Mounting device
- Shims and distance rings If necessary
- Fixing devices for input and output elements
- Lubricant
- Bolt adhesive

Installation tolerances

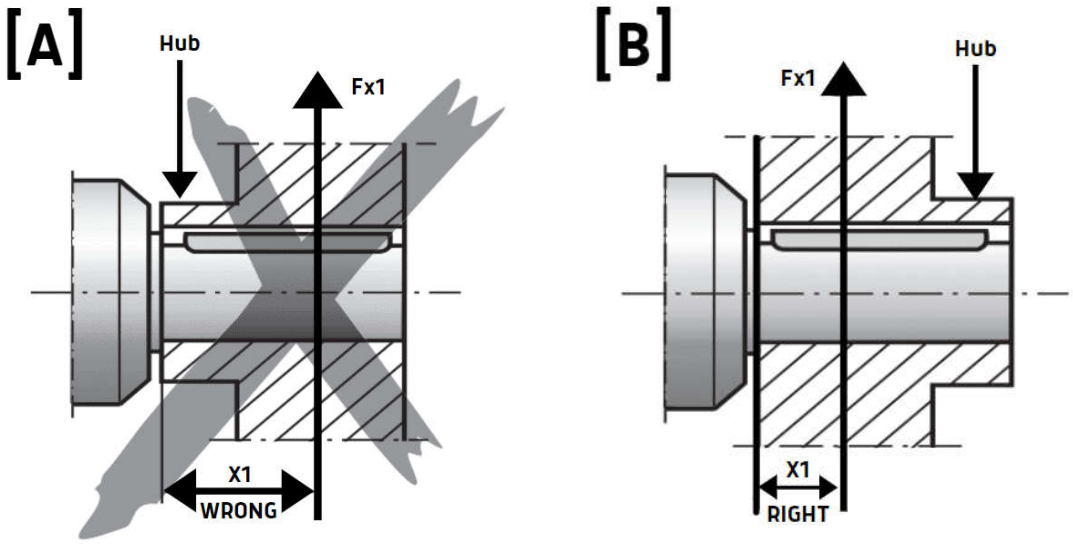
Shaft End	Flanges
Diameter tolerance accordance with DIN 748 • ISO k6 for solid shafts with ϕ ≤50mm • ISO m6 for solid shafts with ϕ >50mm • ISOH7 for hollow shafts Center bore in accordance with DIN 332 shape DR	Centering shoulder tolerance in accordance with DIN 42948 • ISOj6 with bl≤mm • ISOh6 with b2>230mm

4.2 Gearbox with solid shaft installing input and output elements.

The following figure shows a mounting device for installing couplings or hubs on gearbox or motor shaft ends. It may be possible to dispense with the thrust bearing on the mounting device.



Avoid impermissibly high overhung loads: install the gear or chain sprocket according to [B].

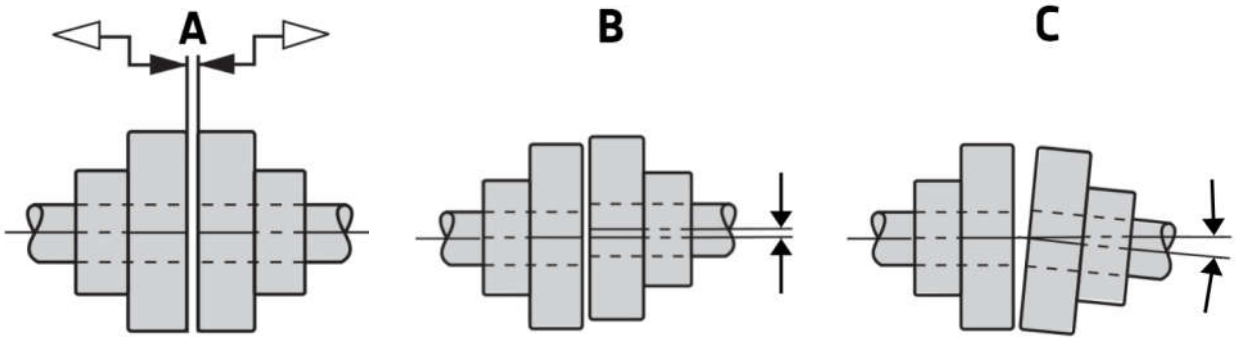


- Only use a mounting device for installing input and elements. Use the center bore and the thread on shaft end for positioning.
- Never drive belt pulleys, couplings, pinions, etc. onto the shaft end by hitting them with a hammer. This will damage the bearings, housing and the shaft.
- In the case of belt pulleys, make sure the belt is tensioned correctly in accordance with the manufacturer's instructions.
- Power transmission elements should be balanced after fitting and must not give rise to any impermissible radial or axial forces.

Note: Assembly is easier if you first apply lubricant to the output element or heat it up briefly (to 80~100℃)

Installing couplings

Couplings must be mounted and balanced according to the Information provided by the coupling manufacturer:



A. Max and Min clearance

B. Axial misalignment

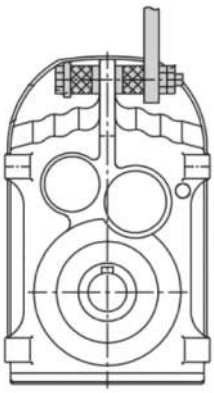
C. Angular misalignment

INPUT AND OUTPUT ELEMENTS SUCH AS BELT PULLEYS, COUPLINGS, ETC. MUST BE PROTECTED AGAINST CONTACT.

4.3 Torque arms for mounted gearboxes

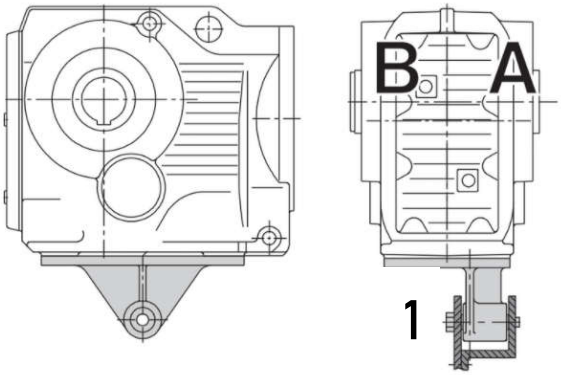
Do not place torque arms under strain during installation!

Parallel Shaft
Helical-bevel gearbox



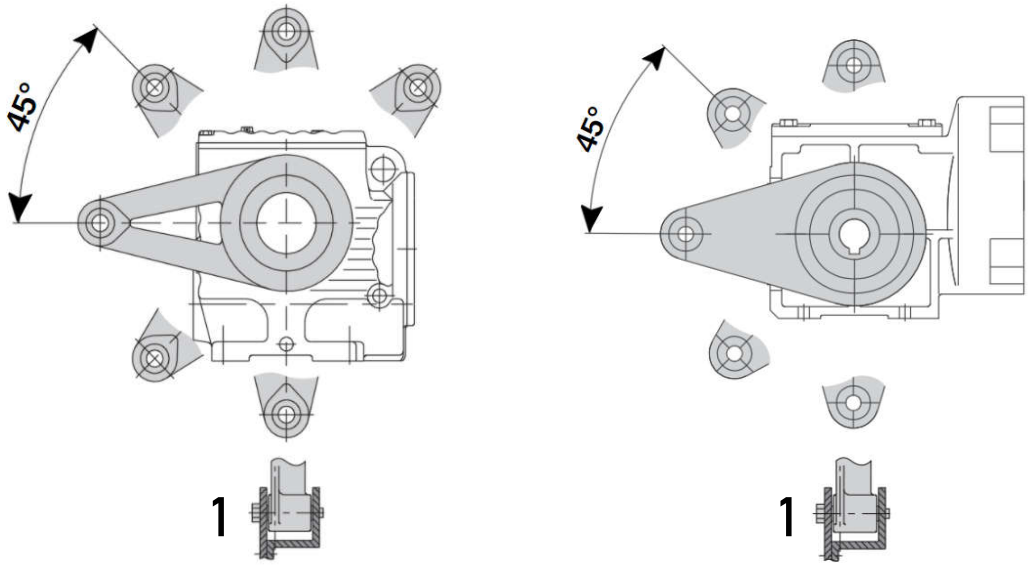
Helical gearbox

- Bush with bearings on both ends → (1)
- Install connection end B as a mirror image of A



Helical-worm gearboxes

- Bush with bearings on both ends (1)

