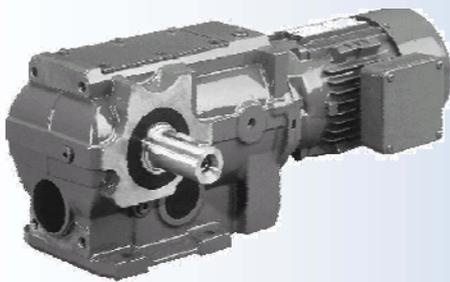




PREMIUM STEPHAN

DIN EN ISO 9001:2000

OPERATING INSTRUCTIONS



SK4

HELICAL BEVEL GEARBOXES
HELICAL BEVEL GEARED MOTORS

EXPLOSION-PROTECTED
HELICAL BEVEL GEARBOXES
HELICAL BEVEL GEARED MOTORS



Important Information

Intended use Gear units/geared motors are designed for the purpose of converting rotary speed and torque. They are intended for use in industrial systems and may only be used as recommended in the Premium Stephan technical documentation and in accordance with the specifications on the type identification plate.

Note These operating instructions involve the storage, installation, operation, lubrication and maintenance of Premium Stephan SK4 helical bevel gearboxes and helical bevel geared motors.



Drives that are suitable for use in explosion-prone areas comply with guideline 94/9 / EC (ATEX). Only drives that have the symbol on the side on the name plate may be used in explosion-prone areas. Notes in these operating instructions that must be observed are also marked with the explosion symbol.

Operation Warranty The observation of these operating instructions is essential to ensure trouble-free operation and in order for any warranty entitlements to be honoured. Therefore, first carefully read through the operating instructions before working with the drive unit!

Start-up Maintenance Installation The personnel entrusted with the handling, storage, installation, start-up, inspection and maintenance of the drive unit must be qualified for industrial, mechanical and electrical equipment. The drive unit must be disposed of in compliance with currently applicable regulations.

Disposal Housing parts, gearwheels, shafts, covers and flanges of the gear units are to be disposed of as steel scrap. Used oil is to be disposed of in accordance with applicable environmental protection regulations.

Premium Stephan Hameln
Branch of Premium Stephan B.V.
Ohsener Str. 79 – 83 D 31789 – Hameln
<http://www.premium-stephan.com>

info@premium-stephan.de

Tel: +49 5151 780 0 • Fax: +49 5151 780 441
Weekend freecall 0800-4327269

Table of Contents

1	TARGET GROUP	5
2	GENERAL INFORMATION	5
2.1	USE OF THE OPERATING INSTRUCTIONS	5
2.2	SYMBOLS USED AND THEIR MEANING.....	5
2.3	ENTITLEMENTS TO WARRANTY FOR DEFECTS.....	5
2.4	DISCLAIMER.....	5
2.5	PRODUCT AND TYPE DESIGNATION CODE.....	6
2.5.1	TYPE DESIGNATION CODE	6
2.5.2	NAME PLATE	8
3	SAFETY INSTRUCTIONS	10
3.1	INTENDED USE.....	10
3.2	NON-INTENDED USE.....	10
3.3	OPERATING CONDITIONS.....	10
3.3.1	TEMPERATURES, AMBIENT MEDIA	10
3.4	GENERAL SAFETY AND APPLICATION NOTES	11
3.5	DISPOSAL	12
4	SAFETY INFORMATION ON USE IN HAZARDOUS LOCATIONS	12
4.1	CHECKLISTS	13
4.1.1	PRIOR TO START-UP	13
4.1.2	DURING START-UP.....	13
4.1.3	DURING OPERATION.....	14
4.2	ATEX SYMBOL	15
4.3	INSTALLATION	16
4.3.1	GENERAL CONDITIONS	16
4.3.2	INSTALLATION OF TRANSFER ELEMENTS	17
4.3.3	MOUNTING COUPLING ON OUTPUT SHAFT	17
4.3.4	MOUNTING COUPLING ON DRIVE SHAFT (I-LANTERN)	17
4.3.5	MOUNTING IEC D FLANGE MOTOR ON DRIVE UNIT WITH COUPLING LANTERN (U-LANTERN).....	18
4.3.6	MOUNTING HELICAL BEVEL GEARED MOTORS WITH HOLLOW SHAFT WITH KEYWAY	18
4.3.7	MOUNTING HELICAL BEVEL GEARED MOTORS WITH HOLLOW SHAFT WITH SHRINK-FIT RING	20
4.3.8	MOUNTING OFFSET GEARED MOTORS WITH HOLLOW SHAFT WITH CONICAL CLAMPING SLEEVE	22
4.3.9	TORQUE SUPPORT	24
4.4	START-UP	25
4.4.1	CHECKS.....	25
4.4.2	MOTOR.....	25
4.4.3	ELECTRICAL CONNECTION	25
4.4.4	CABLE ENTRY	25
4.4.5	MEASURING SURFACE TEMPERATURE	25
4.5	MAINTENANCE	26
4.5.1	CHECKING OIL LEVEL AND FOR LEAKS	26
4.5.2	VISUAL INSPECTION	27
4.5.3	OIL CHANGE	27
4.5.4	REGREASING.....	27
4.5.5	BACKSTOPS	27

4.5.6	GENERAL OVERHAUL.....	29
4.5.7	INSPECTION AND SERVICE INTERVALS	29
4.6	CERTIFICATE OF CONFORMITY	30
4.6.1	CATEGORY II 2 G AND II 2 D GEAR UNITS/GEARED MOTORS.....	30
4.6.2	CATEGORY II 3 G AND II 3 D GEAR UNITS/GEARED MOTORS.....	31
5	<u>SCOPE OF SUPPLY/TRANSPORT/STORAGE</u>	<u>32</u>
5.1	SCOPE OF SUPPLY.....	32
5.2	TRANSPORT	32
5.3	STORAGE.....	32
5.3.1	LONG-TERM STORAGE	32
5.3.1.1	Prolonged Standstill	32
5.3.1.2	Long-term Preservation and Storage.....	33
6	<u>DRIVE UNIT CONSTRUCTION.....</u>	<u>35</u>
6.1	CONSTRUCTION PRINCIPLE.....	FEHLER! TEXTMARKE NICHT DEFINIERT.
6.1.1	GEARBOX.....	35
6.1.2	COUPLING LANTERN (U-LANTERN)	36
6.1.3	FREE HIGH-SPEED SHAFT (I-LANTERN).....	37
6.1.4	MOTOR BASE DESIGN.....	38
6.1.5	MOTOR.....	39
6.1.5.1	Schematic diagram:	39
6.1.5.2	Brake.....	40
6.1.6	GEAR BOX ATTACHMENTS	41
6.1.6.1	Oil Expansion Tank	41
6.1.6.2	Oil Level Glass	43
6.1.7	GEARBOX OPTIONS	44
6.1.7.1	Safety-friction clutch on the input shaft.....	44
6.1.7.2	backstop.....	44
6.1.7.3	General	45
6.1.7.4	For version with IEC D flange-mounted motor and coupling lantern (U-lantern).....	45
6.1.7.5	For version with free drive shaft (I-lantern).....	45
7	<u>MECHANICAL INSTALLATION.....</u>	<u>46</u>
7.1	IMPORTANT NOTES	46
7.2	INSTALLATION SITE / GENERAL CONDITIONS	46
7.2.1	GENERAL	47
7.2.2	PREPARATORY WORK.....	47
7.2.3	MOUNTING COUPLING ON OUTPUT SHAFT	47
7.2.4	MOUNTING COUPLING ON THE HIGH SPEED SHAFT	48
7.2.4.1	Gearbox with free drive shaft (I-lantern).....	48
7.2.4.2	Mounting IEC D Flange Motor on Drive Unit with Coupling Lantern (U-Lantern).....	48
7.2.4.3	Mounting Helical Bevel Geared Motors with Hollow Shaft with Keyway	53
7.2.4.4	Mounting Helical Bevel Geared Motors with Hollow Shaft with Shrink-Fit Ring	55
7.2.5	HOLLOW SHAFT WITH CONICAL CLAMPING SLEEVE	57
7.2.6	TORQUE SUPPORT	59
7.2.7	GEARBOX IN MOTOR BASE VERSION	60
7.3	INSTALLATION	64
8	<u>ELECTRICAL INSTALLATION</u>	<u>65</u>
8.1	IMPORTANT NOTES	65

8.2	ELECTRICAL CONNECTION	66
8.2.1	BRAKE	67
9	<u>COMMISSIONING AND OPERATION</u>	68
9.1	INITIAL COMMISSIONING	68
9.2	TEST RUN	68
9.3	OPERATION.....	69
10	<u>MAINTENANCE.....</u>	69
10.1	IMPORTANT NOTES	69
10.2	MAINTENANCE INTERVALS	69
10.3	OIL CHANGE.....	71
10.3.1	OIL QUANTITY	72
10.3.2	POSITION OF THE OIL LUBRICANT ATTACHMENTS	73
10.4	GREASING AND REGREASING	75
10.4.1	GENERAL	75
10.4.2	REGREASING ROLLER BEARINGS	76
10.4.3	REGREASING FOR GEARBOXES WITH REGREASING DEVICES	76
10.4.4	REGREASING QUANTITIES, BEARINGS.....	76
10.4.5	REGREASING FOR GEARBOX WITH IEC D FLANGE MOTOR AND COUPLING LANTERN.....	76
10.4.5.1	General	76
10.4.5.2	Regreasing.....	77
10.4.6	REGREASING FOR GEARBOX WITH FREE DRIVE SHAFT (I-LANTERN).....	77
10.4.6.1	General	77
10.4.6.2	Regreasing.....	77
10.5	CHOICE OF LUBRICANT:.....	78
10.5.1	LUBRICANT.....	78
10.6	CHECK WEAR TO THE CLUTCH.....	80
11	<u>EXPLODED VIEWS.....</u>	81
11.1	SK..2.C – THREE-STAGE	81
11.2	SK..3.C - THREE-STAGE	82
11.3	SK..4.C - THREE-STAGE	83
11.4	SK..5.C - THREE-STAGE	84
11.5	SK..6.C – THREE-STAGE	85
11.6	SK..7.C– THREE-STAGE	86
11.7	SK..8.C – THREE-STAGE	87
11.8	SK..9.C – THREE-STAGE	88
11.9	SK..2.C14B – SK..6.C14B PRIMARY TRANSMISSION	89
11.10	SK..7.C34B – SK..9.C34C PRIMARY TRANSMISSION	90
11.11	SI POSITIONS – NUMBERS	91
11.12	GEARBOX WITH IEC D FLANGE-MOUNTED MOTOR AND COUPLING LANTERN (U-LANTERN).....	92
11.13	GEARBOX WITH FREE DRIVE SHAFT (I-LANTERN)	96
12	<u>TROUBLESHOOTING AND FAULT REMOVAL</u>	100
12.1	GENERAL.....	100
13	<u>BRANCH OFFICES AND DISTRIBUTION PARTNERS</u>	101

About this documentation

1 Target group

This documentation addresses to qualified personnel according to IEC 364.

2 General Information

2.1 Use of the Operating Instructions

The operating instructions are part of the product and contain important information about its operation and service. The operating instructions are directed at all persons who perform the assembly, installation, start-up, and service work on the product.

The operating instructions must be made accessible in a readable condition. Make sure that the personnel responsible for the systems and operation, as well as persons who work on the device under their own responsibility, have read and understood the operating instructions completely. If anything is unclear or there is a need for additional information, please contact Premium Stephan.

2.2 Symbols Used and their Meaning



NOTE



STOP



OPERATING INSTRUCTIONS



DANGER



DANGER, RISK OF ELECTRIC SHOCK



PAGE



MAINTENANCE



EX INFORMATION

2.3 Entitlements to Warranty for Defects

Compliance with these operating instructions is essential to ensure trouble-free operation and in order for any warranty entitlements to be honoured. For this reason, please read these operating instructions before you start working with the drive!

2.4 Disclaimer

Compliance with these operating instructions is a basic requirement for safe operation of the gear units and geared motors, for achieving the stipulated product features and performance characteristics. Premium Stephan assumes no liability for injury caused to persons or damage to property or financial losses caused by not observing the operating instructions. Warranty for defects is excluded in such cases.

2.5 Product and Type Designation Code

2.5.1 Type Designation Code

Three-stage gear unit

S	K	³	⁴	⁵	⁶	⁷	⁸	⁹	¹⁰	-	¹¹	-	¹²	¹³
----------	----------	--------------	--------------	--------------	--------------	--------------	--------------	--------------	---------------	---	---------------	---	---------------	---------------

Gear unit with more than 3 stages

S	K	³	⁴	⁵	⁶	⁷	²⁵	²⁶	²⁷	⁸	⁹	¹⁰	-	¹¹	-	¹²	¹³
----------	----------	--------------	--------------	--------------	--------------	--------------	---------------	---------------	---------------	--------------	--------------	---------------	---	---------------	---	---------------	---------------

3	Output flange Z No flange F B5-flange T B14-flange R Agitator version
	Output shaft H Hollow shaft with keyway N Solid shaft S Hollow shaft with shrink-fit ring B Hollow shaft with conical clamping sleeve T Hollow shaft with multisplining C Hollow shaft with shrink disc and bronze bushing

5	Size 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9
----------	--

6	Design Index 6 Metric version 7 Inch version
----------	---

7	Number of stages C Three stage
----------	--

8	Total gear ratio
----------	-------------------------

9	Drive unit No designation integrated Motor U IEC flange motor I I-lantern M Motor base
----------	---

10	Accessory for gear unit R Backstop on the drive unit give free direction of rotation F Foot version G Reinforced bearing arrangement
-----------	--

11	Motor:
-----------	---------------

12	Shaft arrangement L Output shaft left R Output shaft right T Output shaft left and right
-----------	--

13	Mounting positions
-----------	---------------------------

Only for gear units with more than 3 stages

25	Size, pre stage gear unit
26	Design index, pre stage gear unit
27	Number of stages, pre stage gear unit

Example:

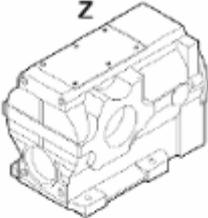
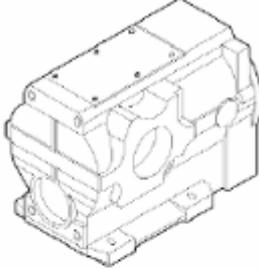
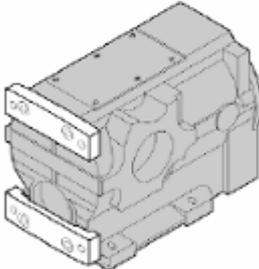
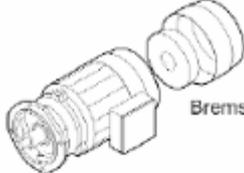
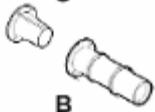
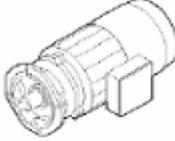
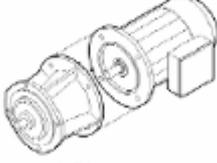
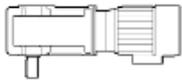
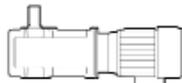
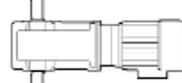
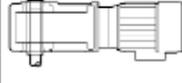
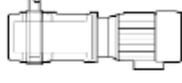
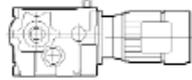
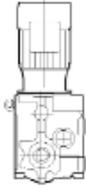
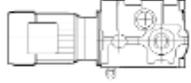
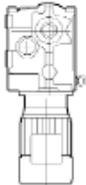
S	K	³	^Z	^N	³	⁶	^C	²⁵	⁹	¹⁰	-	¹¹	S112	-	¹²	^L	¹³	1
----------	----------	--------------	--------------	--------------	--------------	--------------	--------------	---------------	--------------	---------------	---	---------------	-------------	---	---------------	--------------	---------------	----------

SK housing, no flange, solid shaft, size 3, design index 6, three-stage, gear ratio $i = 1/25$, Premium Stephan integral motor size 112, shaft arrangement left, mounting position 1

S	K	³	^F	^H	⁵	⁶	^C	²⁵	¹	²⁶	⁶	²⁷	^B	⁸	³⁵⁰	⁹	^U	¹⁰	-	¹¹	90	-	¹²	^L	¹³	1
----------	----------	--------------	--------------	--------------	--------------	--------------	--------------	---------------	--------------	---------------	--------------	---------------	--------------	--------------	----------------	--------------	--------------	---------------	---	---------------	-----------	---	---------------	--------------	---------------	----------

SK housing, B5 flange, hollow shaft with keyway, size 5, design index 6, three-stage, size pre-stage gear unit 1, design index pre-stage gear unit 6, two-stage pre-stage gear unit, total gear ratio $i = 1/350$, U-lantern for motor size 90, shaft arrangement left, mounting position 1

Geared Motors Type Code Mounting positions

Getriebemotoren Typenschlüssel					
2 bis	<p>Z</p>  <p>F (B5)</p>  <p>T (b14)</p> 	 	8	 <p>Bremskit</p> <p>Integrierter Motor</p>	
3	 <p>H</p>  <p>N</p>  <p>S</p>  <p>B</p>		<p>-F-</p> <p>Ausführung mit angebauten Fuß- leisten (für Baugröße 2 bis 5)</p> <p>Rücklaufsperre an der Zwischen- welle</p>	 <p>Integrierter Bremsmotor</p>  <p>(+R)</p>  <p>I (+R)</p>	
L	R	T	L	R	
					
1	2 ⁺	3	4 ⁺	5	6 ⁺
					

2.5.2 Name plate

Gearbox name plate (example)	Gearbox name plate (example)																																																																	
 PREMIUM STEPHAN Hameln / Germany  Type <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">No.</td> <td style="width: 40%;"></td> <td style="width: 30%;">IM</td> </tr> <tr> <td>n_1</td> <td>/min</td> <td>n_2</td> </tr> <tr> <td>M_1</td> <td>Nm</td> <td>M_2</td> </tr> <tr> <td>i</td> <td>SF=</td> <td>kg</td> </tr> <tr> <td>M_b</td> <td>Nm</td> <td>IP</td> </tr> <tr> <td>Oil :</td> <td></td> <td>liter</td> </tr> </table> <p style="font-size: small;">Bedienungsanleitung muss beachtet werden!! Pay attention to the operating instructions!!</p> <p style="text-align: right; font-size: x-small;">GetriebeSTD</p>	No.		IM	n_1	/min	n_2	M_1	Nm	M_2	i	SF=	kg	M_b	Nm	IP	Oil :		liter	<div style="text-align: right;">CE</div> Type 80A-4G No. 735739/002 - 11 E55257  <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">3 ~</td> <td style="width: 10%;">kV</td> <td style="width: 10%;">S1</td> <td style="width: 10%;"></td> <td style="width: 10%;">3 ~</td> <td style="width: 10%;">kV</td> <td style="width: 10%;">0,66</td> <td style="width: 10%;">S1</td> </tr> <tr> <td></td> <td>V</td> <td>Δ</td> <td></td> <td></td> <td>V</td> <td>220/380 +/-10%</td> <td>Δ</td> </tr> <tr> <td>50Hz</td> <td>A</td> <td></td> <td></td> <td>60Hz</td> <td>A</td> <td>3,4/1,9</td> <td></td> </tr> <tr> <td></td> <td></td> <td>/min</td> <td></td> <td></td> <td></td> <td>1680</td> <td>/min</td> </tr> <tr> <td></td> <td>COS ϕ</td> <td></td> <td></td> <td></td> <td>COS ϕ</td> <td>0,70</td> <td></td> </tr> </table> IM B3 IP 55 Class F AMB Brake: Nm VAC VDC A <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">n_2</td> <td style="width: 10%;">/min</td> <td style="width: 10%;">T2</td> <td style="width: 10%;">Nm</td> <td style="width: 10%;">Oil</td> <td style="width: 10%;"></td> <td style="width: 10%;">L</td> </tr> </table> <p style="text-align: right;">Mat-No. 150017</p> <p style="text-align: right; font-size: x-small;">IEC 60034</p>	3 ~	kV	S1		3 ~	kV	0,66	S1		V	Δ			V	220/380 +/-10%	Δ	50Hz	A			60Hz	A	3,4/1,9				/min				1680	/min		COS ϕ				COS ϕ	0,70		n_2	/min	T2	Nm	Oil		L
No.		IM																																																																
n_1	/min	n_2																																																																
M_1	Nm	M_2																																																																
i	SF=	kg																																																																
M_b	Nm	IP																																																																
Oil :		liter																																																																
3 ~	kV	S1		3 ~	kV	0,66	S1																																																											
	V	Δ			V	220/380 +/-10%	Δ																																																											
50Hz	A			60Hz	A	3,4/1,9																																																												
		/min				1680	/min																																																											
	COS ϕ				COS ϕ	0,70																																																												
n_2	/min	T2	Nm	Oil		L																																																												

Symbol	Unit	Description
Type	-	Gearbox type as per type code
No.	-	Serial number with information on year of manufacture
IM	-	Information on shaft arrangement and mounting position
n_2	rpm	Low Speed Shaft
n_1	rpm	Input speed
IP	-	Degree of protection
M_2	Nm	Maximum permissible output torque
M_1	Nm	Input torque
i	-	Exact gear ratio
SF	-	application factor
Oil	Bez. / Liter	Information on oil type, viscosity and oil quantity
	-	ATEX symbol
COS ω		Power Factor
Eff		Efficiency class
A	Amp	Nominal current
Hz	Hertz	Nominal frequency
V Δ / Δ	Volt	Nominal voltage - connection
Class	-	Insulation class
KW	-	Motorpower
AMB	$^{\circ}$ C	ambient Temperature

2.5.3 Name plate ATEX (Example)

 PREMIUM STEPHAN 	
Ohsener Straße 79-83 / D-31789 Hameln	
Typ	
Ser.No	IM
n_a 1/min	$N_{e\ max}$ 1/min
$M_{a\ max}$ Nm	M_e Nm
$i =$	$fb =$ kg
$M_{b\ max}$ Nm	IP
Öl/oil :	
Bedienungsanleitung muss beachtet werden!!	
Pay attention to the operating instruction!!	
	Cert. No
Hameln/Germany	

Symbol	Unit	Description
Type	-	Gear unit type according to type code
Ser. No.	-	Serial no. with information on year of manufact.
IM	-	Shaft arrangement and mounting position
n_a	rpm	Output speed
n_e	rpm	Input speed
IP	-	Type of enclosure
$M_{a\ max}$	Nm	Maximum permissible output torque
M_e	Nm	Input torque
i_{ex}	-	Exact gear ratio
fb	-	Application factor
$M_{b\ max}$	Nm	Maximum permissible bending moment (flexion) at output
OIL	Des. / litres	Information on oil type, viscosity and oil quantity
	-	ATEX symbol

Determining the application factor:

$$\text{Application factor } fb = \frac{M_{a\ max}}{M_e \times i_{ex}}$$



The output torque values $M_{b\ max}$ and $M_{a\ max}$ must not be exceeded. Failure to observe this requirement will invalidate the ATEX approval.