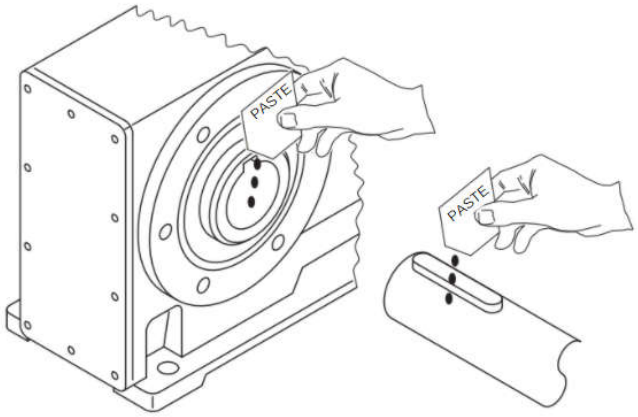


Pic. 5: Torque arm for helical-worm gearboxes

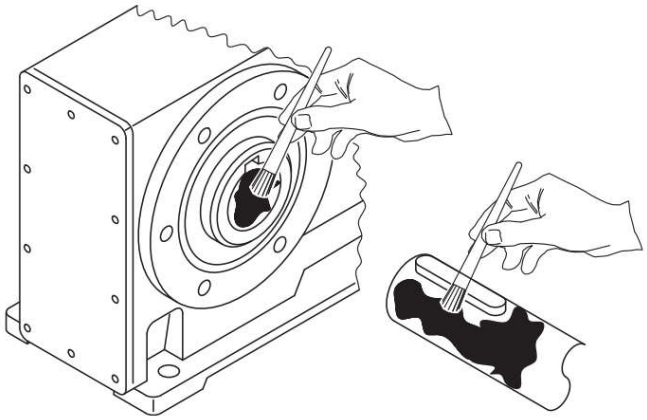
4.4 Mounted gearbox with keyway or splinted hollow shaft

Installation notes:

1. Apply Anti-seize paste.

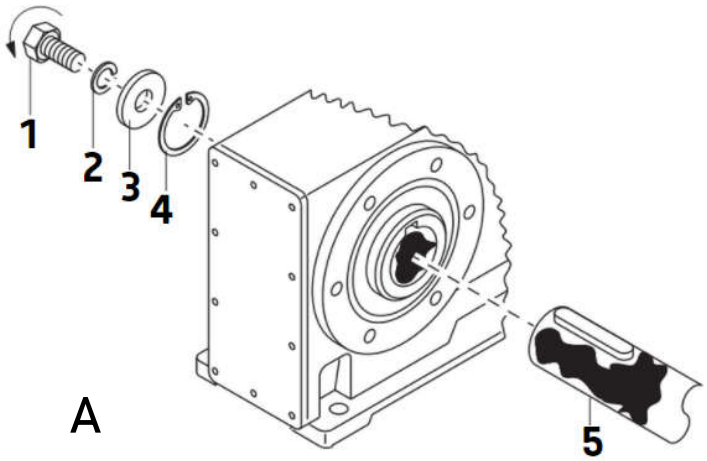


2. Distribute the Anti-seize paste carefully.



3. Install the shaft and secure it axially (mounting is facilitated by using a mounting device)

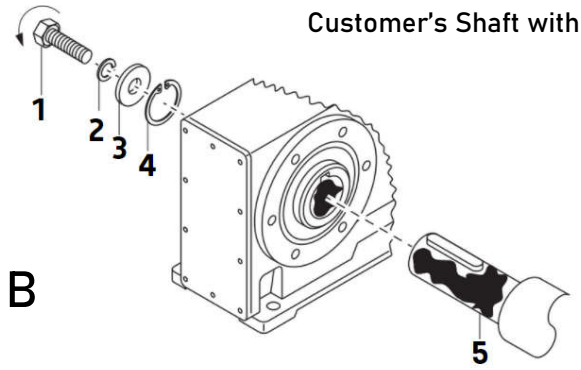
3A: Mounting with standard scope of delivery.



1. Short retaining bolt
2. Lock Washer
3. Washer
4. Retaining Ring
5. Customer Shaft

3B: Mounting with Superior Gearbox Assembly/Disassembly Kit

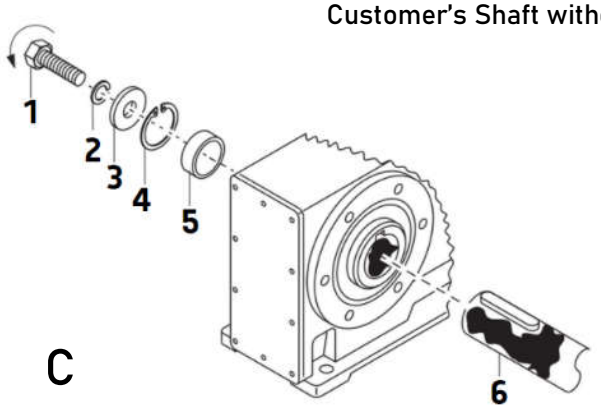
Customer's Shaft with Contact Shoulder



1. Retaining bolt
2. Lock Washer
3. Washer
4. Retaining Ring
5. Customer Shaft with Contact Shoulder

3C: Mounting with Superior Gearbox Assembly/Disassembly Kit

Customer's Shaft without Contact Shoulder



1. Retaining bolt
2. Lock Washer
3. Washer
4. Retaining Ring
5. Spacer
6. Customer Shaft without

4. Tighten the retaining bolt to the appropriate torque (see table 2)

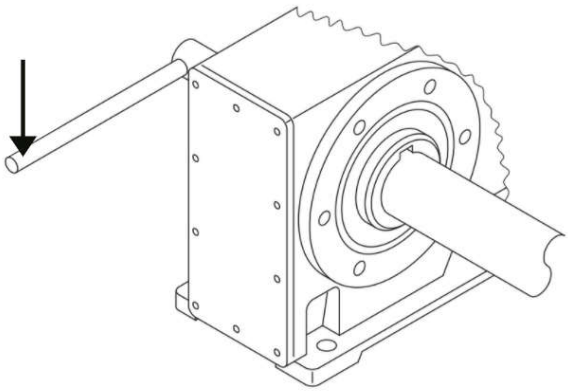


Table 2

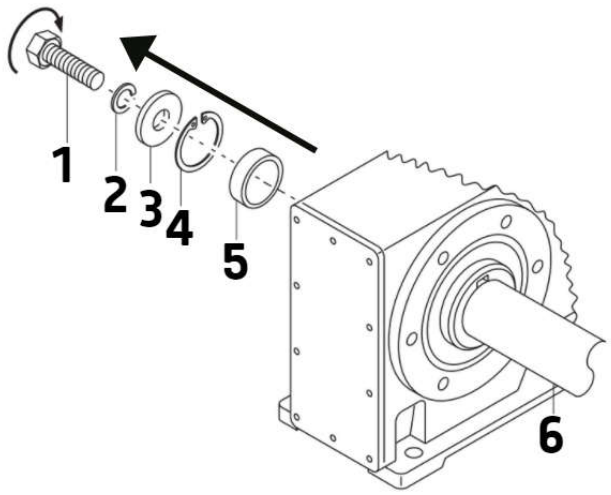
Bolt	Tightening Torque (Nm)
M5	5
M6	8
M10/M12	20
M16	40
M20	80
M24	200

Note: To avoid contact corrosion, we recommend that the customer's shaft should additionally be recessed between the two contact surfaces.

Removal Notes:

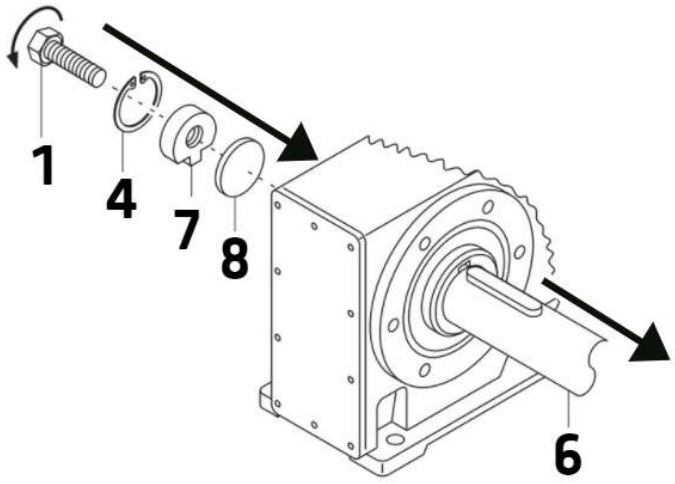
This description is only applicable when the gearbox was assembled using the installation / removal kit from Superior Gearbox Company.

1. Loosen the retaining bolt 1.
2. Remove parts 2 to 4 and, if fitted, spacer 5.



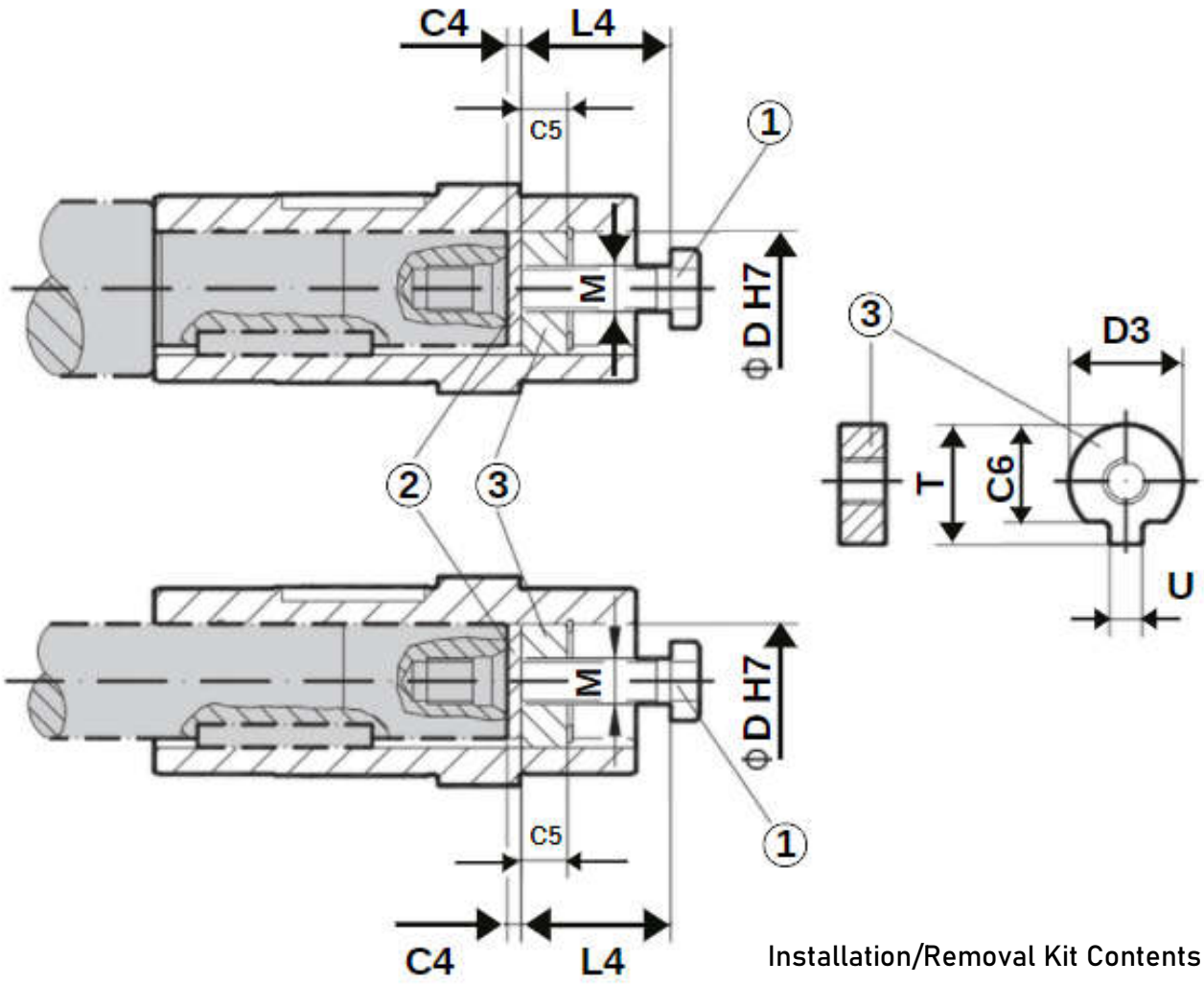
1. Retaining bolt
2. Lock Washer
3. Washer
4. Retaining Ring
5. Spacer
6. Customer Shaft

3. Insert the forcing washer 8 and fixed nut 7 from the Super Gearbox Company installation/removal kit between the customer's shaft 6 and the retaining ring 4.
4. Re-insert the retaining ring 4.
5. Screw the retaining bolt 1 back in. Now you can force the gearbox off the shaft by tightening the bolt.



1. Retaining Bolt
4. Retaining Ring
6. Customer Shaft
7. Fixed Nut
8. Forcing Washer

4.5 Superior Gearbox Installation/Removal Kit



Installation/Removal Kit Contents

1. Retaining bolt
2. Fixed nut for disassembly

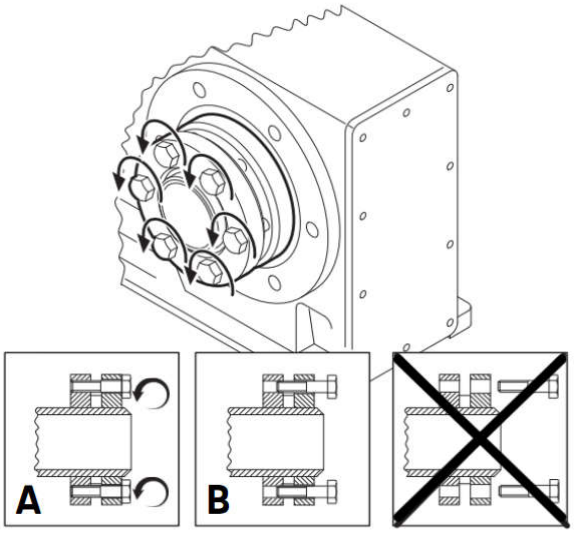
Table 3

Type	D^{H7} [mm]	M[1)]	C4 [mm]	C5 [mm]	C6 [mm]	$U^{-0.5}$ [mm]	$T^{-0.5}$ [mm]	$D3^{-0.5}$ [mm]	L4 [mm]
SGSA..47	25	M10	5	10	20	7.5	28	24.7	35
SGFA..37, KA..37, SA..47, SA..57	30	M10	5	10	25	7.5	33	29.7	35
SGFA..47, KA..47, SA..57	35	M12	5	12	29	9.5	38	34.7	45
SGFA..57, KA..57, FA..47, KA..67, SA..67	40	M16	5	12	34	11.5	41.9	39.7	50
SGSA..67	45	M16	5	12	38.5	13.5	48.5	44.7	50
SGFA..77, KA..77, SA..77	50	M16	5	12	43.5	13.5	53.5	49.7	50
SGFA..87, KA..87, SA..77, SA..87	60	M20	5	16	56	17.5	64	59.7	60
SGFA..97, KA..97, SA..87, SA..97	70	M20	5	16	65.5	19.5	74.5	69.7	60
SGFA..107, KA..107, FA..97	90	M24	5	20	80	24.5	95	89.7	70
SGFA..127, KA..127	100	M24	5	20	89	27.5	106	99.7	70
SGFA..157, KA..157	120	M24	5	20	107	31	127	119.7	70

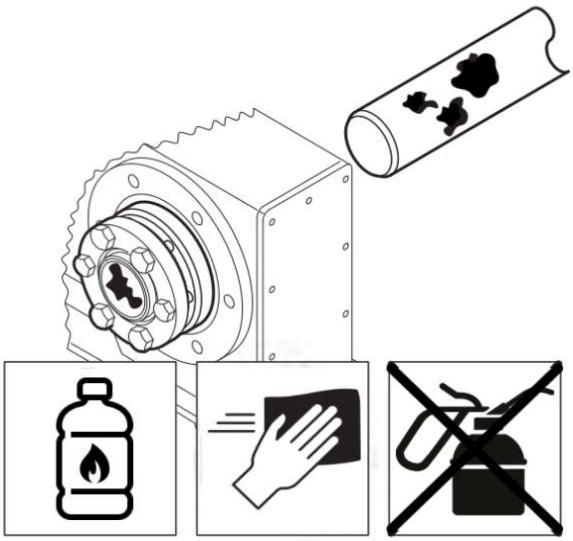
4.6 Mounted gearboxes with shrink disc installation notes.

Do not tighten the locking bolts unless the shaft is installed the hollow shaft could become deformed!

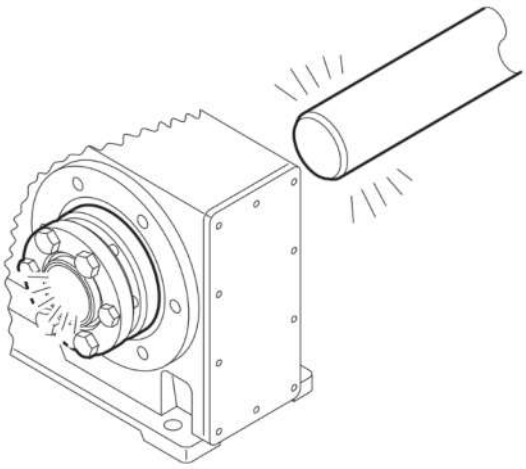
Step One: Loosen all locking screws, making sure not to unscrew them



Step Two: Carefully degrease the hollow shaft hole and the input shaft.