3 Safety instructions

3.1 Intended use



NOTE

Only use the drive system under the following conditions.

Exception: The manufacturer has designed the drive system specifically for other applications and ambient conditions.

The drive system ...

- must only be used for the intended purposes and those confirmed in the shipping documents.
- must only be operated under the operating conditions stipulated in the operating instructions and within the power limits.
- is a component for use in machines and plants.
- complies with the valid standards and regulations.
- fulfils the requirements under Low-Voltage Directive 2006/95/EC.

3.2 Non-intended use

- Use in explosion-protected areas, unless expressly marked as ATEX drives
- Use in harsh environments (acids, gases, vapours, dust, oil)
- Use under water
- Use under radiation

3.3 Operating conditions

Operating ambient temperature:	0°C bis +40°C
Site altitude:	up to 1000 m above sea level

3.3.1 Temperatures, Ambient Media

Temperatures

The permissible temperature range is defined by:

- the lubricant specifications in connection with the oil temperature that is to be expected in operation (see Chapter 10.2 and Name plate Chapter 2.5.2)
- the heat class of the motor in connection with the motor temperature that is to be expected in operation (see name plate and/or operating instructions of the motor).

The operating temperature is determined by the power dissipation, the ambient temperature and the cooling conditions.

Ambient Media

- Drive units are protected against dust and water jets.
- Motors correspond to their protection rating (see name plate and/or operating instructions of the motor).
- Ambient media – especially chemically aggressive media – can attack the shaft seals and paint (gen. plastics). Abrasive media can possibly endanger the shaft seals.

3.4 General safety and application notes

At the time of delivery, the drive system is considered to be state of the art and fundamentally safe to operate.

All transport, storage, installation/assembly, connection, commissioning, maintenance and servicing work may only be performed by qualified personnel.

During such work, qualified personnel must observe:

- The supplementary safety instructions in the individual chapters of this documentation.
- The safety instructions in attached supplementary sheets and further documents from subcontractors.
- This documentation, the detailed operating instructions and the circuit diagrams in the terminal box
- The warning and safety signs on the drive system
- The plant-specific regulations and requirements
- The national and regional regulations for safety and accident prevention

The drive system can pose a risk to persons, the drive system itself and other material assets belonging to the operator ...

- ... if unqualified personnel work on or with the drive system.
- ... if the drive system is used improperly.
- ... if the drive system is installed and operated incorrectly.
- ... if the following notes are disregarded:
 - The drive system may only be operated when in sound condition.
 - As a general rule, any retrofitting, changes or reconstruction of the drive system is prohibited. The above work may only be performed after consultation with Premium Stephan.
 - During operation and for a long time afterwards, drive systems have live parts, moving parts and may also have hot surfaces.
 - Commissioning (starting intended operation) may only be performed once there is confirmation that the machine complies with EMC Directive 2004/108/EC and that the end product conforms with Machinery Directive 2006/42/EC.
 - Observe EN 60204.

Should you have any questions or problems, please contact your Premium Stephan representative.

3.5 Disposal

The personnel entrusted with the handling, storage, installation, start-up, inspection and maintenance of the drive unit must be qualified for industrial, mechanical and electrical equipment.

The drive unit must be disposed of in compliance with currently applicable regulations. Housing parts, gearwheels, shafts, covers and flanges of the gear units are to be disposed of as steel scrap.

Used oil is to be disposed of in accordance with applicable environmental protection regulations.

4 Safety Information on Use in Hazardous Locations



Potentially explosive gas mixtures or dust concentrations in connection with hot, electrically live, moving parts in the gear unit/geared motor can cause serious injuries or fatality.

Only specially trained qualified personnel are permitted to carry out installation, connection, start-up as well as maintenance/repair work on the gear unit/geared motor as well as on auxiliary electrical equipment while taking into consideration:

- these operating instructions
- the motor operating instructions
- the warning and information signs/plates on the gear unit/geared motor
- all other project documentation, start-up instructions and circuit diagrams belonging to the drive unit
- the system-specific regulations and requirements
- the currently applicable national/regional regulations
- the regulations of the employer's liability insurance association

The gear units/geared motors are intended for use in industrial systems and may only be used as recommended in the Premium Stephan technical documentation and in accordance with the specifications on the type identification plate. They correspond to applicable standards and regulations and comply with the requirements of the directive 94/9 EC.

A motor connected to the gear unit may be controlled at the frequency converter only in compliance with the data on the type identification plate of the gear unit and only if such operation is permitted by the type approval of the motor!

Failure to observe the above requirements will invalidate the ATEX approval.

4.1 Checklists

4.1.1 Prior to Start-Up



<p>This checklist defines all activities that must be performed prior to starting-up a gear unit in accordance with ATEX 100a in a hazardous location.</p>	<p>See section</p>
<p>Immediately check the delivery on receipt for any transport damage. Inform the freight carrier immediately of any damage. If necessary, take steps to ensure the drive unit is not installed or placed into operation.</p>	<p>4.3</p>
<p>Do the following data on the type identification plate of the gear unit agree with the operational requirements for the hazardous location?</p> <ul style="list-style-type: none"> ▪ Device group ▪ Ex-category ▪ Operational zone ▪ Temperature class ▪ Maximum surface temperature 	<p>4.2/2.5.2</p>
<p>Have steps been taken to ensure that there is no potentially explosive atmosphere while installing the gear unit in the system?</p>	<p>4.3</p>
<p>Does the lubricant viscosity match the ambient temperature on site?</p>	<p>10.5</p>
<p>Have steps been taken to ensure that the gear units are sufficiently ventilated and there are no sources of external heat input?</p>	<p>4.3 /4.4</p>
<p>Does the mounting position agree with that specified on the type identification plate of the gear unit?</p>	<p>2.5</p>
<p>Is the position-dependent oil level correct?</p>	<p>9</p>
<p>Do all drive and output elements to be mounted have ATEX approval and are they mounted correctly in accordance with regulations?</p>	<p>4.3</p>

4.1.2 During Start-Up



<p>This checklist defines all activities that must be performed during start-up of the gear unit in accordance with ATEX 100a in a hazardous location.</p>	<p>See section</p>
<p>Measure surface temperature after 4 h of operation. The temperature must not exceed a maximum of 90°C. If this temperature is exceeded, the drive unit must be shut down immediately. The system operator must contact Premium Stephan.</p>	<p>4.4.5</p>

4.1.3 During Operation



This checklist defines the activities that must be performed during operation of a gear unit in accordance with ATEX 100a in a hazardous location.	See section
Check oil level	4.5.1
Check seals and rotary shaft seals for leaks	4.5.1
Check surfaces for damage to the paintwork and corrosion	4.5.2

4.2 ATEX Symbol

The ATEX symbol is defined in accordance with DIN EN 13463-1. The following tables provide an overview.

Group I (mining, mine or pit gas and/or combustible dust)		Group II (potentially explosive atmosphere consisting of gas/air or dust/air mixtures, mist or vapours)					
Category M		Category 1		Category 2		Category 3	
1	2	G (Gas) (Zone 0)	D (Dust) (Zone 20)	G (Gas) (Zone 1)	D (Dust) (Zone 21)	G (Gas) (Zone 2)	D (Dust) (Zone 22)
Very high degree of safety	High degree of safety	Very high degree of safety		High degree of safety		Standard degree of safety	

Type of protection	Meaning
fr	Vapour-resistant housing
d	Pressure-proof enclosure
c	Design safety
b	Ignition source monitoring
p	Pressurised enclosure
k	Fluid enclosure
g	Intrinsic safety

Temperature class	Maximum surface temperature (°C)
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

Example:

II 2 G c k T4	Group II	Use in a potentially explosive atmosphere consisting of gas/air or dust/air mixtures, mist or vapours.
	Category 2	For devices that ensure a high degree of safety. Suitable for applications where potentially explosive atmospheres are expected.
	G	Gas (zone 1)
	c	Design safety
	k	Fluid enclosure
	T4	Maximum surface temperature 135 °C

4.3 Installation



Before you begin

The drive unit may be installed only if:

- The data on the type identification plate of the gear unit/geared motor agree with the permissible ex-application on site
- The drive unit is intact, i.e. not damaged
- There are no potentially explosive atmospheres, oils, acids, gasses, vapours etc. in the area during installation
- The lubricant viscosity agrees with the ambient temperature on site
- Steps have been taken to ensure that the drive unit is sufficiently ventilated and that there are no sources of external heat input.

4.3.1 General Conditions

The drive units must be installed or attached free of vibration or mounted on a flat, rigid and solid frame or foundation in order to avoid vibration.



NOTE:

The drive units must be aligned with the utmost care! Stress and strain in the housing must be avoided.

To align the gear unit, place it on the 3 mounting points and use shims to match the other point to an accuracy of less than 0.2 mm.

After the gear unit has been aligned correctly and after all the shims have been fitted, the gear unit must be firmly screwed down to the foundation. Screw class 8.8 in accordance with DIN 267. see dimensioned drawings. The screws must be tightened to the torque requirements as specified by the manufacturer.

Trouble-free lubrication and ventilation are ensured only when the gear unit is mounted in the correct position.



It is necessary to correct the amount of lubricant and the position of the breather screw if the mounting position of the gear unit is changed. It is mandatory to contact Premium Stephan. Otherwise the ATEX approval will be invalid.

Before start-up, check the position-dependent oil level at the oil inspection window on the drive unit.

Size 2 features lifetime lubrication. In this case, the surface temperature and the noise level emitted by the gear unit must be constantly monitored during the start-up procedure.

Intermediate inserts or pads made of plastic must be used if there is a risk of electrochemical corrosion between the gear unit and system. Connect the gear unit housing to earth.

The cooling air intake of the motor must not be obstructed.

4.3.2 Installation of Transfer Elements



Only drive and output elements with an ATEX approval must be used. Observe the operating instructions provided with the power transmission elements. Flexible couplings are to be used on the direct power transmission from the gear unit to the machine and, in case of risk of jamming, friction couplings are required. Only use rigid couplings in connection with unsupported or overhanging shafts (e.g. with agitators or fan drives). Due to the radial forces produced, power transmission elements, such as flat belts or V-belts, gearwheels and sprockets, cranks, eccentric cams etc., are to be arranged as close to the gear unit as possible. The bearings and drive shaft are then subject to the lowest possible load. Refer to our technical sales documentation for the maximum permissible load values.

The protective coating on the end of the shaft must be removed by suitable means prior to mounting the transmission elements.

Great care must be taken while fitting power transmission elements to the ground output shaft of the gear unit; this action can be performed using the threaded hole provided for this purpose on the end face of the shaft.

Preferably, the power transmission element should be heated to a temperature of approx. 100 degrees C. The hole is to be dimensioned in accordance with ISO H7. All parts must be thoroughly deburred, cleaned and the fit locations lightly greased. Avoid all knocks and impacts on the end of the shaft.

The same procedure applies for transmitting the drive power to the gear unit in connection with a free drive shaft.

4.3.3 Mounting Coupling on Output Shaft



Only output elements with an ATEX approval must be used.

Observe the operating instructions provided by the coupling manufacturer. Accurate alignment and regular inspection are necessary.

The maximum permissible shaft extensions for the coupling used must be observed and checked.

Maintain the specified distance between the coupling halves.

Only adjust the radial offset after the angle offset and the distance between the shaft ends have been checked.

Recheck the angle offset after correcting the radial offset.

4.3.4 Mounting Coupling on Drive Shaft (I-lantern)

If the gear unit is supplied equipped with an I-lantern, particular care must be taken while fitting the motor to ensure the correct distance between the coupling halves and to guarantee flush alignment of the motor shaft with respect to the input shaft of the gear unit.

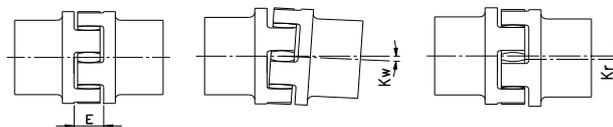


Particular care must be taken when aligning the motor and mounting the coupling half supplied together with the gear unit to ensure that the following conditions (see graphic) are maintained as specified by the manufacturer.

Avoid all impacts and knocks during the mounting procedure.

Failure to observe the installation instructions will invalidate the ATEX approval.

Aligning the coupling halves on the motor and gear unit



4.3.5 Mounting IEC D Flange Motor on Drive Unit with Coupling Lantern (U-Lantern)

If the unit is supplied equipped with a U-lantern and without a motor, care must be taken while mounting the flange motor to ensure that the coupling half is fitted correctly.

The connecting screws must be tightened to the torque specified by the screw manufacturer.

Screw strength class 8.8 in accordance with DIN 267.



Particular care must be taken when mounting the coupling half which is supplied with the gear unit on the motor shaft to ensure that the distance "X" is maintained (see table below).

The coupling seat is to be checked by opening the screw plug item No. 1215.

After the visual inspection, the screw plug must be securely re-tightened.

Avoid all impacts and knocks during the mounting procedure.

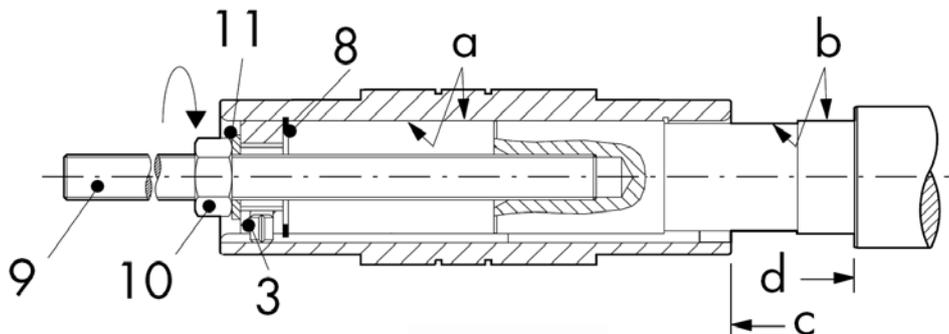
Failure to observe the installation instructions will invalidate the ATEX approval.

For mounting the coupling half on the IEC motor shaft, see Chapter 7.2.4.2.

4.3.6 Mounting Helical Bevel Geared Motors with Hollow Shaft with Keyway

Assembly

- Clean and degrease contact surfaces (a) and (b).
- Grease contact surfaces (a) and (b) with "Molykote D321R" or an equivalent lubricant.
- Slide the geared motor onto the driven shaft until the surfaces (c) and (d) are positioned opposite each other. Fit a threaded rod (9), nut (10), puller ring (11), thrust washer (3) and a retaining ring (8) as required.
- Remove tools (3, 9, 10, 11).

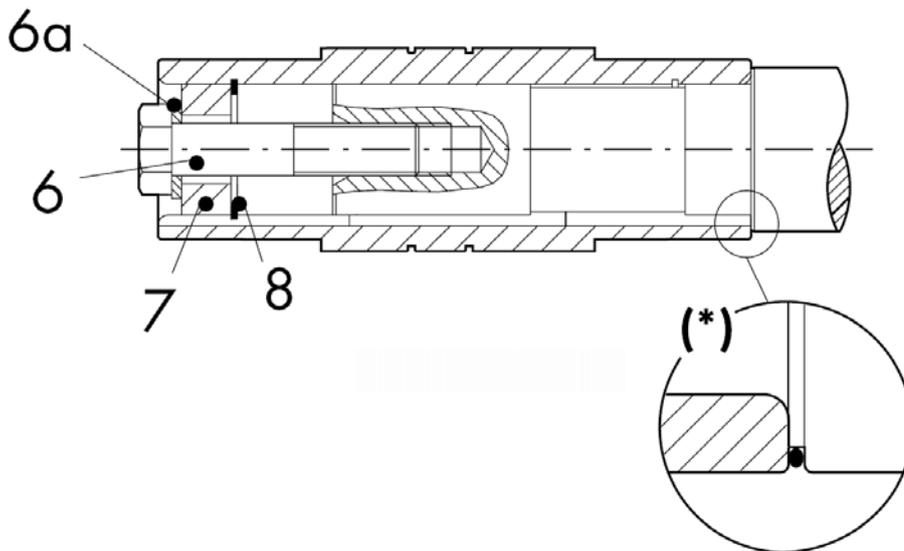




Mounting

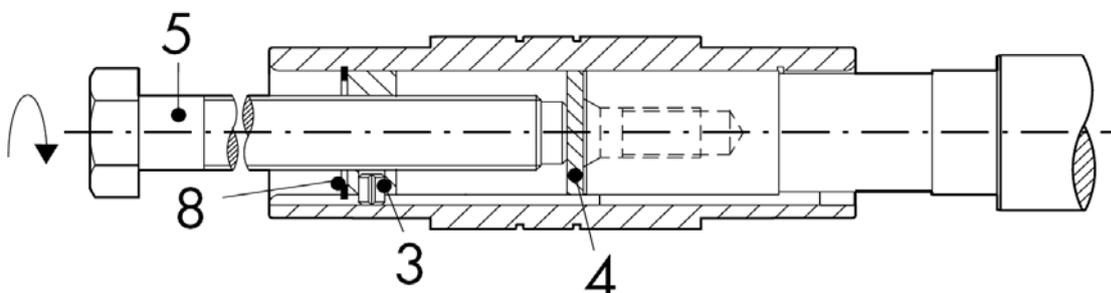
- Fit the mounting ring (7) against the retaining ring (8). Secure the machine shaft by means of mounting screw (6) and washer (6a).
- Fit protective cover and assemble such that it is dust-proof in case of ATEX approval GD or D.
- If the shaft is subject to external axial loads, follow the special guidelines provided on the dimensioned drawing.

(*) An O-ring is recommended to provide increased protection against moisture.



Disassembly

- Remove mounting screw (6), washer (6a), mounting ring (7) and retaining ring (8).
- Fit pulling washer (4) and thrust washer (3) and reinstall retaining ring (8).
- Fit pulling screw (5) in threaded hole in thrust washer (3).
- Remove the geared motor from the drive shaft by tightening the screw (5).