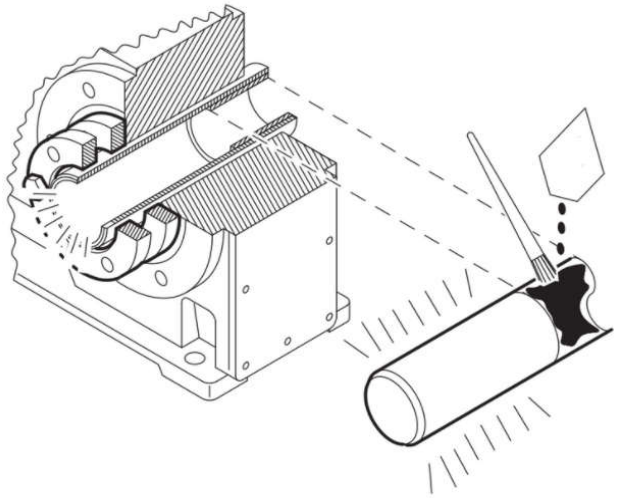
Step Three: Hollow shaft/input shaft after degreasing.



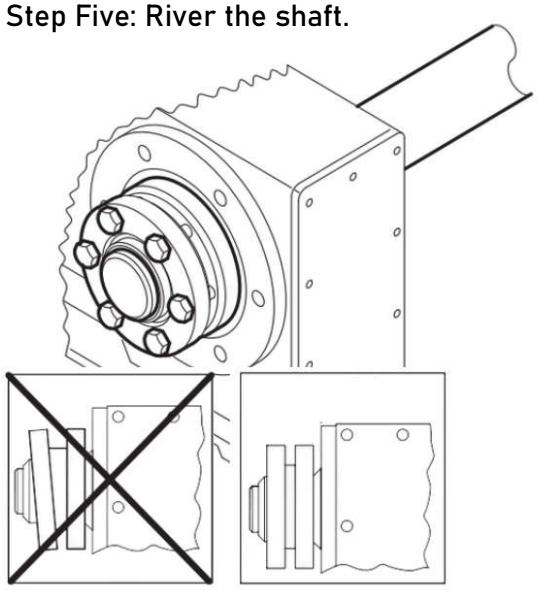
It is essential to make sure that the clamping area of the shrink disk is free from grease!

For this reason, never apply Anti-seize paste directly to the bushing as the paste may be able to get into the clamping area of the shrink disk when the input shaft is put on.

Step Four: Apply Anti-seize paste to the input shaft in the area of the bushing.



Step Five: River the shaft.



Step Six: Tighten the locking bolts with the torque wrench by working round several times from one bolt to the next (DO NOT tighten or loosen bolts in diametrically opposite sequence.)

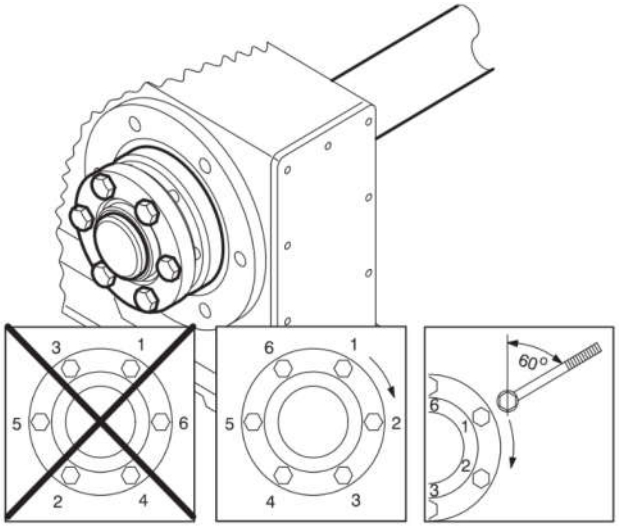


Table 4

Type	Bolt	Nm	$\sphericalangle$ max.[1)]
SGSH37..77	M5	5	60°
SGKH87/97 FH37..77 SH47..77	M6	12	
SGKH87/97 FH87/97 SH87	M8	30	
SGKH107 FH107	M10	59	
SGKH127/157 FH127	M12	100	
SGKH167/187	M16	250	

1) Maximum tightening angle per spin

Notes on removing the shrink disk

1. Unscrew the locking bolts evenly one after the other. Each lucking bolt may only be unscrewed by about one quarter turn in the initial cycle. This is in order to avoid tilting and jamming the locking collars. Do not fully unscrew the lucking bolts!
2. Remove the shaft or pull the hub off the shaft.(You must first remove any rust that may have to formed between the hub and he end of the shaft).
3. Pull the shrink disk off the hub.

 Caution: Risk of Injury If the shrink disk Is not removed correctly! 

Cleaning and lubricating the shrink disk

There is no need to strip down and re-grease disassembled shrink disks before they are screwed back on.

The shrink disk only needs to be cleaned and re-greased eased if it is contaminated.

Use one of the following solid lubricants for the tapered surfaces.

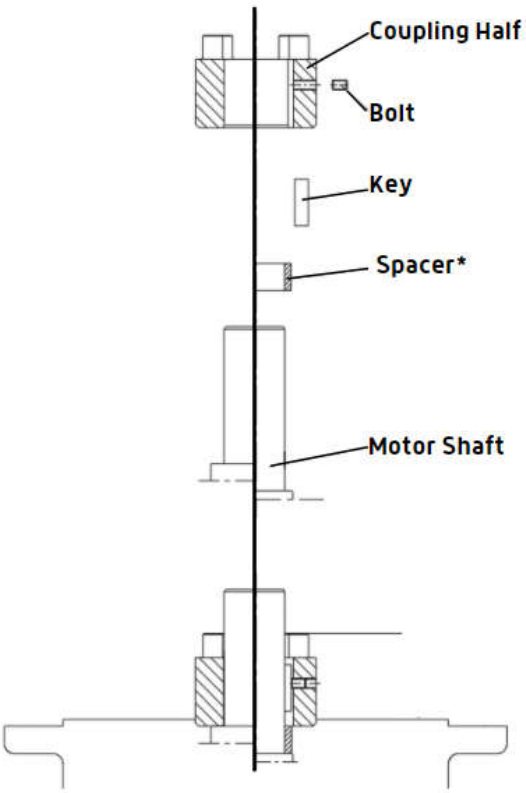
Table 5

Lubricant (MoS_2)	Sold as
Molykote321 (Lube coat)	Spray
Molykote Spray (powder spray)	Spray
Molykote G Rapid	Spray or Paste
Aemasol MO 19P	Spray or Paste
Aemasol DIO—Setral 57N (Lube coat)	Spray

Grease the locking bolts with a multipurpose grease such as Molykote BR2 or similar

4.7 AM adapter coupling

IEC adapter AM63-22S/NEMA adapter AM56-365



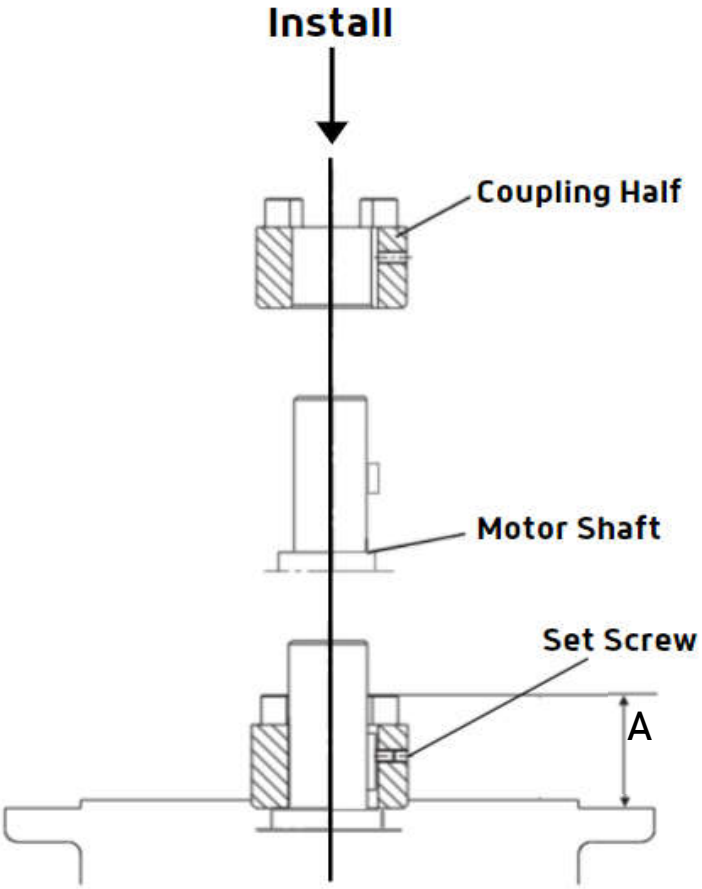
*ONLY with use of a NEMA coupling

1. Clean the motor shaft and flange surfaces of the motor and adapter.
2. Remove the key from the motor shaft and replace it with the supplied key (not AM63 and AM250).
3. Heat the coupling half to approx. 80-100°C, push the coupling half onto the motor shaft.
4. Use a setscrew to secure the coupling half and the key on the motor shaft.
5. Install motor onto the adapter, making sure that the dogs of the two coupling halves engage in each other.

When installing a motor onto the adapter, you must use an anaerobic fluid seal to ensure that moisture cannot penetrate adapter.

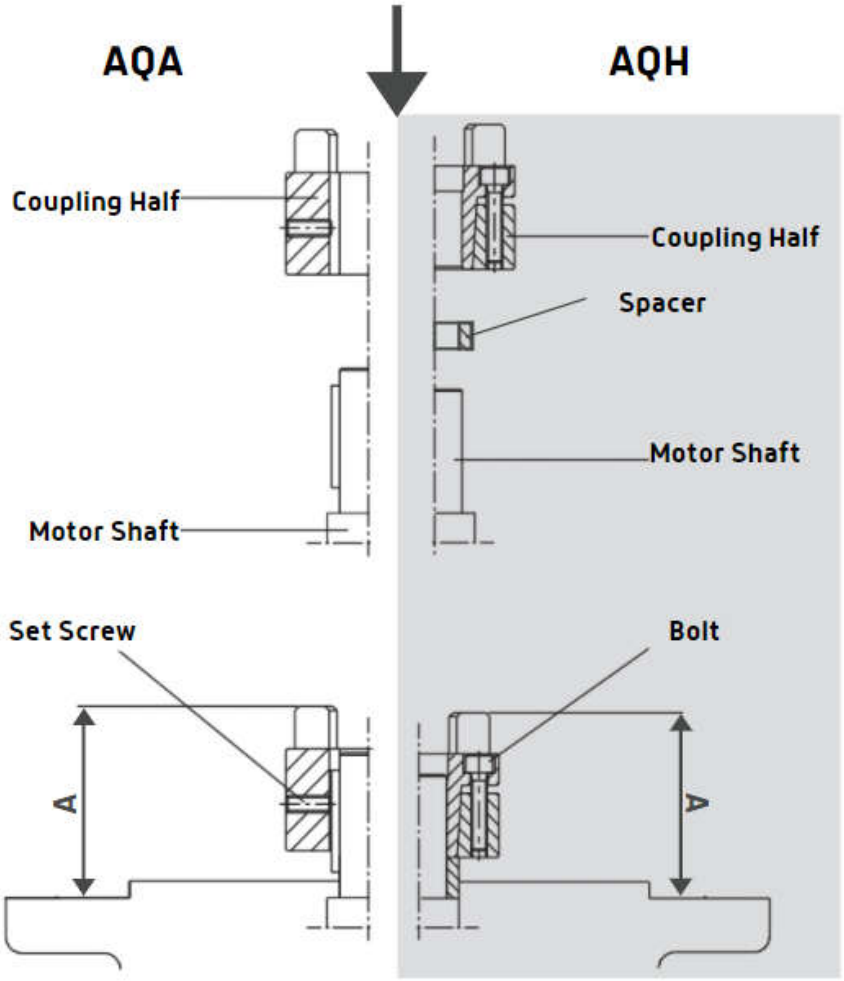
Apply lubricant in the coupling halt for preventing the contact corrosion.

AM adapter coupling (IEC adapter coupling AM250/AM280)



1. Clean the motor shaft and flange surfaces of the motor and adapter.
2. Remove the key from the motor shaft and replace it with the supplied key (not AM63 and AM250).
3. Heat the coupling half to approx. 80-100°C, push the coupling half onto the motor shaft.
4. Check point A
5. Mount the motor on the adapter. When doing this, make sure the coupling dogs of the adapter shaft engage in the plastic spider.

4.8 AQ adapter coupling



1. Clean the motor shaft and flange surfaces of the motor and adapter.
2. AQH: Unscrew the bolts of the coupling half and loosen the conical connection.
3. Heat the coupling half (80-100°C) and push it onto the motor shaft.
   Type AQA/AQH: up to clearance "A" (see table on the next page).
4. AQH: Tighten the bolts on the coupling half in diametrically opposite sequence until all bolts reach the tighten T. specified in the table.
   AQA: Use a setscrew to secure the coupling half.
5. Check the position of the coupling half
6. Install motor onto the adapter making sure that the dogs of the two coupling halves engage in each other. The force that must be applied when joining the two coupling halves is dissipated after final assembly, so there is no risk of any axial load being applied to adjacent bearings.

Setting dimensions & tightening torque

Table 6

Type	Coupling Size	Clearance "A" [mm]	Bolts DIN 912*	Tightening torque T* [Nm]
AQA/AQH80/1/2/3	19/24	44.5	M4	3
AQA/AQH100/1/2		39		
AQA/AQH100/3/4		53		
AQA/AQH115/1/2/3		62		
AQA/AQH115/3	24/28	62	M5	6
AQA/AQH140/1/2		62		
AQA/AQH 140/3	28/38	74.5	M5	6
AQA/AQH 190/1/2		76.6		
AQA/AQH190/3	W45	100	M6	10

*Used in (AQH)

4.9 AD input shaft assembly

Please refer to Section *"Installing Input and output shafts" for information on mounting of input elements.*

5 Startup

5.1 Startup of helical-worm gearboxes

Note: Improper start-up can result in damage to the gearbox.

- Ensure retaining screws are tight after installation.
- Ensure output shaft rotates properly.
- Remove transport fixtures prior to start up.
- Observe all safety notes provided throughout this manual.

Run in period

Helical-worm gearboxes require a run-in period of at least 24 hours before reaching their maximum efficiency. A separate run-in period applies for each direction of rotation if the gearbox is operated in both directions of rotation. The table below shows the average power reduction during the run-in period.

Table *7:* Average losing power of a helical -worm gearbox.

Number of Starts	Helical-worm Gearbox	
	Power Reduction	I range
1	12%	50…280
2	6%	20…70
3	3%	20…90
4	-	-
5	3%	6…25
6	2%	7…25

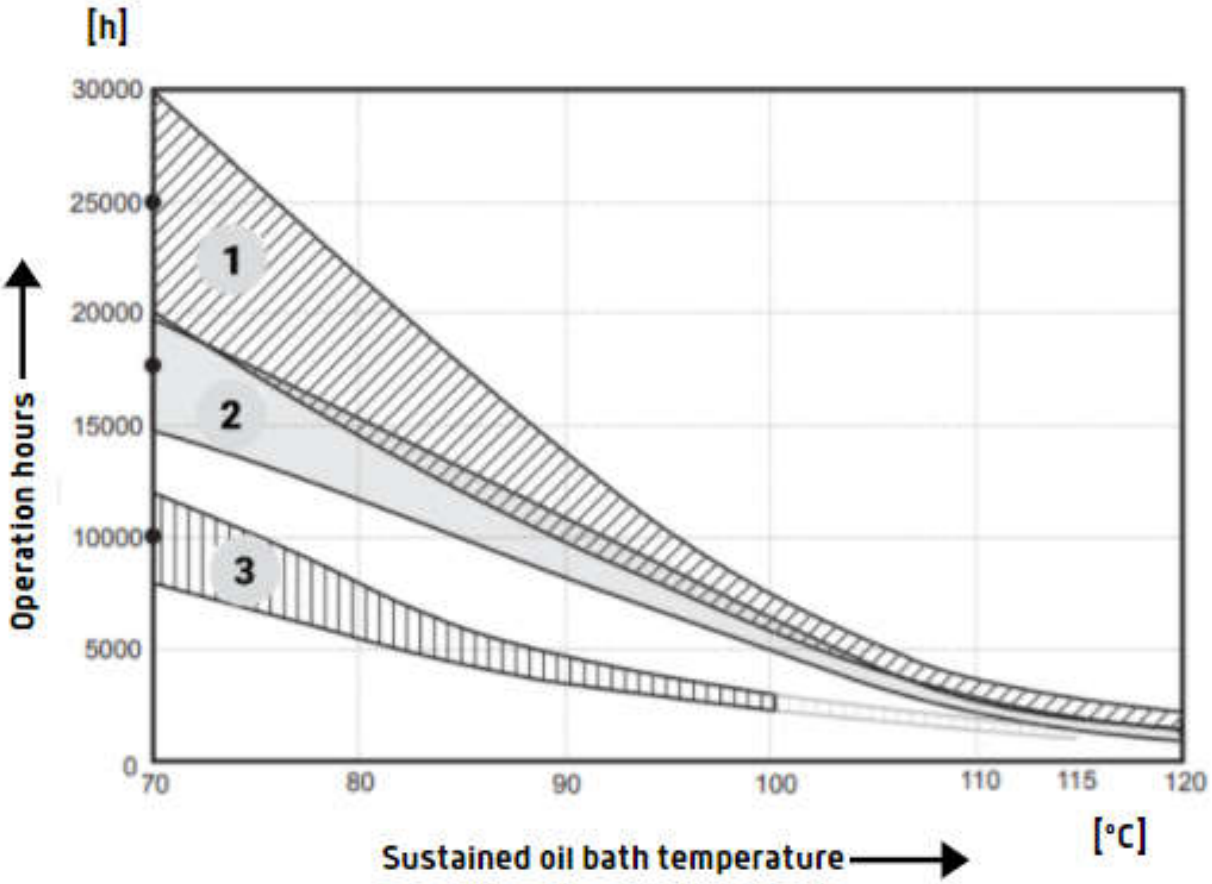
6.Inspection and Maintenance

6.1 Inspection and maintenance intervals

Table 8: Cycle of back-check and maintenance

Frequency	What to do?	Memo
After 300 hours Initial operating	clean housing then change oil	See 6.3
Every 3000 machine hours, at least every 6 months	Check oil and oil level	
Depending on the operating conditions (see image on next page) every 3 years at the latest	Change mineral oil	
	Replace anti-friction bearing grease Replace oil seal	
Depending on the operating conditions (see image on next page) every 5 years at the latest	Change synthetic oil	
	Replace anti-friction bearing grease Replace oil seal	
SGR17/27 and SGF27 have lubrication for life and are therefore maintenance-free		

6.2 Lubricant change intervals



Average value per oil type:

1: Synthetic Oil

2: Hydrocarbonic Synthetic Oil

3: Mineral Oil

6.3 Inspection and maintenance of the gearbox

Do not intermix synthetic lubricants and do not mix synthetic and mineral lubricants together!