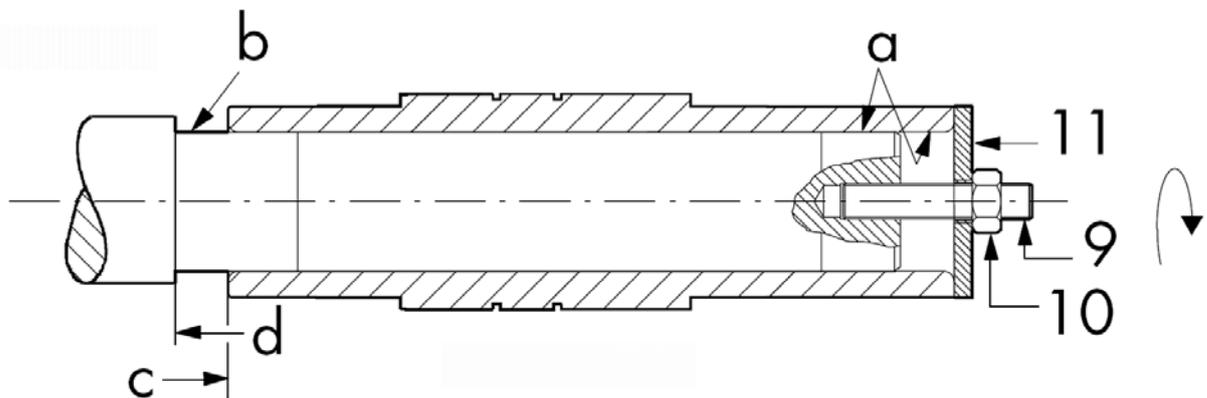
4.3.7 Mounting Helical Bevel Geared Motors with Hollow Shaft with Shrink-Fit Ring

NOTE

The shrink-fit ring supplied by Premium Stephan is ready for installation. Do not pull apart before initial assembly.

Assembly

- Clean and degrease contact surfaces (a) and (b).
- Grease contact surface (b) - BUT ON NO ACCOUNT contact surface (a) - with "Molykote D321R" or an equivalent lubricant.
- Slide the geared motor onto the driven shaft until the surfaces (c) and (d) are positioned opposite each other. If necessary, fit a threaded rod (9), nut (10) and a thrust washer (11).
- Remove tools (9, 10, 11).



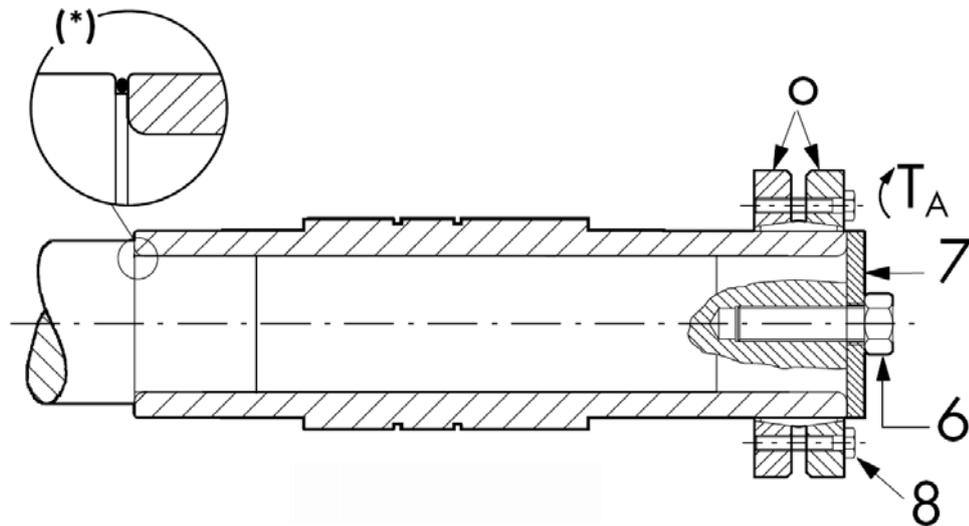
To prevent the shaft slipping, the screws must be tightened to the torque value specified in the table below in order to be able to transmit the output torque indicated on the type identification plate.

Mounting

- Install shrink-fit ring. Remove the spacer rings fitted between the outer rings (o) for transportation purposes. **IMPORTANT:** The two outer rings (o) must be arranged plane-parallel during the assembly procedure and while tightening the screws.
- Use a torque wrench to tighten the screws (8) in stages one after the other until the specified tightening torque TA (see table) is reached. Do not tighten the screws crosswise.
- Fit protective cover and assemble such that it is dust-proof in case of ATEX approval GD or D.

Frame size	TA (Nm)
2	12
3	12
4	12
5	30
6	35
7	59
8	120
9	250

Caution: The screws for the shrink-fit ring must never be tightened if the shrink-fit ring is not fitted.



 **NOTE**

Mounting with axial load

A mounting ring (7) and screw (6) must be fitted if the axial load is not taken up by the shoulder of the machine shaft.

Disassembly

- Evenly release all screws (8) by turning by a quarter turn one after the other.
- Remove the shrink-fit ring from the hollow shaft.
- Remove the gear unit from the drive shaft.

Note: Positions 6, 7, 9, 10, and 11 are not part of the standard delivery, but can be delivered optionally as a mounting kit.

Cleaning and lubricating

If reused, the removed shrink-fit rings need not be disassembled into individual parts for cleaning and lubricating purposes unless they are heavily soiled. After cleaning, grease the conical surfaces with "Molykote D321R" (or an equivalent, solid lubricant with a coefficient of friction of $\mu = 0.04$).

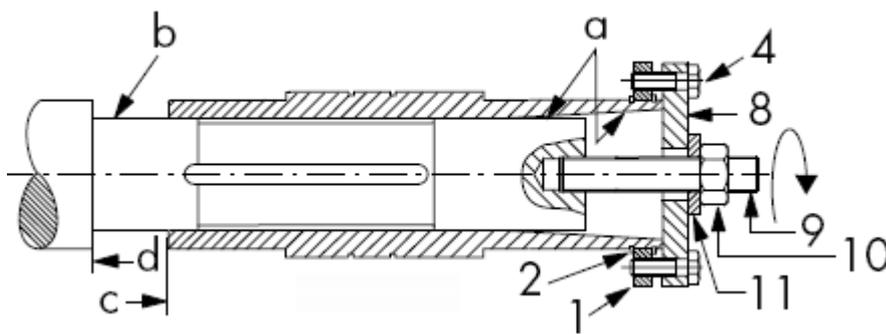
4.3.8 Mounting Offset Geared Motors with Hollow Shaft with Conical Clamping Sleeve

i NOTE

The Premium Stephan clamping sleeve system is supplied separately.

Assembly

- Clean and degrease contact surfaces (a) and (b).
- Grease contact surface (b) - BUT ON NO ACCOUNT contact surface (a) - with "Molykote D321R" or an equivalent lubricant.
- Fit support ring (1) either between the two shaft retaining rings (2) or between the shaft retaining ring (2) and the shoulder of the hollow shaft.
- Align the hollow shaft of the geared motor and the machine shaft. The feather key and keyway must be aligned opposite each other.
- Slide the geared motor onto the driven shaft until the surfaces (c) and (d) are positioned opposite each other. If necessary, fit a threaded rod (9), nut (10), washer (11) and a thrust washer (8). Secure the thrust washer with screws (4).
- Remove tools (8, 9, 10, 11).

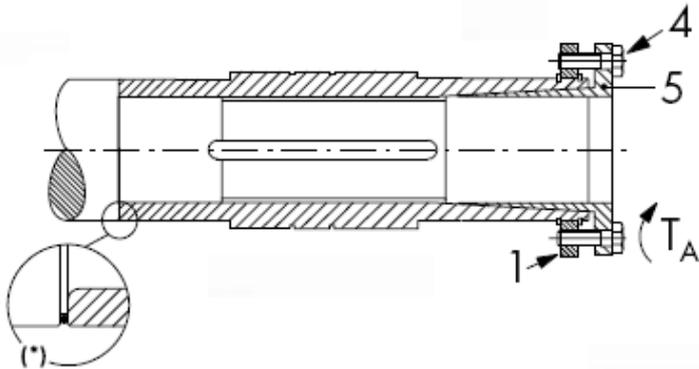


To prevent the shaft slipping, the screws must be tightened to the torque value specified in the table below in order to be able to transmit the output torque indicated on the type identification plate.

Mounting

- Fit conical clamping sleeve in hollow shaft without using force
- Align through-holes in clamping sleeve with threaded holes in support ring (1), fit screws (4) and secure hand-tight
- Use a torque wrench to tighten screws (4) in stages one after the other until the necessary tightening torque T_A (see table) is reached
- Retighten screws after 24 hours of operation
- Fit protective cover and assemble such that it is dust-proof in case of ATEX approval GD or D.

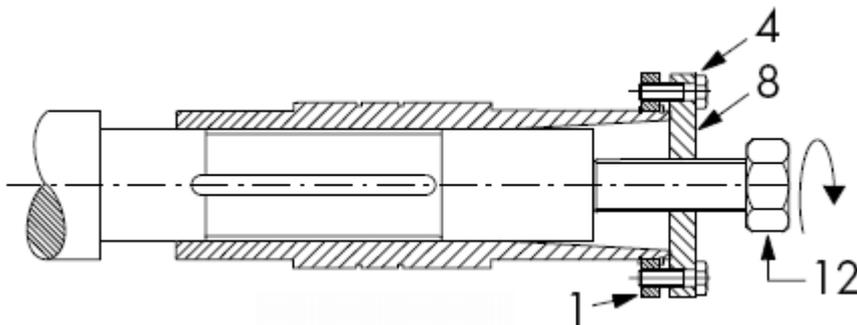
Frame size	TA (Nm)
4	15
5	30
6	30
7	30
8	60
9	60



i NOTE

Disassembly

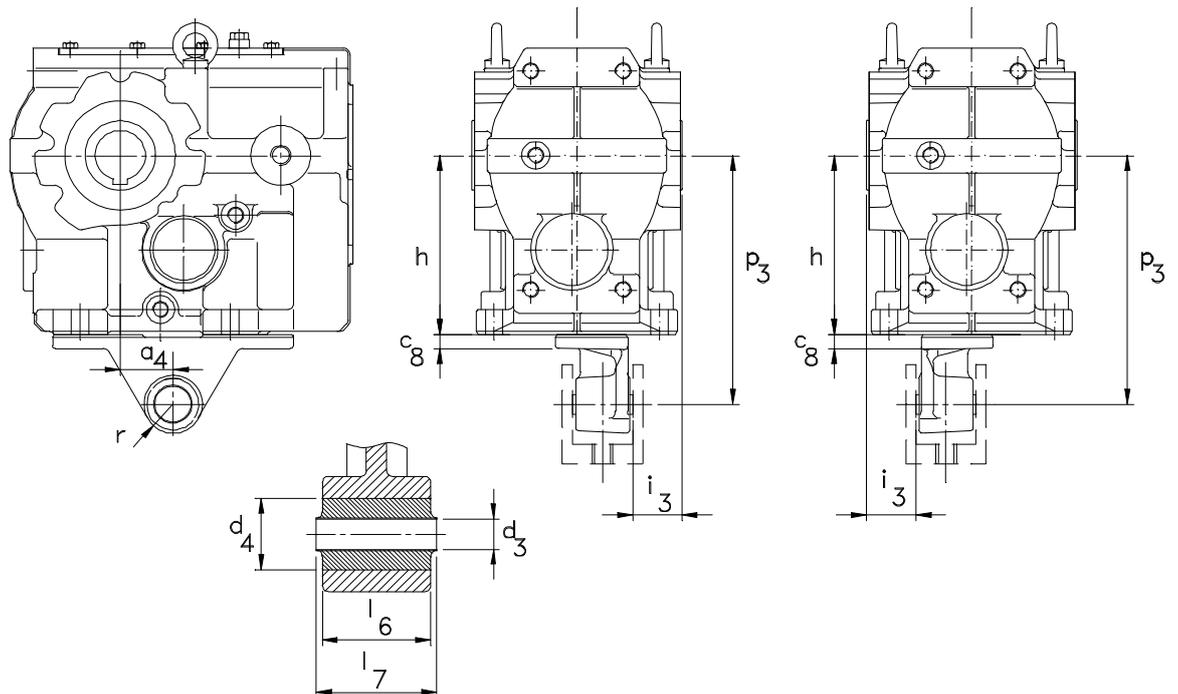
- Evenly release all screws (4) by turning by a quarter turn one after the other.
- Remove conical clamping sleeve (5). If the clamping sleeve (5) does not release of its own accord, fit two screws in the threaded holes and screw against the support ring (1).
- Mount thrust washer (8) with pin (4).
- Fit pulling screw (12) in threaded hole in thrust washer (8).
- Tighten pulling screw (12) in order to remove the geared motor from the machine shaft.



4.3.9 Torque Support

NOTE

The reaction forces in connection with bevel geared motors that are used as slip-on gear units must be taken up by a torque support (optionally available) or by a flexible element (no rigid connection).



Size	a4	r	c8	h	i3	p3	d3	d4	l6	l7
SK2.	30	22,5	12	112	20	160	10,4	26	31	36
SK3.	45	29	13	140	25	200	16,4	36	54	60
SK4.	52,5	29	14	180	25	250	16,4	36	54	60
SK5.	60	41	16	212	30	300	25	52	72	80
SK6.	70	41	17	265	40	350	25	52	92	100
SK7.	74	41	20	315	45	450	25	52	92	100
SK8.	60	70	45	375	7	550	40	103	110	126
SK9.	50	70	45	450	2	700	40	103	110	126

Figures in mm

4.4 Start-up

4.4.1 Checks



- The specified position-dependent oil level must be checked prior to start-up by visually inspection at the oil inspection glass.
- The oil inspection and drain plugs as well as the breather screws and valves must be freely accessible.
- Check direction of rotation, especially in connection with backstops.
- Check seating of protective cover fitted at the customer. In case of ATEX approval GD and D also check the seating is dust-proof.
- Check all mountings.
- The check must be performed with the drive unit in the original mounting position. Screw plugs must be replaced by the breather valves supplied in the position-dependent positions in accordance with section 9 "Positions of lubricant attachments".

4.4.2 Motor



Danger from electrical current: Observe the motor operating instructions!



4.4.3 Electrical Connection

The cable type and cross sections must comply with regulations. The rated power and the connection method are specified on the motor rating plate. A circuit diagram is provided in the motor terminal box. Installation must be performed in compliance with EN 60079-14.

4.4.4 Cable Entry

All cable entry fittings must be firmly secured. Power supply cables must be connected to the terminal box and secured with a nut and spring lock washer. The wiring must be connected by a qualified electrician. Earthing of the electrical system must comply with applicable safety regulations.

With regard to motor protection, reference is made to the applicable regulations in accordance with DIN EN 60034 or IEC 34, VDE 0105 or IEC 364.

Particular care must be taken when closing the terminal box to ensure that the seal is fitted correctly. Screwed cable glands that are not required must be securely closed off.

4.4.5 Measuring Surface Temperature



The maximum surface temperature specified on the type identification plate is based on measurements conducted under normal ambient and installation conditions. Even the slightest changes to these conditions (e.g. poor ventilation) can have a considerable effect on the temperature.

During the start-up phase for the gear unit it is necessary to measure the surface temperature under operating conditions. Determine the surface temperature at the transition from the gear unit to the motor (motor end plate) where the terminal block obstructs ventilation by the motor fan. The operating temperature is reached after about 4 hours and must not exceed a maximum value of 90°C.

If the maximum temperature is exceeded, immediately shut down the drive unit and contact Premium Stephan. Failure to observe this requirement will invalidate the ATEX approval.

4.4.6 Connecting the earthing wire

	<p>EARTHING WIRE</p> <p>Earthing must be done at the specified and ladled position. The earthing cross-section view of the machine must concur with assembly specification, e.g. in accordance with DIN EN IEC 60204-1.</p>
---	--

	<p>CAUTION</p> <p>When connecting, it is important that the connection surface is clean and protected against corrosion by a suitable substance, such as acid-free Vaseline.</p>
---	---

4.5 Maintenance



Danger from electrical current:

The power supply to the motor must be disconnected before starting routine maintenance, cleaning or servicing work.

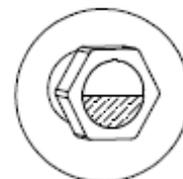
4.5.1 Checking Oil Level and for Leaks



The oil level and all seals should be checked at regular intervals every 2000 hours of operation or at least every 6 months with the drive unit stationary. If the oil level is not correct, then top it up with the same type of oil or change the oil or alternatively drain some out. In the event of a leak, the seals must be changed. The oil level is only allowed to differ from the middle of the oil inspection glass in reference to the chart figures.

You must keep the maximum allowed deviation regarding chapter 9.3., if an oil level indicator is attached.

Size	Deviation from centre of oil inspection glass
SK. 3.	± 2 mm
SK4. ... SK6.	± 3 mm
SK7. ... SK9.	± 5 mm



STOP

If there are visible leaks, the drive unit should be shut down, even if the specified maintenance intervals are not reached, and the corresponding seals replaced.

4.5.2 Visual Inspection



All surfaces are to be regularly checked for damage to the paintwork and corrosion every 2000 hours of operation and at least every 6 months. Any damage must be repaired and the protective paintwork replaced.



4.5.3 Oil change



The first oil change is recommended after 800 hours of operation. Further oil changes should be performed after 6000 hours of operation or after 3 years at the latest. Use clean, fresh oil from clean containers. Avoid abraded material and water entering the lubrication system. The water content must remain below 0.05 %.

Exception: Size 2 has lifetime lubrication, no oil change is necessary.



4.5.4 Regreasing

On request, the drive unit can be equipped with regreasing facilities at the roller bearings that do not run in the oil bath. Regreasing is only necessary in the mounting positions 2, 5 and 6. The roller bearings are packed in the factory with lithium grease. To achieve a longer service life, regreasing is necessary after 6000 hours of operation or after 1 year at the latest.



4.5.5 Backstops

The standard backstops are integrated in the drive lantern. Backstops are wearing parts and must be replaced every 6000 hours of operation, or after 3 years at the latest. The system operator must take all the necessary safety precautions to avoid failure of the backstop that may result in personal injury and/or damage to the drive unit and/or the application. It is necessary to replace the backstop under the following conditions:

- In the event of unusual wear of the gear unit or if the oil in the gear unit is contaminated, as it could have had an adverse effect on the clamping elements and bearing races in the integrated backstop.
- In the event of unusual load (stress or strain) that may have had an adverse effect on the condition of the clamping elements and bearing races in the integrated backstop. Only authorised, qualified personnel are permitted to replace the backstop or change the direction of rotation of the backstop while complying with the operating instructions for the backstop.
- Never loosen or release any part of the backstop facility while the drive unit is under load: this could impair the reversal action of the drive unit and load; the drive unit must be in a no-load condition and
- The drive unit must be secured to prevent unintentional or inadvertent movements.

4.5.6 General Overhaul



The drive unit should be subject to a general overhaul after 15000 hours of operation, or every 5 years at the latest. All wearing parts must be checked and replaced as required. The general overhaul of the drive unit must be performed by an authorised Premium Stephan service workshop.

4.5.7 Inspection and Service Intervals



Time interval hours of operation / years		What is to be done?	Measures!
600 hours	monthly	Check the function of the breather element	<ul style="list-style-type: none"> ▪ Clean filter element ▪ Change filter element
2000 hours	½ yearly	Check all surfaces for damage to the paintwork and corrosion.	<ul style="list-style-type: none"> ▪ Any damage must be repaired and the protective paintwork replaced.
2000 hours	½ yearly	Check the oil level and all seals.	<ul style="list-style-type: none"> ▪ If necessary, top up with the same type of oil/drain or change oil. ▪ If leaking, change seals and roller bearing grease.
6000 hours	every 3 years	Replace backstop, change oil	<ul style="list-style-type: none"> ▪ Replace backstop. ▪ Only use oil approved by Premium Stephan. Used oil must be disposed of in an environmentally acceptable manner.
6000 hours	Every year	Regrease	<ul style="list-style-type: none"> ▪ Regrease all roller bearings as required
15000 hours	every 5 years	General Overhaul	<ul style="list-style-type: none"> ▪ Send in the drive unit to an authorised Premium Stephan service workshop.



Please contact Premium Stephan if it is necessary to change the mounting position of the gear unit. Failure to observe this requirement will invalidate the ATEX approval.

4.6 Certificate of Conformity

4.6.1 Category II 2 G and II 2 D Gear Units/Geared Motors

Certificate of Conformity Konformitätserklärung	 PREMIUM STEPHAN
--	---

European Parliament Directive

Directive 94/9/EC

Declaration of Conformity

 according to directive 94/9/EC,
appendix VIII

Applied standards: DIN EN 13463-1
DIN EN 13463-5
DIN EN 13463-8

We

**Premium Stephan Hameln
Branch of Premium Stephan B.V.
Ohsener Straße 79-83
31789 Hameln
Deutschland**

Herewith declare that the gear / geared motors

**SI4
SK4
SP4**

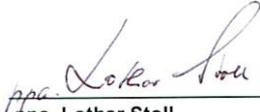
 that are subject to this declaration conforms to the
requirements

II 2 G and II 2 D

Of the EC directive 94/9/EC.