The position of the oil level and oil drain plug and the breather valve depends on the mounting position. Refer to the diagrams of the mounting positions.

Checking the oil level

1. De-energize the gearmotor and secure it to prevent it from being switched on inadvertently!
   Wait until the gearbox has cooled off! Danger of burns!
2. Refer to Section "installing the gearbox" when changing the mounting position!
3. For gearboxes with an oil level plug: remove the oil level plug, check the fill level, and correct it if necessary. Screw the oil level plug back In.

Checking the oil

1. De-energize the gearmotor and secure it to prevent it from being switched on inadvertently!
   Wait until the gearbox has cooled off! Danger of buns!
2. Remove a little oil from the oil drain plug.
3. Check the oil consistency.
4. For gearboxes with an oil level plug: remove the oil level plug, check the fill level, and correct it if necessary. Screw the oil level plug back In.

Changing the oil

Only change the oil when the gearbox is at operating temperature.

1. De-energize the gearmotor and secure it to prevent it from being switched on inadvertently!
   Wait until the gearbox has cooled off! Danger of burns!

Note: The gearbox must still be warm otherwise the high viscosity of excessively cold oil will make it harder to drain the oil correctly.

2. Place a container underneath the oil drain plug
3. Remove the oil level plug, breather plug/breather valve and oil drain plug.
4. Drain all the oil.
5. Screw In the oil drain plug.
6. Pour in new oil of the same type through the vent hole. Do not mix synthetic lubricants.
   - Pour in the volume of oil in accordance with the mounting position or as specified on the nameplate.
   - Check at the oil level plug.
7. Screw the oil level plug and the breather plug back in.

7 Malfunctions

Problem	Possible cause	Remedy
Unusual, regular running noise	Meshing/grinding noise: bearing damage Knocking noise: irregularity in the gearing	Check the oil Change bearings Contact customer service
Unusual, irregular running noise	Foreign bodies in the oil	Check the oil Stop the drive Contact customer service
Oil leaking: -From the gear cover plate -From the motor flange -From the output enroll seal -From the motor oil seal	Rubber seal on the gear cover plate leaking Seal defective Gearbox not vented	Tighten the bolts on the gear cover plate and observe the gearbox If oil still leaking: contact Superior Gearbox customer service
Oil leaking from breather valve	Too much oil Drive operated in incorrect mounting position Frequent starts (oil foams) and/or high oil level	Correct the oil level Mount the breather valve correctly and correct the oil level
Output shaft does not turn although the motor is running, or the input shaft is rotated	Connection between shaft and hub in gearbox interrupted	Replace gearbox/gearmotor

Short-term oil/grease leakage at the oil seal is possible in the run-in phase (24 hours running time).

Please have the following information to hand when contacting customer service:

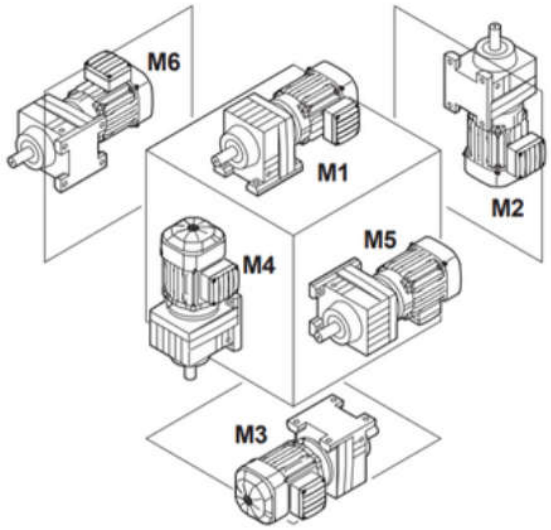
- Data from the nameplate (complete)
- Nature and extent of the fault
- Time and peripheral circumstances of the fault
- Presumed cause

8 Mounting Positions

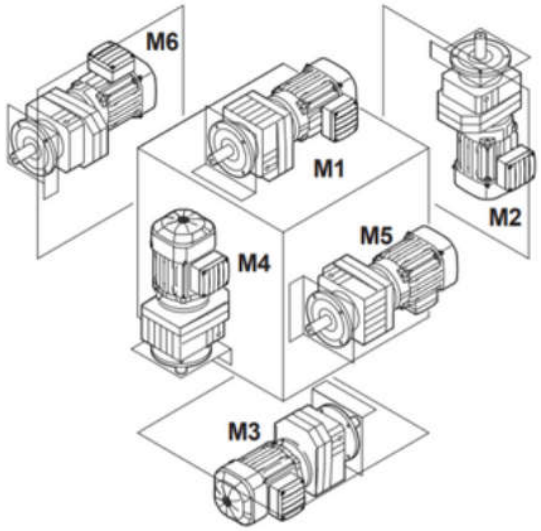
8.1 General information on mounting positions

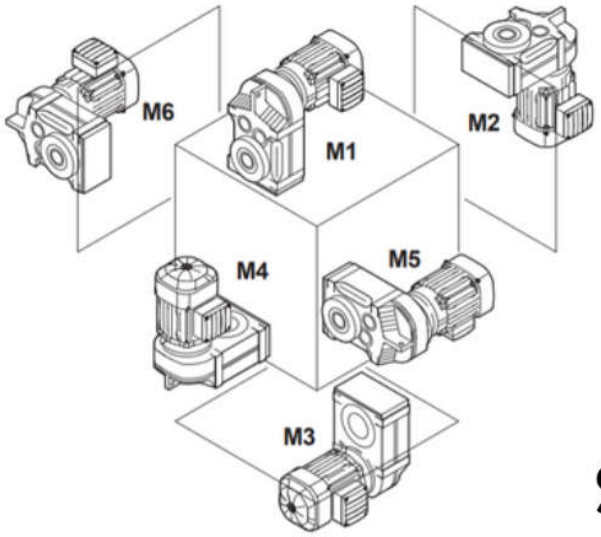
Mounting position designation

Superior Gearbox differentiates between six mounting position M1-M6 for gearboxes. The following figures show the gearmotor in mounting positions M1-M6.