 Premium Stephan provides the documents required
according to 94/4/EC appendix VIII at:

..

Hameln, 2011-07-19

 ppa. Lothar Stoll

 Director Marketing & Sales
Research & Development

Richtlinie des Europäischen Parlamentes

Richtlinie 94/9/EG

Konformitätserklärung

Nach Richtlinie 94/9/EG, Anhang VIII

Angewandte Normen: DIN EN 13463-1
DIN EN 13463-5
DIN EN 13463-8

Wir,

**Premium Stephan Hameln
Zweigniederlassung der Premium Stephan B.V.
Ohsener Straße 79-83
31789 Hameln
Deutschland**

 erklären, dass die Getriebe / Getriebemotoren der
Reihe

**SI4
SK4
SP4**

 auf die sich diese Erklärung bezieht, den
Anforderungen

II 2 G und II 2 D

Der EG Richtlinie 94/9/EG entspricht.

 Premium Stephan hinterlegt die gemäß 94/9/EG
Anhang VIII geforderten Unterlagen bei

TÜV Nord, Nr: 35085861

Editor: CG	19.07.2011	3P0131-01	Copyright reserved	Page / Seite: 1/1
------------	------------	-----------	--------------------	-------------------

4.6.2 Category II 3 G and II 3 D Gear Units/Geared Motors

Certificate of Conformity Konformitätserklärung	 PREMIUM STEPHAN
--	--

European Parliament Directive

Directive 94/9/EC

Declaration of Conformity

 according to directive 94/9/EC,
 appendix VIII

Applied standards: DIN EN 13463-1
 DIN EN 13463-5
 DIN EN 13463-8

We,

Premium Stephan Hameln
Branch of Premium Stephan B.V.
Ohsener Straße 79-83
31789 Hameln
Deutschland

Herewith declare that the gear / geared motors

SI4
SK4
SP4

 that are subject to this declaration conforms to the
 requirements

II 3 G and II 3 D

Of the EC directive 94/9/EC.

 Premium Stephan provides the documents required
 according to 94/4/EC appendix VIII for inspection.

Hameln, 2011-07-19



ppa. Lothar Stoll

 Director Marketing & Sales
 Research & Development

Richtlinie des Europäischen Parlamentes

Richtlinie 94/9/EG

Konformitätserklärung

Nach Richtlinie 94/9/EG, Anhang VIII

Angewandte Normen: DIN EN 13463-1
 DIN EN 13463-5
 DIN EN 13463-8

Wir,

Premium Stephan Hameln
Zweigniederlassung der Premium Stephan B.V.
Ohsener Straße 79-83
31789 Hameln
Deutschland

 erklären, dass die Getriebe / Getriebemotoren der
 Reihe

SI4
SK4
SP4

 auf die sich diese Erklärung bezieht, den
 Anforderungen

II 3 G und II 3 D

Der EG Richtlinie 94/9/EG entspricht.

 Premium Stephan hinterlegt die gemäß 94/9/EG
 Anhang VIII geforderten Unterlagen zur Einsicht
 bereit.

Editor: CG	19.07.2011	3P0131-02	Copyright reserved	Page / Seite: 1/1
------------	------------	-----------	--------------------	-------------------

5 Scope of supply/transport/storage

5.1 Scope of supply

- The drive systems are individually assembled in accordance with the modular system. The scope of supply is detailed in the accompanying shipping documents.
- Upon receipt of the order, immediately check to ensure that the scope of supply corresponds to the details in the shipping documents.
 - Premium Stephan does not offer warranty for claims regarding missing parts submitted at a later date.
 - Report any visible transport damage to the deliverer immediately.
 - Report any obvious missing parts / deficiencies to your representative immediately.

5.2 Transport

- If necessary, use suitable, sufficiently dimensioned means of transport.
- Securely tighten ring bolts.
 - They are only designed to hold the weight of the drive.
 - Do not apply any further loads.
- Avoid jolts during transport!

5.3 Storage

The drive systems can be stored for up to 1 year in a dry, dust-free and low-vibration environment without the need for any special measures.

5.3.1 Long-Term Storage

5.3.1.1 Prolonged Standstill

The protective oil film slowly dissipates from the untreated surfaces during prolonged standstill periods of the gear unit. Consequently, rust may form on the internal parts of the gear unit. The risk of rust formation depends to a large extent on the environmental conditions (damp, maritime, tropical or chemically aggressive environment). To prevent the formation of corrosion and to form a new protective film of oil, it is necessary to allow the gearbox to rotate for a few minutes every two weeks (depending on the environmental conditions).

A special ventilation filter (marked with sticker) should be fitted in order to avoid the penetration of moisture into the gear unit.

If, in spite of an increased risk of rust formation, it is still not possible to allow the gearbox to rotate at regular intervals, the following protective measures are required during a lengthy period of non-use:

- An oil-soluble concentrate with anticorrosion additives that are effective both in liquid as well as gaseous form should be added at a concentration of approx. 2 % to the oil. Refer to the manufacturer's specifications provided by the oil supplier for the effective duration, compatibility and exact concentration of the additive.
- All openings in the gear unit (oil drain plug, breather screw etc.) must be hermetically sealed.

5.3.1.2 Long-term Preservation and Storage

For **long-term storage**, the following must be guaranteed:

- shock-free environment
- closed, dry rooms with a temperature range of -20 to +40°C
- storage in an atmosphere without aggressive gasses, vapours, dusts, and salts
- corrosion-proof bags should preferably be used for storage
- if the motors thaw in the ambient conditions, then precautions must be taken to protect against moisture. Special packaging with airtight, welded plastic sheeting is necessary or packaging in plastic sheeting with moisture-absorbing materials.
- packing with a moisture-absorbing material must be placed in the terminal box
- unprotected metal surfaces like the shaft ends and flanges must be given a long-term corrosion protection in addition
- motors with reinforced mounting are usually delivered with a transport locking device. The transport locking device must only be removed during mounting and before the unit is switched on for the first time.

For long-term storage, the following must be guaranteed:

Provided the unit is stored indoors, a 2-year protection period can be guaranteed if:

- The oil in the gear unit has been drained off and the unit has been completely filled with anticorrosive oil.
- All openings in the gear unit (oil drain plug, breather valve etc.) are hermetically sealed.
- A clearly visible warning indicating "No operational lubricant" is displayed on the gear unit.


Note

The gear unit must not be placed into operation with the storage oil. The drained oil must be stored or disposed of corresponding to environmental protection regulations.

In addition, preparations must be made here for use after the long-term storage:

- prepare the geared motor for operation, taking the measures carried out for long-term storage and preservation into consideration
- test the insulation resistance of the coil against ground, depending on the motor, e.g.:

Power rating P_N [kW]	Insulation resistance based on the nominal voltage [k Ω / V]
$1 < P_N \leq 10$	6.3
$10 < P_N \leq 100$	4
$100 < P_N$	2.5

If the minimum value is undershot, then the coil must be properly dried and the insulation resistance must be measured once again.

- If necessary, the inserted bags with moisture-absorbing material must be removed from the terminal box.
- Short trial run

After a successful (a) test of the insulation resistance of the coil and (b) a short trial run, the drive unit can be put into operation.

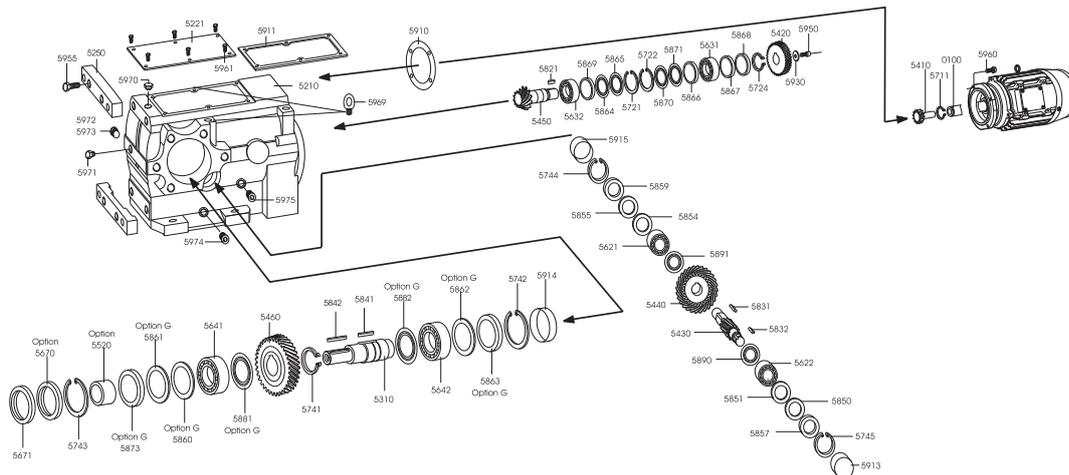
- For storage of more than 2 years, open bearings must be visually checked. In the event of discolouration or hardening and other abnormalities, the grease must be replaced. After storage of more than 3 years, the standard grease must be changed under all circumstances.
- For motors with a regreasing device, the grease must be replaced several times by regreasing (three times at one-day intervals, with the motor running under nominal load). Afterwards, the old grease must be removed from the grease compartment of the outer bearing housing.
- When using covered and packed deep groove ball bearings, after a storage time of more than 2 years, the rolling bearings must be replaced in all cases. Make sure the identical bearings are used.

Motor/matrix-specific regulations deviating from this may have to be observed.

5.4 Drive Unit Construction

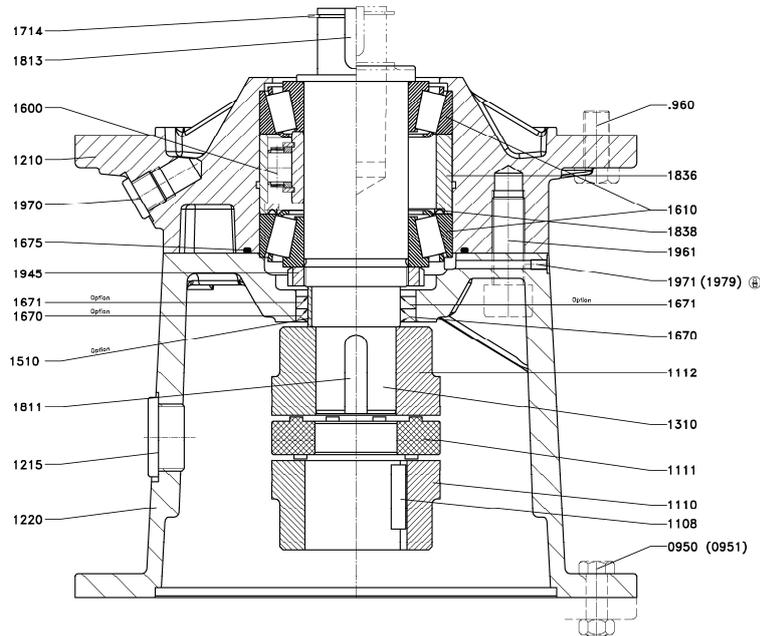
5.4.1 Gearbox

The following illustration shows the principle design of a helical bevel geared motor. It is intended as a reference aid to the individual parts lists. Variations are possible depending on the gear unit size and version.



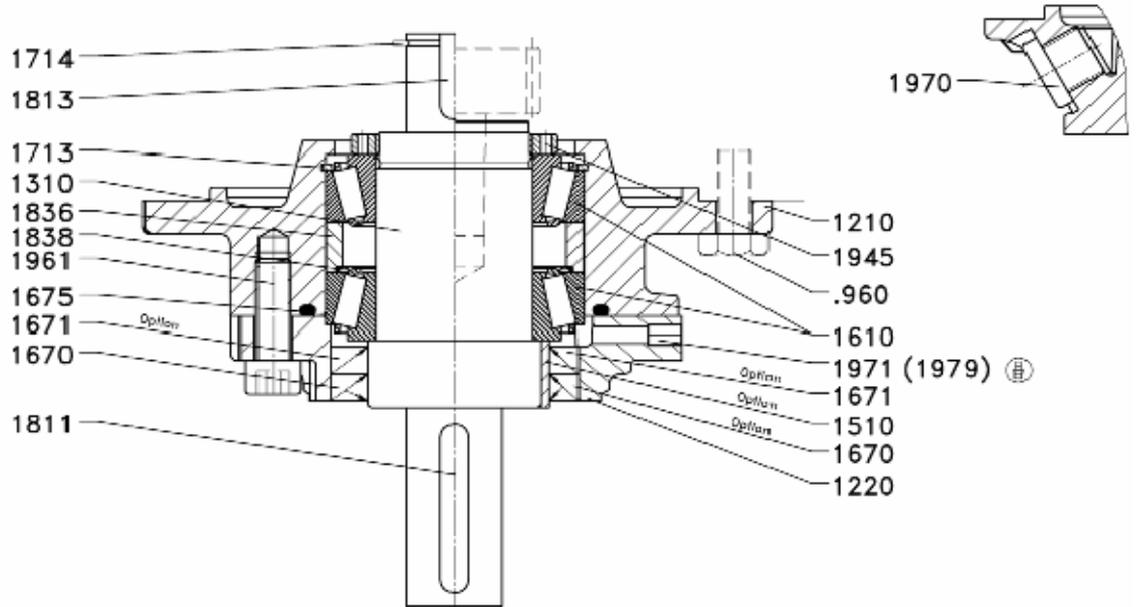
Item No.	Description
0100	Motor
5210	Housing
5221	Cover
5250	Attached foot strips
5310	Output shaft
5410	Pinion
5420	Gearwheel
5430	Pinion shaft
5440	Gearwheel
5450	Pinion shaft
5460	Gearwheel
571. / 572. / 574.	Retaining ring
5821 / 583. /584.	Feather key
585. / 586. / 587.	Support ring/shim ring
588. / 589.	Nilos ring
5910 / 5911	Gasket
5913 / 5914 / 5915	End cover
5914	End cover or protective cover for hollow shaft "H" (option)
5918	protection hood for hollow shaft "S" (option)
593.	Washer
595. / 596. / 597.	Screw
5963	roll pin
597.	Screw
5621	Bearing
5622	Bearing
5631	Bearing
5632	Bearing
5641	Bearing
5642	Bearing
5670	Rotary shaft seal
5671	Rotary shaft seal

5.4.2 Coupling Lantern (U-lantern)



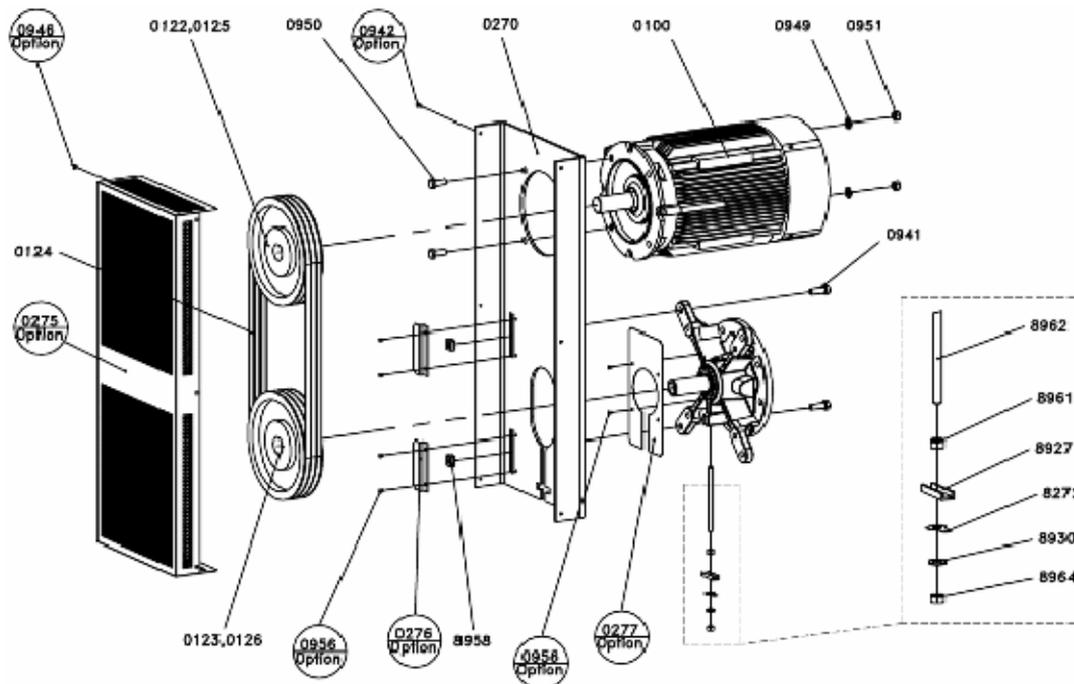
os. No.	Stückliste
0950	Screw motor fastening
0951	nut, motor fixing
_960	Screw rear frame fastening
1108	Parallel key, coupling motor
1110	Coupling half, motor side
1111	Dog, flexible element
1112	coupling half gearside
1210	Lantern/frame
1215	Oil plug
1220	Cover/flange/adapter
1310	high speed shaft
1510	Bushing, high speed shaft (option)
1600	backstop kit
1610	Bearing, drive shaft
1670	oil seal, high speed shaft
1671	Oil seal, high speed shaft (option)
1670	Oil seal, high speed shaft (option)
1671	Oil seal, high speed shaft (option)
1675	o-ring, flange
1714	circlip, pinion Z1
1811	Key, high-speed shaft
1813	Key, pinion Z1
1836	Spacer ring, shaft unit
1838	Druckfeder
1945	Shaft nut, shaft unit
1961	Screw cover/flange
1970	Oil plug/breather
1971	Oil plug
1979	Lubricating nipple

5.4.3 Free High-Speed Shaft (I-Lantern)



Item No.	Stückliste
_960	Screw rear frame fastening
1210	Lantern/frame
1220	Cover/flange/adaptor
1310	high speed shaft
1510	Bushing, high speed shaft (option)
1610	Bearing, drive shaft
1670	oil seal, high speed shaft
1670	Oil seal, high speed shaft (option)
1671	Oil seal, high speed shaft (option)
1671	Oil seal, high speed shaft (option)
1675	o-ring, flange
1713	Retaining ring
1714	Circlip, pinion Z1
1811	Key, high-speed shaft
1813	Key, pinion Z1
1836	Spacer ring, shaft unit
1838	Compression spring
1945	Shaft nut, shaft unit
1961	Screw cover/flange
1970	Oil plug/breather
1971	Oil plug
1979	Lubricating nipple

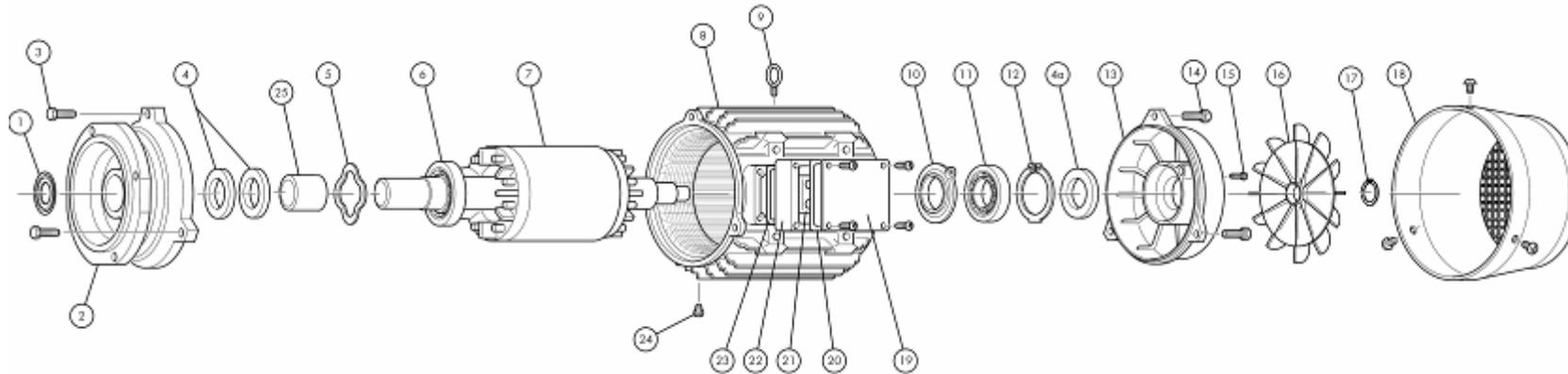
5.4.4 Motor Base Design



Item No.	Stückliste
0100	Motor
0122	Pulley, motor
0123	Pulley, gearbox
0124	Belt (set)
0125	Taper bushing, motor
0126	Taper bushing, gearbox
0270	Motor support
0275	Protective cover (option)
0276	Protective bracket (option)
0277	Protective plate (option)
0941	Screw, motor support
0942	Screw, protective cover (option)
0946	Cage nut, protective cover (option)
0949	Washer, motor fastening
0950	Screw, motor fastening
0951	Nut, motor fixing
0956	Screw, machine guard (option)
8272	Mounting bracket
8927	Circlip
8930	Washer
8958	Nut, motor support
8961	Nut, counter
8962	Threaded rod, motor support
8964	Nut, adjustment

5.4.5 Motor

5.4.5.1 Schematic diagram:



Item No.	Description
1	flinger
2	flange
3	Bolt
4	Seal (second seal: Option)
4a	Seal
5	Adjustment washer
6	Bearing
7	Rotor
8	Stator
9	Lifting lug (if inserted)
10	bearing housing
11	Bearing
12	Retaining ring

Item No.	Description
13	End cover
14	Bolt
15	Screw
16	Fan
17	Retaining ring
18	Fan cover and fixing bolts
19	Terminal box cover
20	Seal, terminal box
21	Terminal board
22	Terminal box
23	Terminal box seal
24	Drain plug (if inserted)
25	Bearing race (option)

5.4.5.2 Brake

Spring pressure, single disc, safety brake for direct current and for dry run (option)

The motor can be optionally equipped with a brake. Premium Stephan uses the brakes listed below as standards. Deviations from the versions are possible.

With the electromagnetic single-disc brake, the braking power is applied by springs and the brake is electrically ventilated. In the event of a power failure, the brake engages. This fulfils the stipulated safety requirements. On request, the brakes are equipped with manual ventilation. The brakes are manufactured and tested according to VDE 0580 and comply with CENELEC Memorandum No. 3, Part 3, Par. 2.3 of the EEC Safety Policy.

Recommended values – the specifications of the brake manufacturer are decisive.

M	BR	TB Nm	WRN J	Pzo W	t1 ms	t2 ms	t3 ms	J1 kg*cm ²	a _{max} mm	a _{Nenn} mm
63	08	5	5x10 ⁷	22	35	30	70	0,15	0.6	0.2
71	08	5	5x10 ⁷	22	35	30	70	0,15	0.6	0.2
80	10	10	12x10 ⁷	28	45	45	95	0,45	0.7	0.2
90	13	20	20x10 ⁷	34	60	60	140	1,72	0.8	0.3
100	15	40	35x10 ⁷	42	80	75	175	4,5	0.9	0.3
112	15	40	35x10 ⁷	42	80	75	175	4,5	0.9	0.3
132	20	100	125x10 ⁷	100	160	120	280	12,2	1,1	0.4
160	23	150	200x10 ⁷	150	200	150	350	28,5	1.1	0.4
180	26	250	340x10 ⁷	250	220	180	500	66,5	1.2	0.5
200	458-25	400	-	110	110	375	950	200	1.3	0.6
225	458-25	400	-	110	110	375	950	200	1.3	0.6

Motor Motor size

BR Brake size

TB Nominal torque

WRN Work done by frictional force until readjustment of air gap a

Pzo Coil power consumption

t1 Switch-on time

t2 Switch-off time (DC side switching)

t3 Switch-off time (AC side switching)

J1 Mass moment of inertia

a_{max} Max. air gap

a_{Nenn} Nominal air gap

Technical Data:

The response times apply to normal operating temperatures and nominal voltages for the set nominal air gap.

The specified values are subject to the usual tolerances.

t1 (switch-on time) is the time from switching on the voltage up to a decrease of the braking torque to 10% of the nominal torque TB.

t2 and t3 (switch-off time) is the time from switching off the voltage up to an increase of the braking torque to 90% of its nominal value. t2 applies for DC switching and t3 for AC switching.

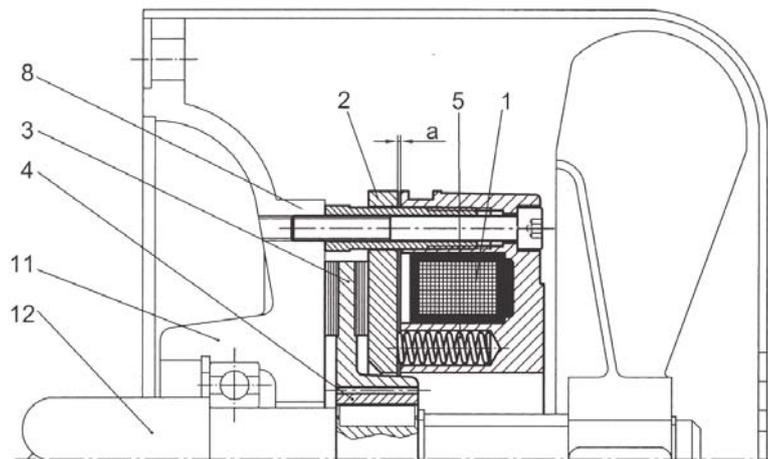
The brakes are mounted under the fan cover of the motor, and have a degree of protection of IP55. Hence, they are protected against dust deposits and water jets.

The dynamic braking torque TB applies to dry running, broken-in brakes, and normal operating conditions.

The braking torque decreases as the motor speed increases.

If there is oil or grease on the rubbing surfaces, then the braking torque will be reduced by up to 50%. If the brakes are not broken in, then the braking torque can be up to 20% below the nominal torque.

Construction and Mode of Operation



When there is no power, the compression springs (5) in the magnet body (1) press on the rotor (3) via the axially moving anchor washer (2) and against the bolting surface (8). The braking torque is generated by the frictional contact. The brake rotor is form-fit connected to the hub (4).

A magnetic field is created by applying a direct current to the field coil in the magnet body (1). The generated magnetic force acts on the anchor washer (2) and draws it via air gap "a" against the spring force of the compression spring (5) on the magnet body (1). The brake rotor is released and the braking function is removed.

5.4.6 Gear Box Attachments

5.4.6.1 Oil Expansion Tank

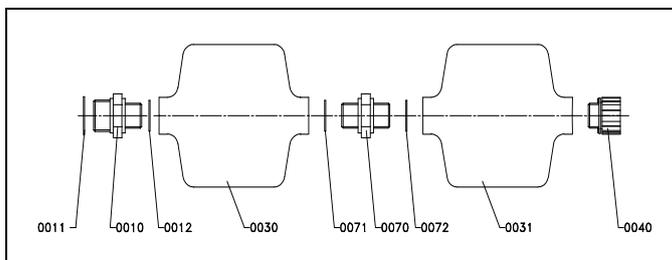
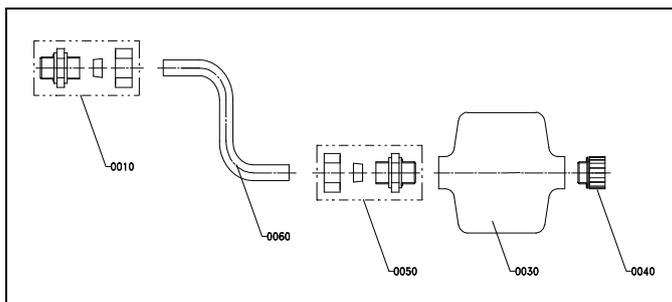
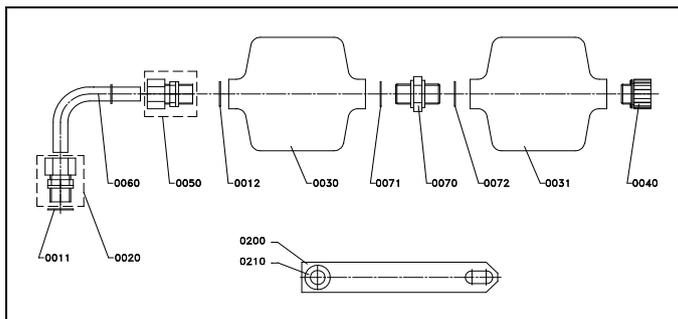
The oil expansion tank serves the purpose of collecting the oil that has been foamed up by the gearing and expanded by the oil temperature to avoid it escaping from the gear unit.

The oil expansion tanks each have a capacity of one litre. One or several tanks must be installed depending on the required expansion volume.

It is necessary to check whether the oil expansion tank does not conflict with the connection sizes for the specific application. Please consult Premium Stephan.

The following table provides an overview of the standard Premium Stephan oil expansion tanks.

Gearbox type and size	Mounting position	Speed [rpm]	Compensation volume [litres]
SI3. ... SI5.	V5, V6, V15, V36, V1, V3	all	1
SI6., ... SI9.	V5, V6, V15, V36, V1, V3	all	1
SI7. ... SI9.	V5, V6, V15, V36, V1, V3	only for n >1500 rpm	2
SK3. ... SK7.	2	all	1
SK8. ... SK9.	2	all	4
SK6. ... SK7.	5, 6	all	1
SK8. ... SK9.	5, 6	all	2
SK3. ... SK7.	5, 6	only for n >1500 rpm	1
SK8. ... SK9.	5, 6	only for n >1500 rpm	4
SP3. ... SP8.	1, 2	only for n >1500 rpm	1
SP7. ... SP8.	5, 6	only for n >1500 rpm	2



Item No.	Description
0010	Double fitting
0011	Seal
0012	Seal
0020	Pipe screw fitting
0030	Ausgleichsbehälter
0031	Ausgleichsbehälter
0040	Breather valve
0050	Pipe screw fitting
0060	Pipe
0070	Double fitting
0071	Seal
0072	Seal
0140	Sealing tape
0200	Mounting bracket
0210	Leadthrough grommet

5.4.6.2 Oil Level Glass

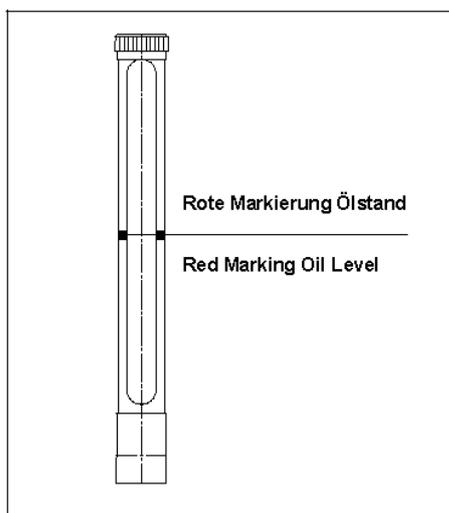


From size 4, the gear unit can be equipped with an oil level glass for the purpose of simply reading off the oil level. The drive unit must be switched off when reading the oil level. The maximum deviation of the oil level from the oil level marking is specified in the table below.

Oil return is only used in the mounting positions with output shaft at the bottom. For this purpose the oil return pipe must be connected to the oil level glass and the gear unit.

Level glasses equipped with capacitive sensors are also possible for the purpose of continuous oil level monitoring.

Getriebetyp und Baugröße	Deviation from marking
SI4 SI6.,	± 3 mm
SI7. ... SI9.	± 5 mm
SK4. ... SK6.	± 3 mm
SK7. ... SK9.	± 5 mm
SP4.....SP6	± 3 mm
SP7.....SP8	± 5 mm



Schematic drawing



Caution: The "red" marking for the oil level glass is subject to the gear-type, application conditions / requirements and ordering designations.

The oil level is mandatory!

5.4.7 Gearbox Options

5.4.7.1 Safety-friction clutch on the input shaft

In addition, the U-lantern can also be equipped with an optional safety-friction clutch. A spacing ring on the adapter is needed for this. Please observe the operating instructions of the safety-friction clutch for setting the torque and for installing the safety-friction clutch. See table for areas of application.

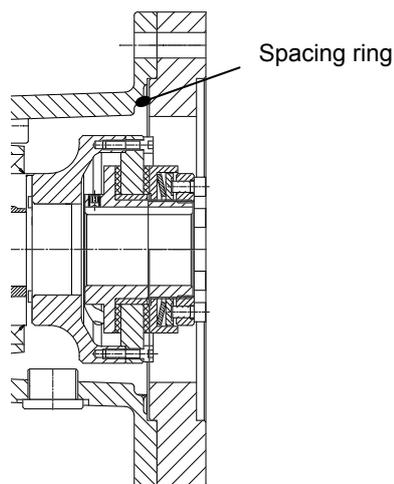


Fig. U-Lantern with safety-friction clutch

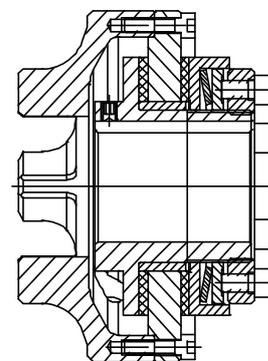


Fig. Safety-friction clutch

Clutch size	Motor Size IEC								
	63	71	80	90	100	112	132	160	180
24	1 – 10 Nm								
24	5 – 35 Nm								
38					25 – 140 Nm				
48									50 – 300 Nm

5.4.7.2 backstop

By using speed-lifting backstops, it is only necessary to replace this wearing part every 6000 hours of operation, or after 3 years at the latest. The system operator must take all the necessary safety precautions to avoid failure of the backstop that may result in personal injury and/or damage to the drive unit and/or the application. It is necessary to replace the backstop under the following conditions:

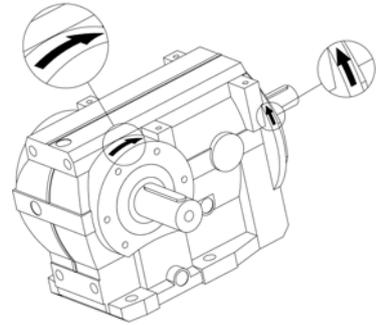
- In the event of unusual wear of the gear unit or if the oil in the gear unit is contaminated, as it could have had an adverse effect on the clamping elements and bearing races in the integrated backstop.
- In the event of unusual load (stress or strain) that may have had an adverse effect on the condition of the clamping elements and bearing races in the integrated backstop.


NOTICE

Operating the motor in the direction that is blocked could destroy the backstop ! Potential damage to property.

Do not start up the motor in the direction that is blocked. Be sure that the motor power supply is correctly connected so that the motor rotates in the required direction.

The permitted direction of rotation is indicated on the input and output side of the housing.



5.4.7.3 General

Only authorised, qualified personnel are permitted to replace the backstop or change the direction of rotation of the backstop while complying with the operating instructions for the backstop.

Never loosen or release any part of the backstop facility while the drive unit is under load: this may have an adverse effect on the return of the drive unit and the load. The load must be removed from the drive unit and the drive unit must be secured against involuntary movements.

5.4.7.4 For version with IEC D flange-mounted motor and coupling lantern (U-lantern)

In nominal operation, the minimum lift-off rotational speed must not be undershot. Undershooting it is permitted only during the start-up or braking procedure. For installation conditions, see table:

Coupling size	Motor Attachment IEC or Nema	
	Locking power T_{KN} [Nm] ($T_{Kmax} = 2 \times T_{KN}$)	Lift-off rotational speed [min-1]
38	320	680
48	1400	610
55	1400	610

5.4.7.5 For version with free drive shaft (I-lantern)

Journal	Free Drive Shaft I	
	Locking power T_{KN} [Nm] ($T_{Kmax} = 2 \times T_{KN}$)	Lift-off rotational speed [min-1]
Ø38 x 80	320	680
Ø1,375" x 3,125"		
Ø48 x 110	1400	610
Ø2,125" x 4,25"		

6 Mechanical installation

6.1 Important notes



Only transport the drive unit with sufficiently strong means of transport or hoisting equipment. Make sure it is secured. Avoid bumps.
Some of the motors attached to the drive unit are equipped with lifting lugs. They are only for use with the motor-drive unit assembly, and may not be used for the entire geared motor.

6.2 Installation Site / General Conditions

The drive units must be installed or attached free of vibration or mounted on a flat, rigid and solid frame or foundation in order to avoid vibration.



**Note: The drive units must be aligned with the utmost care!
Stress and strain in the housing must be avoided.**

To align the gear unit, place it on the 3 mounting points and use shims to match the other point to an accuracy of less than 0.2 mm.
After the gear unit has been aligned correctly and after all the shims have been fitted, the gear unit must be firmly screwed down to the foundation. Screw class 8.8 in accordance with DIN 267. see dimensioned drawings. The screws must be tightened to the torque requirements as specified by the manufacturer.
Trouble-free lubrication and ventilation are ensured only when the gear unit is mounted in the correct position.

It is necessary to correct the amount of lubricant and the position of the breather screw if the mounting position of the gear unit is changed.
Prior to start-up, check the position dependent oil level in the drive unit by undoing the oil level screw plug (see section 8).

Sizes 1 and 2 feature lifetime lubrication. In this case, the surface temperature and the noise level emitted by the gear unit must be constantly monitored during the start-up procedure.

Intermediate inserts or pads made of plastic must be used if there is a risk of electrochemical corrosion between the gear unit and system. Connect the gear unit housing to earth.

The cooling air intake of the motor must not be obstructed.

6.2.1 General

It is important to observe the operating instructions of the transmission elements. Flexible couplings are to be used on the direct power transmission from the gear unit to the machine and, in case of risk of jamming, friction couplings are required. Only use rigid couplings in connection with unsupported or overhanging shafts (e.g. with agitators or fan drives). Power transmission elements, such as flat or V-belts, gearwheels and sprocket wheels, cranks, cams, etc., should be arranged as closely as possible to the gearbox casing due to the radial forces that occur. The bearings and drive shaft are then subject to the lowest possible load. Refer to our technical sales documentation for the maximum permissible load values.

Prior to installing transmission elements, it is necessary to remove the protective coating of paint on the shaft end with suitable means.

The mounting of transmission elements onto the polished output shaft of the gearbox must be carried out with care and can be performed with the aid of the tapped hole on the face provided for this purpose. Preferably, the power transmission element should be heated to a temperature of approx. 100 degrees C. The hole is to be dimensioned in accordance with ISO H7. All parts must be carefully deflashed, cleaned and the locating points lightly greased. Avoid all knocks and impacts on the end of the shaft. The same procedure applies for transmitting the drive power to the gear unit in connection with a free drive shaft.

6.2.2 Preparatory Work

Remove any anticorrosive agents and contamination from the driven shafts and flange faces using standard solvents.

Do not allow solvent to remain on the sealing lips of the shaft sealing ring, as this can cause material damage!

6.2.3 Mounting Coupling on Output Shaft



Observe the operating instructions provided by the coupling manufacturer. Accurate alignment and regular inspection are necessary.

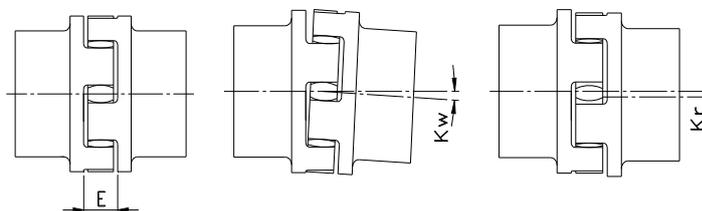
The maximum permissible shaft extensions for the coupling used must be observed and checked.

Maintain the specified distance between the coupling halves.

Only adjust the radial offset after the angle offset and the distance between the shaft ends have been checked.

Recheck the angle offset after correcting the radial offset.

Alignment of the coupling halves



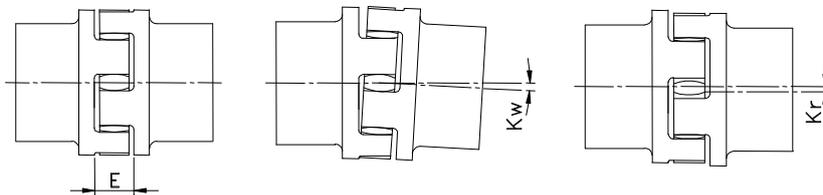
6.2.4 Mounting Coupling on the High Speed Shaft

If the gear unit is supplied equipped with an I-lantern, particular care must be taken while fitting the motor to ensure the correct distance between the coupling halves and to guarantee flush alignment of the motor shaft with respect to the input shaft of the gear unit.

Particular care must be taken when aligning the motor and mounting the coupling half supplied together with the gear unit to ensure that the following conditions (see graphic) are maintained as specified by the manufacturer.

Avoid all impacts and knocks during the mounting procedure.

Aligning the coupling halves on the motor and gear unit



6.2.4.1 Gearbox with free drive shaft (I-lantern)

- Observe the operating instructions for the transmission elements.
- Avoid jolting or striking the shaft end.

6.2.4.2 Mounting IEC D Flange Motor on Drive Unit with Coupling Lantern (U-Lantern)

Motor documentation

This contains detailed information on installing transmission elements on the motor shaft.



Increased wear or damage to the clutch

Incorrectly installed clutch components can reduce the service life of the clutch and can even cause damage.

Possible consequences:

- Clutch components or even the entire clutch may have to be replaced.