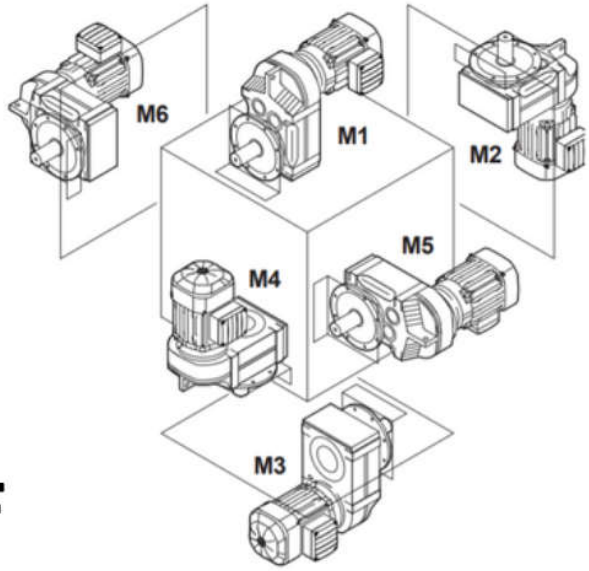


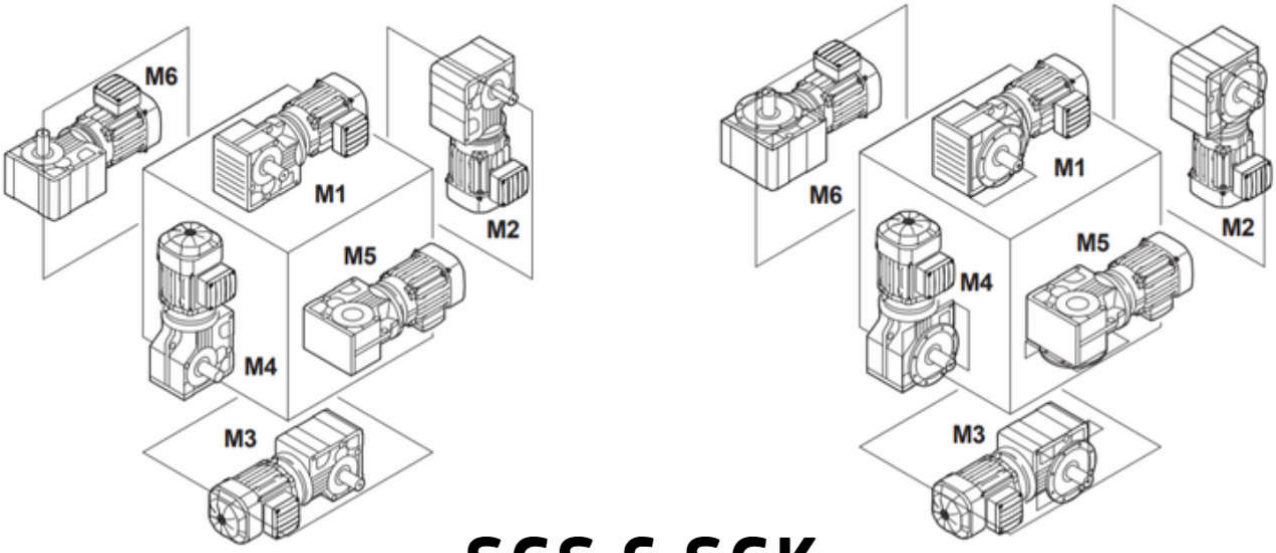
SGR





SGF



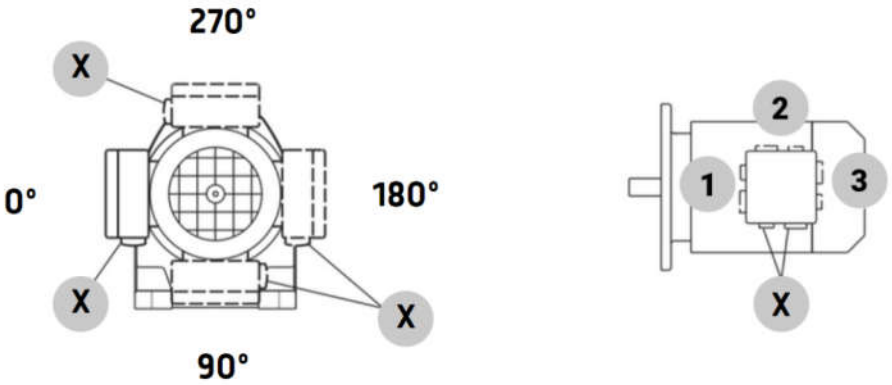


SGS & SGK

8.2 Important order information

Position of the motor terminal box and cable entry

- Possible positions of the terminal box are 0°, 90°, 180°, 270°.
- As viewed onto and cable entry the fanguard.
- In addition, the position of the cable entry can be selected. The possibilities are "X" (normal position) 1, 2, or 3.

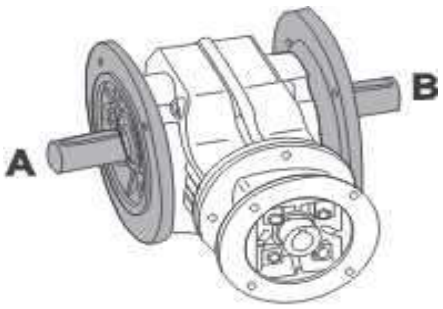


The terminal box cannot be positioned at 90° on the R17d63…geared motor.
Only: cable entries "X" and "2" are possible with DT56 and DR63 motor.
Exception: This restriction does not apply to the D63 with the plug connector.
Cable entry "2" is not possible with the D71..BMG 90° motor with terminal box position 90°.

Position of the output shaft and the output flange

In right-angle gearboxes, it is necessary to indicate the position of the output shaft and output flange:

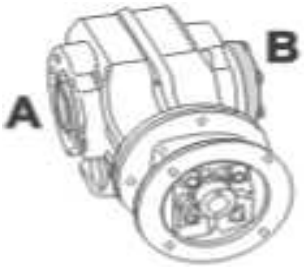
A or B or A+B



Position of output shaft and output flange.

Position of the Connection end In Right-angle gearboxes

In shaft mounted right-angle gearboxes with shrink disk, it is necessary to indicate whether the A or B end is the connection end. In the below figure, the A end is the connection and the shrink disk are located opposite the connection end.



Connection end at bottom only is possible with SGK167/SGK187 in mounting positions M5 and M6.

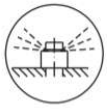
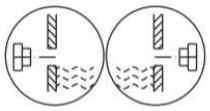
Position of Joint

Example

Type	Mtg. Pos.	Shaft with	Flange with	Connection end	Position of shrink disk	Position of Terminal box	Position of cable entry	Dir./Rot. of the output
SGK47D71D4	M2	A	-	-	-	0°	"X"	CW
SGSF77D100L4	M6	A+B	A+B	-	-	90°	"3"	-
SGKA97D132M4	M4	-	-	B	-	270°	"2"	-
SGKH107D160L4	M1	-	-	A	B	180°	"3"	-

Symbols Used

The following table shows the symbols used in the mounting position sheets and what they mean:

Symbol	Meaning
	Breather valve
	Oil level plug
	Oil drain plug

Churning losses

Increased churning losses may arise in some mounting positions. Please contact Superior Gearbox Company in case of the following combinations:

Mounting position	Gearbox type	Gearbox size	Input speed (rpm)
M2.M4	SGR	97...107	>2500
		>107	>1500
M2,M3,M4$_p$M5$_r$M6	SGF	97 ...107	>2500
		>107	>1500
	SGK	77...107	>2500
		>107	>1500
	SGS	77...97	>2600

9 Lubricants

9.1 Lubricant fill quantities

The specified fill quantities are recommended values. The precise values vary depending on the number of stages and gear ratio. When filling, it is essential to check the oil level plug since it indicates the precise oil capacity.

The following tables show guide values tor lubricant fill quantities in relation to the mounting position M1-M6.

Helical gearboxes (SGR)

Gearbox type	Fill quantity (L)					
	M1*	M2*	M3	M4	M5	M6
SGR17/R17F	0.25	0.6	0.35	0.6	0.35	0.35
SGR27/R27F	0.25/0.4	0.7	0.4	0.7	0.4	0.4
SGR37/R37F	0.3/1	0.9	1	1.1	0.8	1
SGR47/R47F	0.7/1.5	1.6	1.5	1.7	1.5	1.5
SGR57/R57F	0.8/1.7	1.9	1.7	2.1	1.7	1.7
SGR67/R67F	1.1/2.3	2.6/3.5	2,8	3.2	1.8	2
SGR77/R77F	1.2/3	3.8/4.3	3.6	4.3	2.5	3A
SGR87/R87F	2.3/6	8.778.4	7.2	7.7	6.3	6.5
SGR97	4.679.8	11.7/14	11.7	13.4	11.3	11.7
SGR107	6/13.7	16.3	16.9	19.2	13.2	15,9
SGR137	10/25	28	29.5	31.5	25	25
SGR147	15.4/40	46.5	48	52	39.5	41
SGR167	27/70	82	78	89	66	69

Gear unit type	**Fill quantity (L)**					
	M1*	**M2***	**M3**	**M4**	**M5**	**M6**
SGRF17	**0.25**	**0.6**	**0.36**	**0.6**	**0.35**	**0.35**
SGRF27	**0.25/0.4**	**0.7**	**0.4**	**0.7**	**0.4**	**0.4**
SGRF37	**0.4/1**	**0.9**	**1**	**1.1**	**0.8**	**1**
SGRF47	**0.7/1.5**	**1.6**	**1.5**	**1.7**	**1.5**	**1.5**
SGRF57	**0.8/1.7**	**1.8**	**1.7**	**2.1**	**1.7**	**1.7**
SGRF67	**1.2/2.5**	**2.7/3.6**	**2.7**	**3.1**	**1.9**	**2.1**
SGRF77	**1.2/2.6**	**3.8/4.1**	**3.3**	**4.1**	**2.4**	**3**
SGRF87	**2.4/6**	**B.8/7.9**	**7.1**	**7.7**	**6.3**	**6.4**
SGRF97	**5.1/10.2**	**11.9/14**	**11.2**	**14**	**11.2**	**11.8**
SGRF107	**6.3/14.9**	**15.9**	**17**	**19.2**	**13.1**	**15.9**
SGRF137	**9.5/25**	**27**	**29**	**32.5**	***25***	**25**
SGRF147	**16.4/42**	**47**	**48**	**52**	**42**	**42**
SGRF167	**26/70**	**82**	**78**	**88**	**66**	**71**

1)The output end gear unit of multistage gear units must be filled with the larger oil volume.