Protective measures:

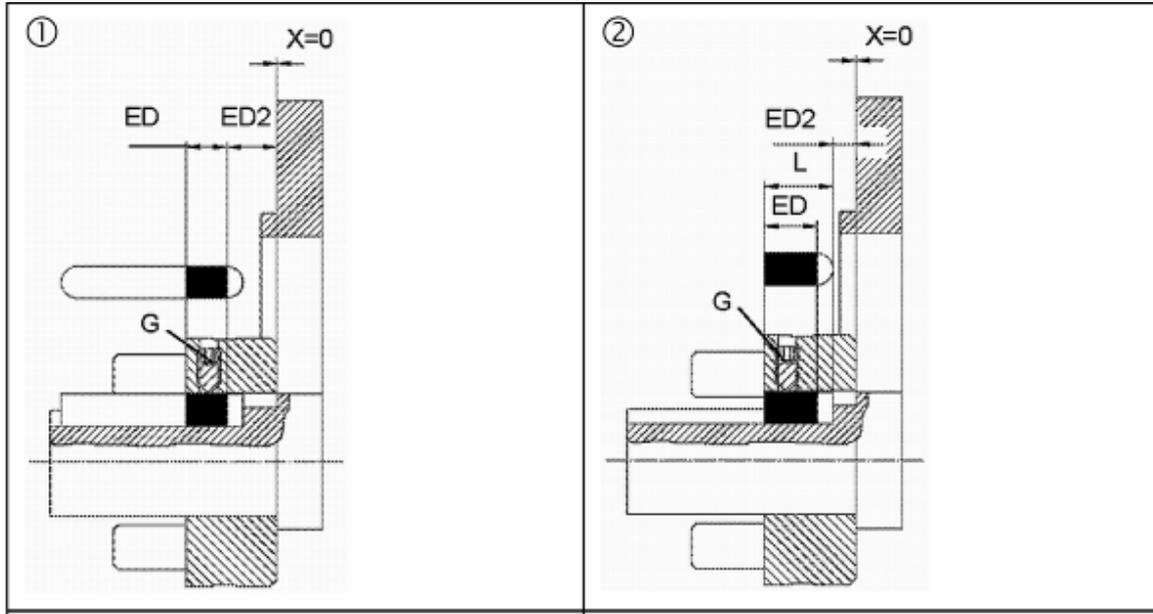
- Do not change the position of the factory-set, pre-assembled clutch hub on the gear shaft.
- Adhere precisely to the measurements contained in the following tables for installing the clutch hub on the motor shaft.

The clutch hub for the motor shaft and the ring gear are included in the scope of supply.

How to attach the motor to the gearbox:

1. Depending on the motor frame size, insert the supplied keyway into the motor shaft.
 - See the following graphics and tables.
2. Fit the clutch hub to the motor shaft.
 - The coupling hub may only be heated to a max. of 80°C, in order to make it easier to heat up the shaft.
3. Set the clutch hub to the correct position on the motor shaft.
 - Adhere precisely to the measurements.
 - See the following graphics and tables.
4. Secure the clutch hub:
 - Tighten the grub screws (G).
 - Observe the tightening torques.
 - See the following graphics and tables.
5. Insert the ring gear into the cam section of a hub.
6. Seal the connection between the motor and clutch housing (U-mount) :
 - Use a liquid surface sealant, e.g. Loctite 510.
 - Observe the manufacturer's processing instructions.
7. Screw together the motor and gearbox.
8. Open the inspection opening on the clutch housing:
 - Remove the screw plug.
9. Visual inspection:
 - Are all clutch components correctly installed?
10. Carefully insert the screw plug.

Coupling ROTEX® 24



PICTURE 2
Scope of supply: Key
AB 8x7x15 hardened

Gearbox	K	M	Mounting dimensions				Mounting		B
			X	Edmin	ED2max	L	G	TA	
Type	BG	BG	[mm]	[mm]	[mm]	[mm]		[Nm]	
SI..16. - SI..56. SI..26C16. - SI..96C36. SP..16. – SP..56. SP..16C16. – SP..86C36. SK..26C – SK..66C. SK..26C16. – SK..96C36.	24	63	0	5	12,5	-	M5	2	2
		71	0	10	10	-			2
		80	0	13	7	-			2
		90	0	11	5	15			2
		100	0	11	5	15			2
		112	0	11	5	15			2

SI Helical gearbox

SP Flat gear units

SK helical bevel gearboxes

ED Percentage of contact area of key

K Rotex coupling,

M Motor

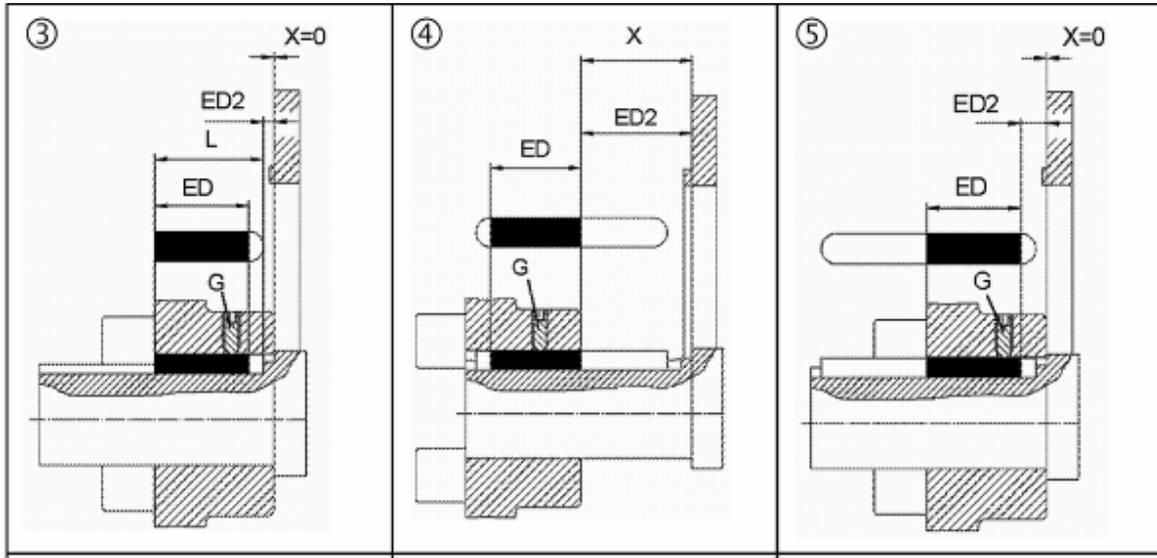
BG Size

G Thread

TA Torque

B No. of the illustration

ROTEX® coupling 38



PICTURE 3
Scope of supply: Key
AB10x8x40

Gearbox	K	M	Mounting dimensions				Mounting		B
			X	Edmin	ED2max	L	G	TA	
Type	BG	BG	[mm]	[mm]	[mm]	[mm]		[Nm]	
SI..26.-SI..56	38	132	0	20	5	40	M8	10	3
SP..36.SP..56.		160	65	30	65	-			4
SK..36C-SK..66C		180	65	35	65	-			4
SI..66.-SI..96	38	100	0	13	11	-			5
SP..66.-SP..86.		112	0	16	11	-			5
SK..76C-SK..96C		132	0	20	5	40			3
		160	65	30	65	-			4
		180	65	35	65	-			4

SI Helical gearbox

SP Flat gear units

SK helical bevel gearboxes

ED Percentage of contact area of key

K Rotex coupling

M Motor

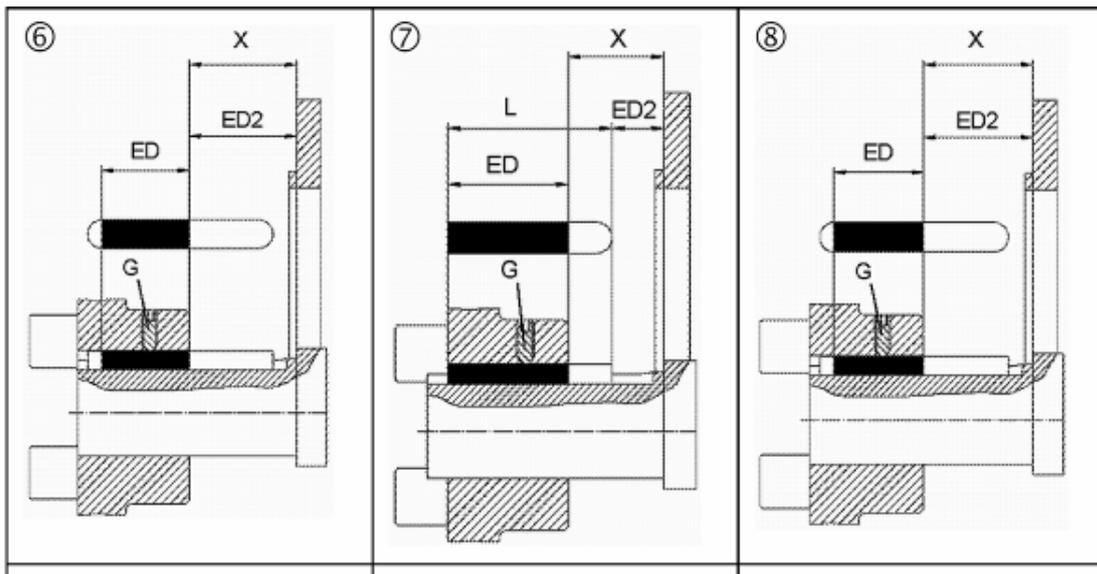
BG Size

G Thread

TA Torque

B No. of the illustration

ROTEX® coupling 48 / ROTEX® coupling 55



PICTURE 7
Scope of supply: Key
AB 14x9x80

Gearbox	K	M	Mounting dimensions				Mounting		B
			X	Edmin	ED2max	L	G	TA	
Type	BG	BG	[mm]	[mm]	[mm]	[mm]		[Nm]	
SI..66.-SI..96 SP..66.-SP..86. SK..76C-SK..96C	48	160	29,5	30	45	-	M10	17	7
		180	29,5	35	5,5	80			7
		200	54	40	54	-			6
		225	84	42	84	-			6
SI..66.-SI..96 SP..66.-SP..86. SK..76C-SK..96C	55	250	75	50	75	-	M10	17	8
		280	75	50	75	-			8

SI Helical gearbox

SP Flat gear units

SK helical bevel gearboxes

ED Percentage of contact area of key

K Rotex coupling

M Motor

BG Size

G Thread

TA Torque

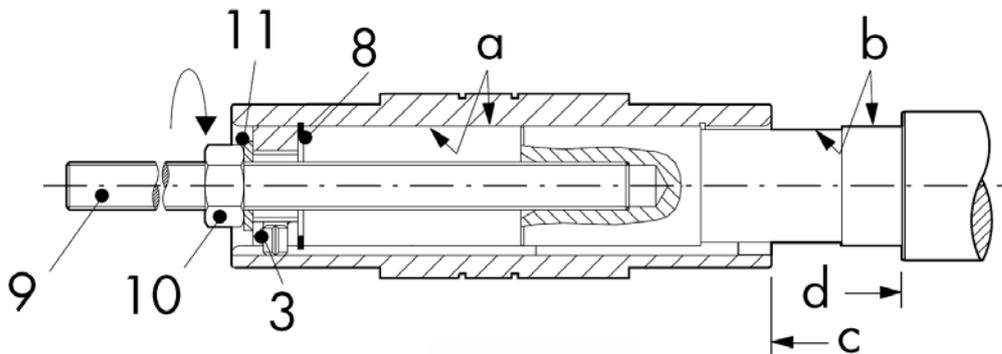
B No. of the illustration

6.2.4.3 Mounting Helical Bevel Geared Motors with Hollow Shaft with Keyway

NOTE

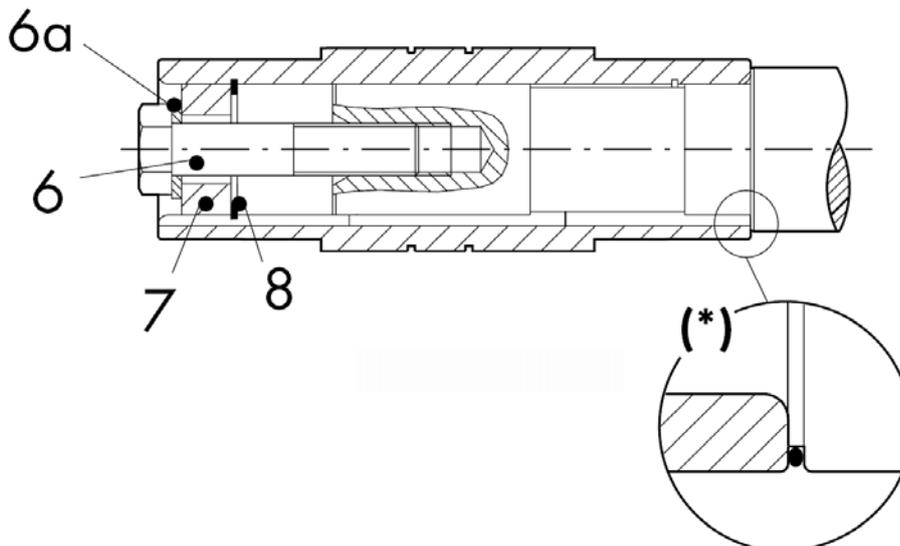
Assembly

- Clean and degrease contact surfaces (a) and (b).
- Grease contact surfaces (a) and (b) with "Molykote D321R" or an equivalent lubricant.
- Slide the geared motor onto the driven shaft until the surfaces (c) and (d) are positioned opposite each other. Fit a threaded rod (9), nut (10), puller ring (11), thrust washer (3) and a retaining ring (8) as required.
- Remove tools (3, 9, 10, 11).



Mounting

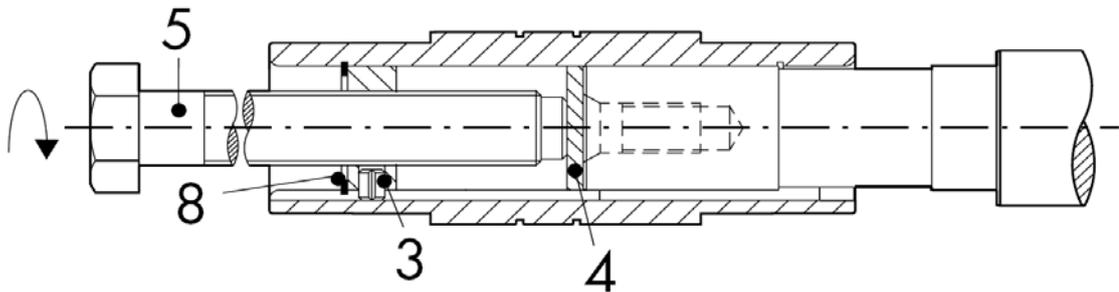
- Fit the mounting ring (7) against the retaining ring (8). Secure the machine shaft by means of mounting screw (6) and washer (6a).
- Fit protective cover.
- If the shaft is subject to external axial loads, follow the special guidelines provided on the dimensioned drawing.



(*) An O-ring is recommended to provide increased protection against moisture.

Disassembly

- Remove mounting screw (6), washer (6a), mounting ring (7) and retaining ring (8).
- Fit pulling washer (4) and thrust washer (3) and reinstall retaining ring (8).
- Fit pulling screw (5) in threaded hole in thrust washer (3).
- Remove the geared motor from the drive shaft by tightening the screw (5).



 : NOTE

Items 3, 4, 5, 9, 10 and 11 do not belong to the standard scope of delivery, however, they are available as an option in the form of an assembly kit.

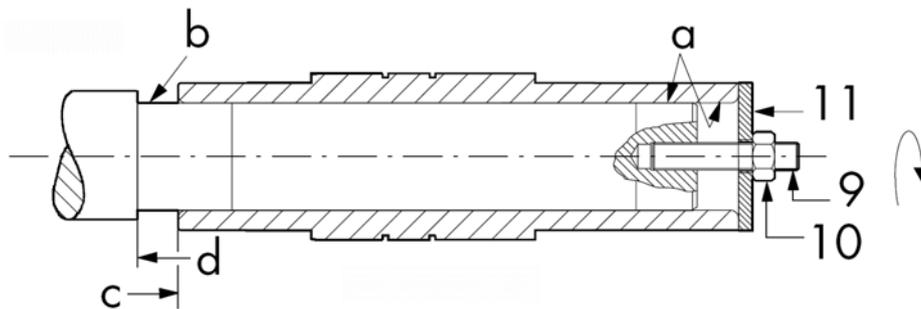
6.2.4.4 Mounting Helical Bevel Geared Motors with Hollow Shaft with Shrink-Fit Ring

i NOTE

The shrink-fit ring supplied by Premium Stephan is ready for installation. Do not pull apart before initial assembly.

Assembly

- Clean and degrease contact surfaces (a) and (b).
- Grease contact surface (b) - BUT ON NO ACCOUNT contact surface (a) - with "Molykote D321R" or an equivalent lubricant.
- Slide the geared motor onto the driven shaft until the surfaces (c) and (d) are positioned opposite each other. If necessary, fit a threaded rod (9), nut (10) and a thrust washer (11).
- Remove tools (9, 10, 11).



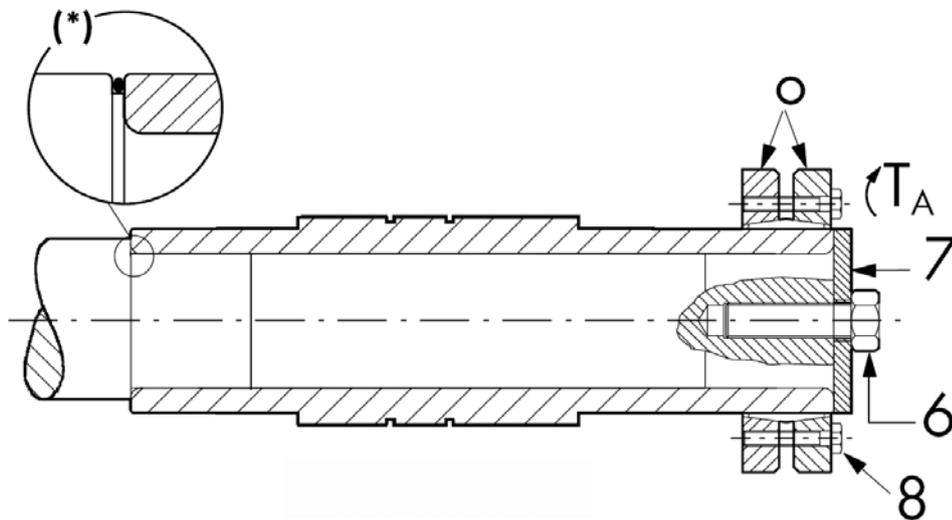
To prevent the shaft slipping, the screws must be tightened to the torque value specified in the table below in order to be able to transmit the output torque indicated on the type identification plate.

Mounting

- Install shrink-fit ring. Remove the spacer rings fitted between the outer rings (o) for transportation purposes. IMPORTANT: The two outer rings (o) must be arranged plane-parallel during the assembly procedure and while tightening the screws.
- Use a torque wrench to tighten the screws (8) in stages one after the other until the specified tightening torque TA (see table) is reached. Do not tighten the screws crosswise.
- Fit protective cover.

Frame size	TA (Nm)
1	12
2	12
3	12
4	12
5	30
6	35
7	59
8	120

Caution: The screws for the shrink-fit ring must never be tightened if the shrink-fit ring is not fitted.



i NOTE

Mounting with axial load

A mounting ring (7) and screw (6) must be fitted if the axial load is not taken up by the shoulder of the machine shaft.

Disassembly

- Evenly release all screws (8) by turning by a quarter turn one after the other.
- Remove the shrink-fit ring from the hollow shaft.
- Remove the gear unit from the drive shaft.

Note: Positions 6, 7, 9, 10, and 11 are not part of the standard delivery, but can be delivered optionally as a mounting kit.

Cleaning and lubricating

If reused, the removed shrink-fit rings need not be disassembled into individual parts for cleaning and lubricating purposes unless they are heavily soiled. After cleaning, grease the conical surfaces with "Molykote D321R" (or an equivalent, solid lubricant with a coefficient of friction of $\mu = 0.04$).

6.2.5 Hollow Shaft with Conical Clamping Sleeve

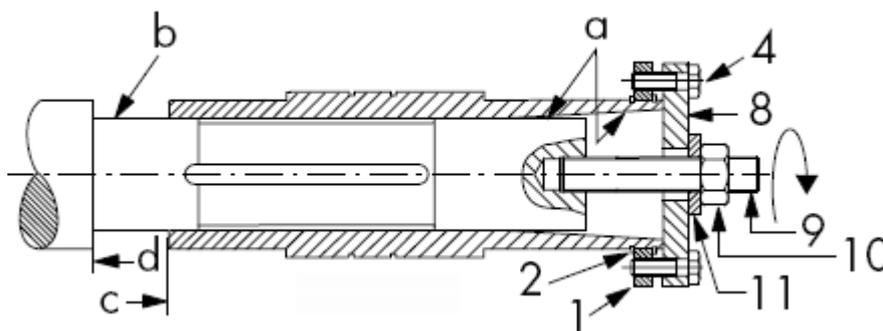


NOTE

The Premium Stephan clamping sleeve system is supplied separately.

Assembly

- Clean and degrease contact surfaces (a) and (b).
- Grease contact surface (b) - BUT ON NO ACCOUNT contact surface (a) - with "Molykote D321R" or an equivalent lubricant.
- Fit support ring (1) either between the two shaft retaining rings (2) or between the shaft retaining ring (2) and the shoulder of the hollow shaft.
- Align the hollow shaft of the geared motor and the machine shaft. The feather key and keyway must be aligned opposite each other.
- Slide the geared motor onto the driven shaft until the surfaces (c) and (d) are positioned opposite each other. If necessary, fit a threaded rod (9), nut (10), washer (11) and a thrust washer (8).
- Remove tools (8, 9, 10, 11).



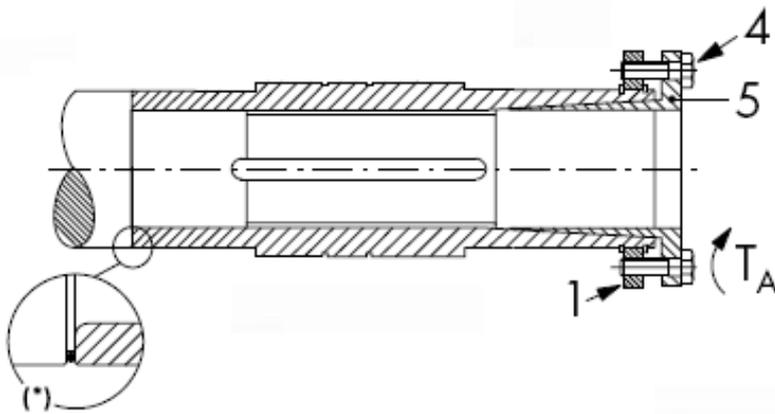
NOTE

To prevent the shaft slipping, the screws must be tightened to the torque value specified in the table below in order to be able to transmit the output torque indicated on the type identification plate.

Mounting

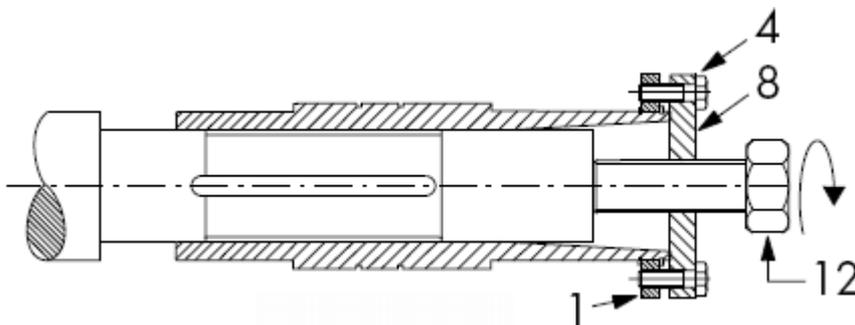
- Fit conical clamping sleeve in hollow shaft without using force
- Align through-holes in clamping sleeve with threaded holes in support ring (1), fit screws (4) and secure hand-tight
- Use a torque wrench to tighten screws (4) in stages one after the other until the necessary tightening torque T_A (see table) is reached
- Retighten screws after 24 hours of operation
- Fit protective cover.

Frame size	TA (Nm)
4	15
5	30
6	30
7	30
8	60



Disassembly

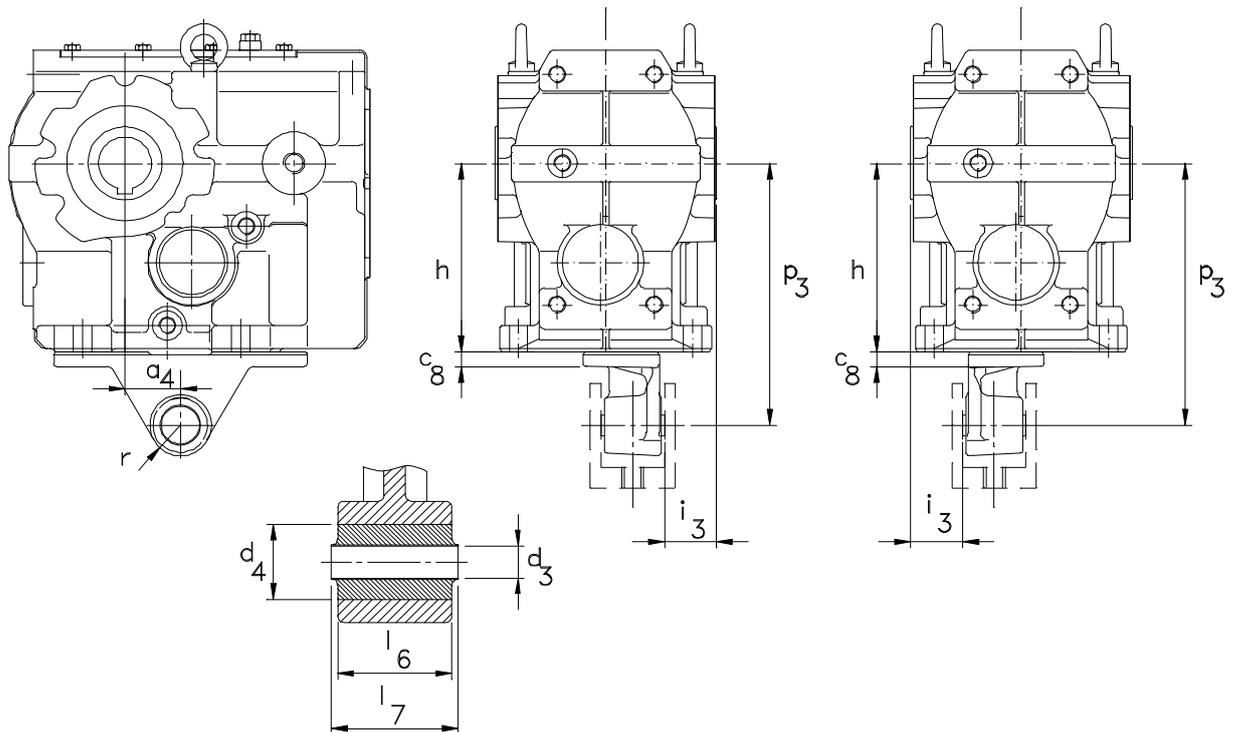
- Evenly release all screws (4) by turning by a quarter turn one after the other.
- Remove conical clamping sleeve (5). If the clamping sleeve (5) does not release of its own accord, fit two screws in the threaded holes and screw against the support ring (1).
- Mount thrust washer (8) with pin (4).
- Fit pulling screw (12) in threaded hole in thrust washer (8).
- Tighten pulling screw (12) in order to remove the geared motor from the machine shaft.



6.2.6 Torque Support



The reaction forces in connection with bevel geared motors that are used as slip-on gear units must be taken up by a torque support (optionally available) or by a flexible element (no rigid connection).

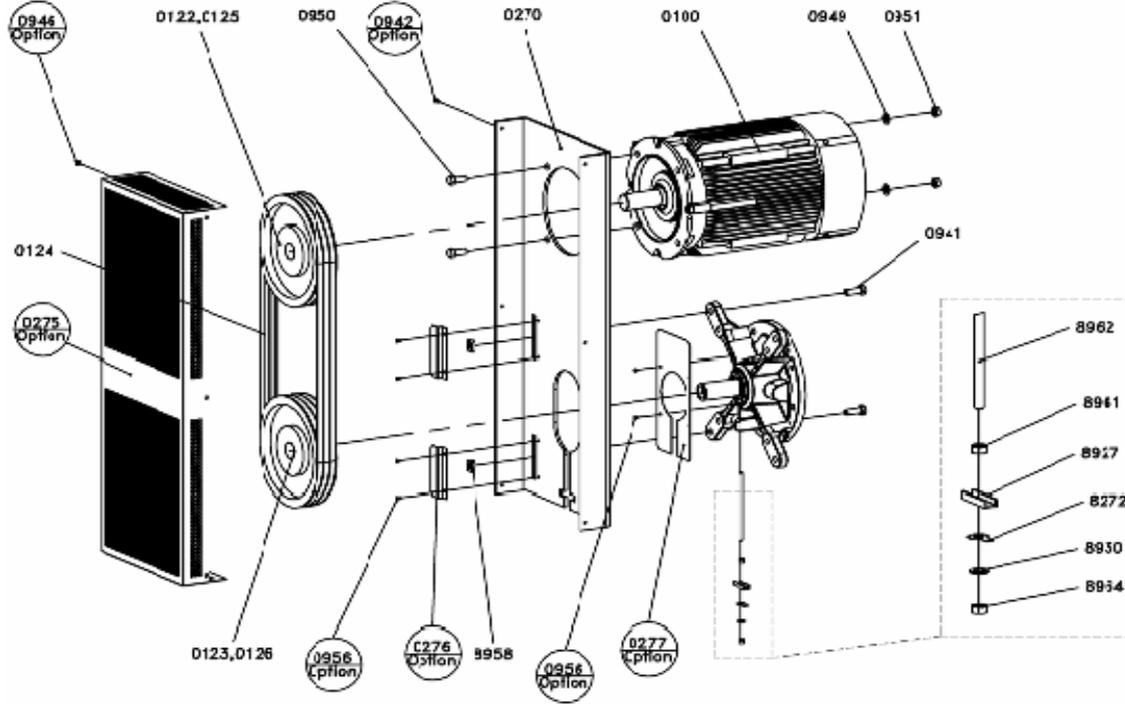


Size	a4	r	c8	h	i3	p3	d3	d4	l6	l7
SK2.	30	22,5	12	112	20	160	10,4	26	31	36
SK3.	45	29	13	140	25	200	16,4	36	54	60
SK4.	52,5	29	14	180	25	250	16,4	36	54	60
SK5.	60	41	16	212	30	300	25	52	72	80
SK6.	70	41	17	265	40	350	25	52	92	100
SK7.	74	41	20	315	45	450	25	52	92	100
SK8.	60	70	45	375	7	550	40	103	110	126
SK9.	50	70	45	450	2	700	40	103	110	126

Figures in mm

6.2.7 Gearbox in Motor Base Version

Construction and individual parts, motor support 470



Item No.	Parts List	DIN	BG. Item No.
0100	Motor		
0122	Pulley, motor		
0123	Pulley, gearbox		
0124	Belt (set)		
0125	Taper bushing, motor		
0126	Taper bushing, gearbox		
0270	Motor support		0120
0275	Protective cover (option)		0272
0276	Protective bracket (option)		0272
0277	Protective plate (option)		0272
0941	Screw, motor support		0120
0942	Screw, protective cover (option)		0272
0946	Cage nut, protective cover (option)		0272
0949	Washer, motor fastening		0120
0950	Screw, motor fastening		0120
0951	Nut, motor fixing		0120
0956	Screw, machine guard (option)		0272
8272	Mounting bracket		0120
8927	Circlip		0120
8930	Washer		0120
8958	Nut, motor support		0120
8961	Nut, counter		0120
8962	Threaded rod, motor support		0120
8964	Nut, adjustment		0120

Variations of the condition at delivery



- Drive unit is completely installed with motor, belt drive and full protection against contact. Belt is preset. See Service and Belt Change for more information.
- Motor support and protection device are completely installed. Belt drive and mounting parts are enclosed loose. Motor is installed by customer. **Attention!** Please check the mounting parts before you dispose of the packaging!
- Only the motor support is installed. The choice and installation of the motor and belt drive is done by the operator. See Installation of Motor for more information. For input speeds greater than 1800/min it is necessary to contact Premium Stephan.

Installation of the Motor

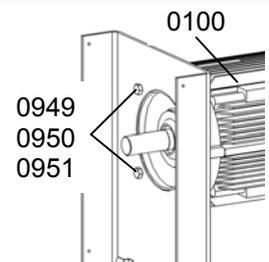
For the installation, the protection device 0275 must be unscrewed, should it be mounted.

Fasten the motor to the motor support 0270 with the fastening material items 0949, 0950, and 0951. When doing this, the following torque must be observed for the screws.

M12 = 86Nm

M16 = 210Nm

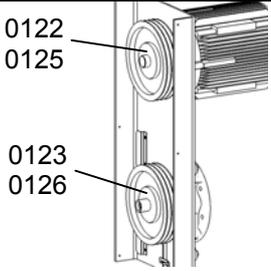
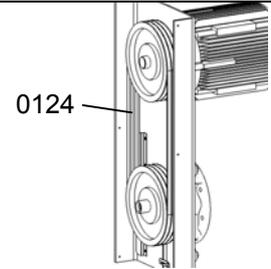
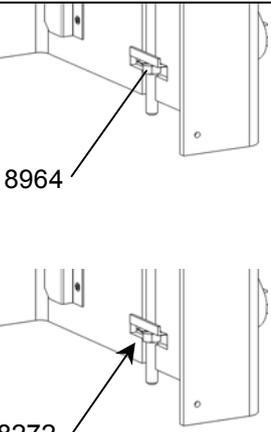
M20 = 410Nm

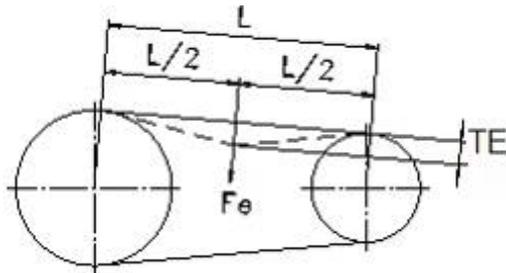


Installation of the Belt Drive



If the belt drive is selected by the operator, the operating instructions of the pulley manufacturer and the belt supplier must then be observed.

<p>Installation of the pulleys</p> <p>Clean and degrease the shaft ends. Tighten pulleys 0122 and 0123 with the corresponding taper bushings 0125 and 0126 using the front screw thread. Put the pulleys as close to the shaft collar as possible and make sure there are aligned. Tighten the screws of the taper bushing.</p> <p>Attention! Don't use hammers or any other striking tool to install the pulleys. This can damage the bearings.</p>	
<p>Installation of the V-belts</p> <p>Belts 0124 must be installed by hand. To do this, set the centre-to-centre distance between the motor and gearbox to a minimum. Also see the section on belt tension.</p> <p>Forcible tightening via the panel edges or the use of tyre irons will cause damage to the V-belts and reduce the service life. Multi-groove drive units must be equipped with belts of equal length and a complete set must be replaced.</p>	
<p>Belt Tension</p> <p>To set the belt tension, the fixing bolts of the motor support 0941 must be loosened by half a turn. The belt tension is applied via the central register nut 8964. After correctly setting it, it must be secured by bending over the locking plate 8272.</p> <p>The belts are tightened gradually, as the belt drive continues to turn by a few rotations after each tensioning process. In the process, the belts adjust and the load distribution becomes balanced. Between the tensioning processes, the indentation depth TE must be measured under force Fe in the middle of the belt drive. The values for TE and Fe can be found on the name plate on the motor support. For multi-groove belt drives, make sure that all belts have the same tension.</p>	



If the belt drive is not selected by Premium Stephan, then there is no name plate on the motor support. The operator is then responsible for making a correct choice and for correct installation.

After a correct setting, the fixing bolts 0941 of the motor support must be tightened again with a torque of 210 Nm.



Attention! The protective cover must be attached before start-up. Fasten the protective cover 0275 with the cage nuts 0946 and fixing bolts 0942 (M6 = 10 Nm).

If no protective cover is attached, then other measures must be taken by the operator to prevent any risk to people or animals.



Service and Inspection

CAUTION! Before starting any service work, switch the drive unit off and secure it against being started again.

Initial start-up or after changing belts:

After 4 – 8 hours of operation, the drive unit must be switched off and the belt tension checked and tightened if necessary. Increased belt wear is an indication that the pulleys are not aligned correctly. If this is the case, then realign the pulleys.

Additional service and Inspection:

Other checks and inspections of the belt drive take place within the service interval of the gearbox. During the process, observe the following points:

- check the belts for aging and damage
- replace damaged or worn belts (only the complete set)
- check the belt tension of each individual belt
- clean corrosion from pulleys and replace them in the event of heavy rust or damage
- clean the interior of the belt drive to remove dirt deposits

Belt change

- remove protective devices 0275 if there are any
- loosen motor fixing bolts 0941 by half a turn
- bend open locking plate 8272 and unscrew the register nut 8964 far enough that the belts can be removed from the pulleys by hand
- continue as described under 4.2

6.3 Installation

The drive units must be installed or attached free of vibration or mounted on a flat, rigid and solid frame or foundation in order to avoid vibration.



Note: The drive units must be aligned with the utmost care! Stress and strain in the housing must be avoided.

To align the gear unit, place it on the 3 mounting points and use shims to match the other point to an accuracy of less than 0.2 mm.

After the gear unit has been aligned correctly and after all the shims have been fitted, the gear unit must be firmly screwed down to the foundation. Screw class 8.8 in accordance with DIN 267. see dimensioned drawings. The screws must be tightened to the torque requirements as specified by the manufacturer.

Trouble-free lubrication and ventilation are ensured only when the gear unit is mounted in the correct position.

It is necessary to correct the amount of lubricant and the position of the breather screw if the mounting position of the gear unit is changed.

Prior to start-up, check the position dependent oil level in the drive unit by undoing the oil level screw plug (see section 8).

Sizes 1 and 2 feature lifetime lubrication. In this case, the surface temperature and the noise level emitted by the gear unit must be constantly monitored during the start-up procedure.

Intermediate inserts or pads made of plastic must be used if there is a risk of electrochemical corrosion between the gear unit and system. Connect the gear unit housing to earth.

The cooling air intake of the motor must not be obstructed.

7 Electrical installation

7.1 Important notes

- Only qualified specialist electricians may create the electrical connection.
- Work may only be performed ...
 - when the electrical plant is deenergised and secured against an unintentional restart.
 - when isolation from supply has been checked.
 - when the drive system is at a standstill.
 - when the required protective covers or housings have not been removed without permission.

- During work, observe ...
 - the technical data on the motor name plate.
 - the notes in the terminal box of the motor.
 - the warning and safety signs on the drive system.
 - the notes in the operating instructions and circuit diagrams.
 - the national/regional regulations for safety and accident prevention, the system-specific provisions

**NOTE:**

The customer is responsible for EMC-compliant installation and adherence to the limit values specified by EMC legislation.

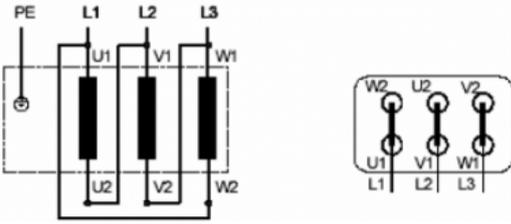
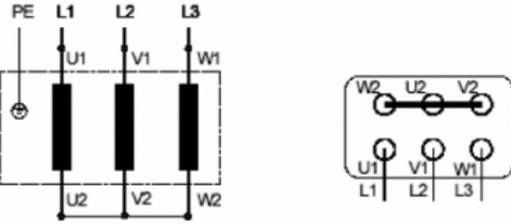
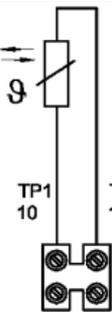
7.2 Electrical connection

Ensure ...

- that the connected loads do not exceed the standard tolerances:
 - Voltage $\pm 10\%$, frequency $\pm 2\%$
 - Wave form, symmetry during operation on the frequency inverter
 - If the connection values exceed tolerances, then there might be increased heating
- that the electrical connection is durable and safe:
 - No loose wire ends.
 - Use an assigned cable end assembly.
 - that the PE conductor connection is safe.
 - that the stipulated air clearances between bare live parts and to the earth are adhered to.
 - that the terminal box is free from foreign bodies, soiling and humidity.
 - that unneeded cable glands and the terminal box are dust and waterproof.