Gearbox type	Fill quantity (L)					
	M1	M2	M3	M4	*M5*	M6
SGRX57	0.6	0.8	1.3	1.3	0.9	0.9
SGRX67	0.8	0.8	1.7	1.9	1.1	1.1
SGRX77	1.1	1.5	2.6	2.7	1.6	1.6
SGRX87	1.7	2.5	4,8	4.8	2.9	2.9
SGRX97	2.1	3.4	7.4	7	4.8	4.8
SGRX107	3.9	5.8	11.6	11.9	7.7	7.7

Gearbox type	Fill quantity (L)					
	M1	M2	M3	M4	M5	M8
SGRXF57	0.5	0.8	1.1	1.1	0.7	0.7
SGRXF67	0.7	0.8	1.5	1.7	1	1
SGRXF77	0.9	1.5	2.4	2.5	1.6	1.6
SGRXF87	1.6	2.5	4.9	4.7	2.9	3
SGRXF97	2.1	3.6	7.1	7	4.8	4.8
SGRXF107	3.1	5.9	11.2	10.5	7.2	7.2

Parallel shaft helical gearboxes (SGF)

SGF..,SGFA..B,SGFH..B,SGFV..B:

Gearbox type	Fill quantity (L)					
	M1	M2	M3	M4	M5	M6
SGF..37	1	1.2	0.7	1.3	1	1.1
SGF..47	1.5	1.9	1.1	1.9	1.6	1.7
SGF..57	2.6	3.8	2.1	3.7	2.9	3
SGF..67	2.7	3.8	1.9	3.8	2.9	3.2
SGF..77	5.1	7.3	4.3	8.1	6	6.3
SGF..87	10.3	13.2	7.8	14.4	11	11.2
SGF..97	19	22.5	12.6	25.5	18.9	20.5
SGF..107	25.5	32	19.5	38.6	27.5	28
SGF..127	41.5	56	34	63	46.5	49
SGF..157	72	105	64	106	87	79

SGFF..:

Gearbox type	Fill quantity (L)					
	M1	M2	M3	M4	M5	M6
SGFF..87	1	1.2	0.7	1.3	1	1.1
SGFF..47	1.5	1.9	1.1	1.9	1.6	1.7
SGFF..57	2.6	3.8	2.1	3.7	*2.9*	3
SGFF..67	2.7	3.8	1.9	3.8	2.9	3.2
SGFF..77	5.1	7.3	4.3	8.1	6	6.3
SGFF..87	10.3	13.2	7.8	14.4	11	11.2
SGFF..97	19	22.5	12.6	25.5	18.9	20.5
SGFF..107	25.5	32	19.5	38.6	27.5	28
SGFF..127	41.5	56	34	63	46.5	49
SGFF..167	72	105	64	106	87	79

SGFA..,SGFH..,SGFV..,SGFAF..,SGFVF..,SGFAZ..,SGFHZ..,SGFVZ

Gearbox type	Fill quantity (L)					
	M1	M2	M3	M4	M5	M6
SGF..37	1	1.2	0.7	1.2	1	1.1
SGF..47	1.5	1.8	1.1	1.9	1.5	1.7
SGF..57	2.7	3.8	2.1	3.6	2.9	3
SGF..67	2.7	3.8	1.9	3.8	2.9	3.2
SGF..77	5	7.3	4.3	8	6	6.3
SGF..87	10	13.0	7.7	13.8	10.8	11
SGF.. 97	18.5	22.5	12.6	25.0	18.5	20
SGF..107	24.5	32	19.5	37.5	27	27
SGF..127	39	55	34	61	45	46.5
SGF.. 157	58	103	62	104	85	77

SGFA..,SGFH..,SGFV..,SGFAF..,SGFHF..,SGFVF..,SGFAZ.., SGFHZ..,SGFVZ..

SGK..,SGKA..B,SGKH..B,SGKV..B:

Gearbox type	Fill quantity (L)					
	M1	M2	M3	M4	M5	M6
SGK..37	0.5	1	1	1.3	1	1
SGK..47	0.8	1.3	1.5	2	1.6	1.6
SGK..57	1.2	2.3	2.6	3	2.6	2.4
SGK..67	1.1	2.4	2.6	3.4	2.6	2.9
SGK..77	2.2	4.1	4.4	5.9	4.2	4.4
SGK..87	3.7	8	8.7	10.9	7.8	8
SGK..97	7	14	15.7	20	15.7	15.5
SGK..1Q7	10	21	25.5	33.5	24	24
SGK..127	21	41.5	44	54	40	41
SGK..157	31	62	65	90	58	62
SGK..167	35	100	100	125	85	85
SGK..187	60	170	170	205	130	130

SGKF..

Gearbox type	Fill quantity (L)					
	M1	M2	M3	M4	M5	*M6*
SGKF37	0.5	1.1	1.1	1.5	1	1
SGKF47	0.8	1.3	1.7	*2.2*	1.6	1.6
SGKF57	1.3	2.3	*2.7*	*3*	2.9	2.7
SGKF67	1.1	2.4	2.8	3.6	2.7	2.7
SGKF77	2.1	4.1	4.4	6	4.5	4.5
SGKF87	3.7	8.2	9	11.9	8.4	8.4
SGKF97	7	14.7	17.3	21.5	15.7	16.5
SGKF107	10	22	26	35	25	25
SGKF127	21	41.5	46	55	41	41
SGKF157	31	66	69	92	62	62

SGKA..,SGKH..,SGKV..,SGKAF..,SGKHF..,JTRKVF..,SGKAZ..,SGKHZ..,SGKVZ..,

Gearbox type	Fill quantity (L)					
	M1	M2	M3	M4	MS	M6
SGK..37	0.5	1	1	1.4	1	1
SGK..47	0.8	1.3	1.3	2.1	1.6	1.6
SGK..57	1.3	2.3	2.7	3	2.9	2.7
SGK..67	1.1	2.4	2.7	3.8	2.6	2.6
SGK..77	2.1	4.1	4.6	6	4.4	4.4
SGK..87	8.7	8.2	8.8	11.1	8	8
SGK..97	7	14.7	15.7	20	15.7	15.7
SGK..107	10	20.5	24	32	24	24
SGK..127	21	41.5	43	62	40	40
SGK..157	31	66	67	87	62	62
SGKH167	35	100	100	126	85	85
SGKH187	60	170	170	205	130	130

Helical-worm gearboxes (SGS)

Gearbox type	Fill quantity (L)					
	M1	M2	M3	M4	M5	M6
SGS37	0.25	0.4	0.5	0.6	0.4	0.4
SGS47	0.35	0.8	0.7	1.1	0.8	0.8
SGS57	0.5	1.2	1	1.5	1.3	1.3
SGS67	1	2.0	2.2/3.1	3.2	2.6	2.6
SGS77	1.9	4.2	3.7/5.4	6	4.4	4.4
SGS87	3.3	8.1	6.9/10.4	12	8.4	8.4
SGS97	0,«	15	13.4/18	22.5	17	17

SGSF..:

Gearbox type	Fill quantity (L)					
	M1	M2	M3	M4	M5	M6
SGSF37	0.25	0.4	0.5	0.6	0.4	0.4
SGSF47	0.4	0.9	0.9	1.2	1.0	1.0
SGSF57	0.6	1.2	1	1.6	1.4	1.4
SGSF67	1	2.2	2.3/3	3.2	2.7	2.7
SGSF77	1.9	4.1	3.9/5.8	6.5	4.9	4.9
SGSF87	3.8	8	7.1/10.1	12	9.1	9.1
SGSF97	7.4	15	13.8/18.8	23.6	18	18

SGSA..,SGSH..,SGSAF..,SGSHF..,SGSAZ..,SGSHZ..:

Gearbox type	All quantity (L)					
	M1	M2	M3	M4	M5	M6
SGS..37	0.25	0.4	0.5	0.6	0.4	0.4
SGS..47	0.4	0.8	0.7	1.1	0.8	0.8
SGS..57	0.5	1.1	1	1.6	1.2	1.2
SGS..67	1	2	1.8/2.6	2.9	2.5	2.5
SGS..77	1.8	3.9	3.6/5	5.9	4.5	4.5
SGS..87	3.8	7.4	6/8.7	11.2	8	8
SGS..97	7	14	11.4/16	21	15.7	15.7

The output end gearbox of multistage gearboxes must be filled with the larger oil volume.

9.2 Lubricant used regularly

CONOCO	ISO	VG320
Mobil	ISO	VG320
Mobil	ISO	VG150
ESSO		EP460
Middle burthen oil	ISO	VG220
Omala oil		18#
High temperature lubricant	GREASE	multipurpose
Grease		000# Grease with lithinm

Notes:

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SUPERIOR GEARBOX COMPANY

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