Connection plans

Motor

<p>Delta connection Low voltage (see name plate)</p>  <p>The diagram shows a three-phase supply (L1, L2, L3) connected to a motor terminal block. The motor windings are connected in a delta configuration. The supply lines are labeled PE, L1, L2, L3. The motor terminals are labeled U1, V1, W1 and U2, V2, W2. The connections are: L1 to U1, L2 to V1, L3 to W1; U2 to V1, V2 to W1, W2 to U1.</p>	<p>Star connection High voltage (see name plate)</p>  <p>The diagram shows a three-phase supply (L1, L2, L3) connected to a motor terminal block. The motor windings are connected in a star configuration. The supply lines are labeled PE, L1, L2, L3. The motor terminals are labeled U1, V1, W1 and U2, V2, W2. The connections are: L1 to U1, L2 to V1, L3 to W1; U2, V2, and W2 are connected together to form a star point.</p>
<p>Temperature monitoring Thermal contact (max. 250 V AC, 1.6 A)</p>  <p>The diagram shows a thermal contact switch symbol (a circle with a diagonal line and a small circle) connected to a terminal block. The terminal block has two terminals labeled TB1 20 and TB2 21.</p>	<p>PTC thermistor (DIN 44081/DIN 44082)</p>  <p>The diagram shows a PTC thermistor symbol (a rectangle with a diagonal line and a small circle) connected to a terminal block. The terminal block has two terminals labeled TP1 10 and TP2 11.</p>

7.2.1 Brake

Standard voltages:

102 VDC / 230 VAC for motor output up to 3 kW

178 VDC / 400 VAC for motor output up to 4 kW

Other voltages are available and must be specified on the order.



DANGER DUE TO ELECTRICAL CURRENT

The brake version and the power supply may deviate from the version described here.

Please observe the information on the name plate and the enclosed connection diagrams.

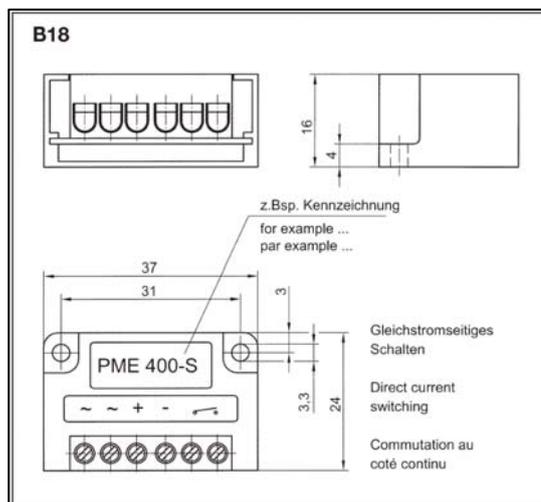


DANGER

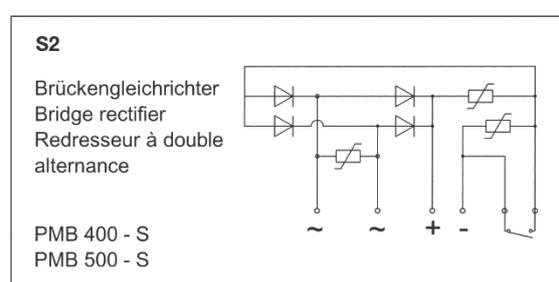
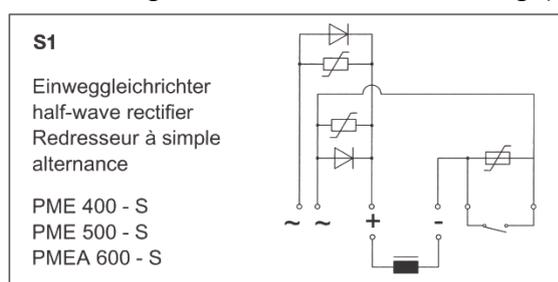
The brake coil is operated via a one-way rectifier (PME). As an alternative, a bridge rectifier (PMB) may also be used. The rectifier has internal protective circuitry and a switch contact that facilitates an additional DC-side switching of the brake coil.

One-way bridge rectifier with terminals:

Terminal cross-section 1.5 mm²



Circuit diagram for DC-side switching (GS)



8 Commissioning and operation

8.1 Initial commissioning

1. Remove all transport locking devices.
2. Replace the screw plug on the gearbox with the breather element supplied. Labelling on the gearbox:



The breather element can be found in a bag attached to the gearbox.



NOTE:

Only replace the screw plug when the drive system has been shut down.

3. For gearboxes without oil filling:
 - Fill gearbox with suitable lubricant (Chap. 2.5.2 and Chap. 10.5)
 - Oil grade: see name plate. (Chap. 2.5.2 and Chap. 10.5)
 - Filling volume: see name plate for guide value. (Chap. 2.5.2)
 - Check oil level! (Chap. 10.3)
4. Measure the insulation resistance of the electric motor.
 - Permissible resistance: $> 1 \text{ k}\Omega$ per volt of operating voltage.
 - If the resistance is too low, observe the information regarding remedial measures in the operating instructions.

Checks before initial start-up

- Check all fastenings.
- Check output elements and safety elements.
- All grease nipples, screw plugs and control screws must be freely accessible.
- Check electrical connection.

8.2 Test run



NOTE:

The drive system may only be commissioned once it has been confirmed that all notes and specifications have been adhered to and the degree of protection has been checked.

- Secure the keyway for the test run without output elements.
- Do not take monitoring and protective devices out of service.
- Check the correct direction of rotation of the drive system when disengaged. During this check, listen for unusual grinding noises.

- For gearboxes with backstop:
Check the direction of rotation of the gearbox.
Check the minimum speed (see operating instructions for the backstop).
- For brake motors:
Check the proper functioning of the brake.
In the event of a brake malfunction, observe the information regarding remedial measures in the operating instructions.

8.3 Operation

- Monitor the drive system regularly during operation.
- Shut down the drive system if increased temperatures, unusual noises or vibrations are detected.
Establish the cause of the malfunction.
Eliminate the fault (if necessary, consult the manufacturer).

9 Maintenance

9.1 Important notes



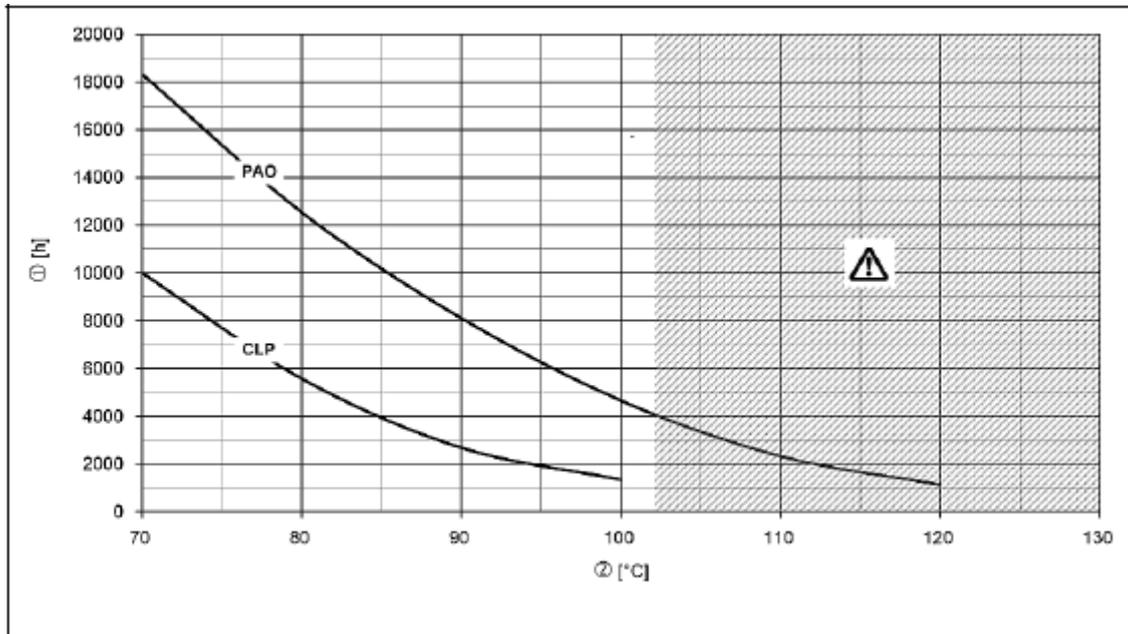
DANGER DUE TO ELECTRICAL CURRENT

The power supply to the motor must be disconnected before starting routine maintenance, cleaning or servicing work.

9.2 Maintenance intervals

Maintenance interval		Check	Maintenance work
After [Operating hours]	At the latest after [Years]		
Regularly at more frequent intervals		Ventilation unit	Check operability.
800 (recommended)	-	-	First oil change after initial commissioning:
See the following diagram		-	Further oil changes:
3000	0.5	Check all surfaces for defects in the paintwork and corrosion damage.	Repair any damage. Reapply protective coating.
		Check seals.	In the event of leakage, change seals and roller bearing grease.
		Check clutch backlash.	
6000	1	Regrease	Grease all roller bearings required for relubrication.
	3	Check backstop for buffing marks on the sprag and raceways (noticeable indentations)	In the case of increased wear, replace the backstop, otherwise refill grease.
25000	5	-	General Overhaul Send the complete drive to an authorised Premium Stephan service centre.

Oil Change Intervals



- Oil change interval in operating hours PAO Synthetic oil
- Oil sump continuous temperature CLP Mineral oil
- Temperature limit range
Consultation with the manufacturer required



NOTE:

Use clean, fresh oil from clean containers. Avoid abraded material and water entering the lubrication system. The water content must remain below 0.05 %. When changing the oil, wash out the housing with suitable cleaning agents and remove remains of old oil.

Size 2 features lifetime lubrication, no oil change necessary.

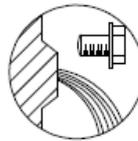
In the event of a visible leak, the drive unit must be stopped and the affected seals renewed even if the service interval time has not been reached.

9.3 Oil change

Drain oil

The drive system must be at operating temperature.

1. Shut down the drive system.
2. Remove the breather element.
 - Labelling on the gearbox:
3. Open the oil drain plug carefully.
 - Labelling on the gearbox:
 - Be careful when draining off the warm oil.
 - Use suitable containers.



4. Dispose of the used oil in accordance with environmental protection regulations.
5. Reinsert the oil drain plug.

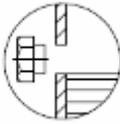
Fill oil

1. Shut down the drive system.
2. Remove the oil filler plug on the gearbox.
 - Labelling on the gearbox:
3. Add the oil quantity indicated on the name plate without any air pockets (bubbles).
 - The value given is a guide value!
 - Check the correct oil quantity on the oil level monitoring element:
 - Should bubbles start to form, wait for the gas to release.
 - **Then re-check the oil level.**
4. Reinsert the oil filler plug.
5. Reinstall the breather element.
 - **Recheck the oil level**



NOTE:

The drive system must be shut down in order to check the oil level.

	Oil level monitoring element		
	Oil level screw plug	Oil inspection glass	Oil Level Glass
Labelling			
Correct fill level	Bottom-edge threaded hole	Middle inspection glass	Red marking

9.3.1 Oil Quantity



NOTE

All oil quantity specifications are guideline values!

Oil filling quantities for 3-stage helical bevel gearboxes

Type	Mounting position					
	1	2	3	4	5	6
	Litres	Litres	Litres	Litres	Litres	Litres
SK2.	0.6	2.1	1.9	2	1.7	1.2
SK3.	1.1	3.7	3.7	4	3.6	2.5
SK4.	2.4	6.7	5.5	5	5.7	4
SK5.	4	11.4	9	9	9	8
SK6.	5.5	21	15	12	12	12
SK7.	7.5	29	25	20	20	20
SK8.	13.5	46	39	32	32	32
SK9.	23	78	67	55	55	55
Figures in [litres] All oil quantity specifications are guide values; observe Chapters 9 and 10.						

Oil Filling Quantities for 4-Stage and 5-Stage Gear Units

Type	Mounting position					
	1	2	3	4	5	6
	Litres	Litres	Litres	Litres	Litres	Litres
SK2.C1.B	0,6 + 0,45	2,1 + 1,2	1,9 + 0,85	2 + 1,4	1,7 + 0,8	1,2 + 0,85
SK3.C1.B	1,1 + 0,45	3,7 + 1,2	3,7 + 0,85	4 + 1,4	3,6 + 0,8	2,5 + 0,85
SK4.C1.B	2,4 + 0,45	6,7 + 1,2	5,5 + 0,85	5 + 1,4	5,7 + 0,8	4 + 0,85
SK5.C1.B	4 + 0,45	11,4 + 1,2	9 + 0,85	9 + 1,4	9 + 0,8	8 + 0,85
SK6.C3.B	5,5 + 0,45	21 + 1,2	15 + 0,85	12 + 1,4	12 + 0,8	12 + 0,85
SK7.C3.B	7,5 + 1,4	29 + 4,5	25 + 4	20 + 4,9	20 + 2,7	20 + 2,7
SK8.C3.B	13,5 + 1,4	46 + 4,5	39 + 4	32 + 4,9	32 + 2,7	32 + 2,7
SK9.C3.B	23 + 1,4	78 + 4,5	67 + 4	55 + 4,9	55 + 2,7	55 + 2,7
Figures in [litres] All oil quantity specifications are guide values; observe Chapters 9 and 10.						

9.3.2 Position of the oil lubricant attachments

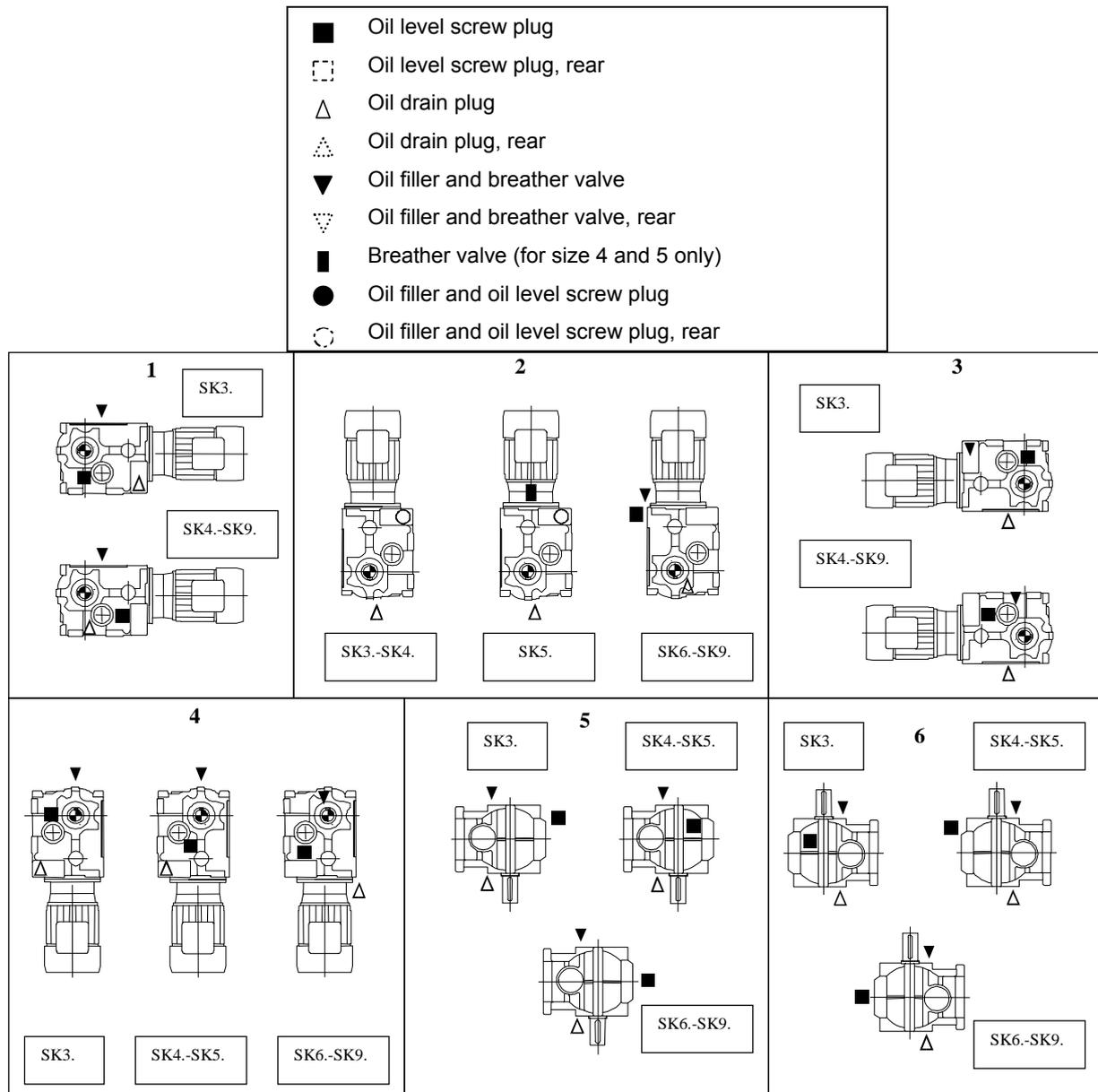
i NOTE

The positions of lubricant attachments depend on the mounting position of the gear unit and are shown in the following illustrations as a function of the mounting positions.

SK..26.

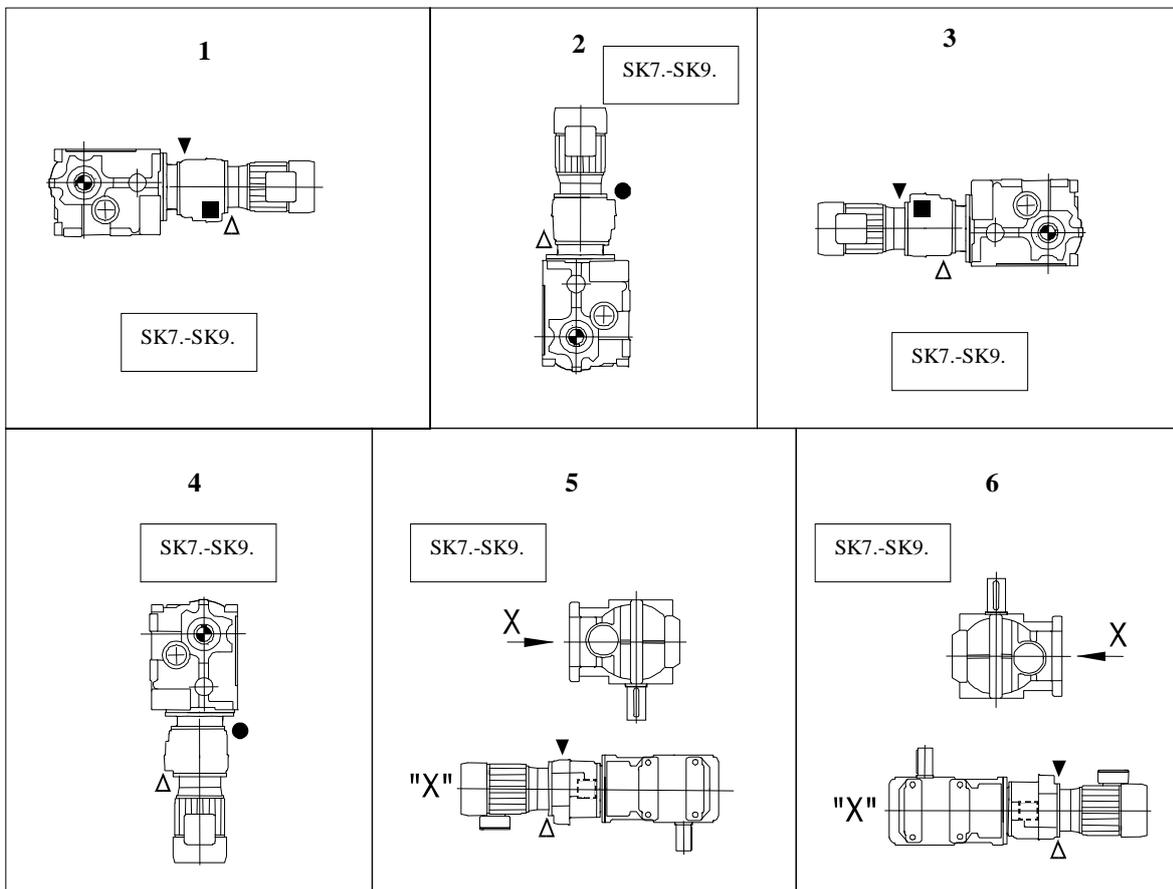
i NOTE

These gear units feature lifetime lubrication and have no oil screw plugs.
Gearboxes SK..36. to SK..96.



Gearboxes SK..36. to SK..96. with preliminary stage SI..36.

■	Oil level screw plug
□	Oil level screw plug, rear
△	Oil drain plug
▽	Oil drain plug, rear
▼	Oil filler and breather valve
▽	Oil filler and breather valve, rear
■	Breather valve (for size 4 and 5 only)
●	Oil filler and oil level screw plug
○	Oil filler and oil level screw plug, rear

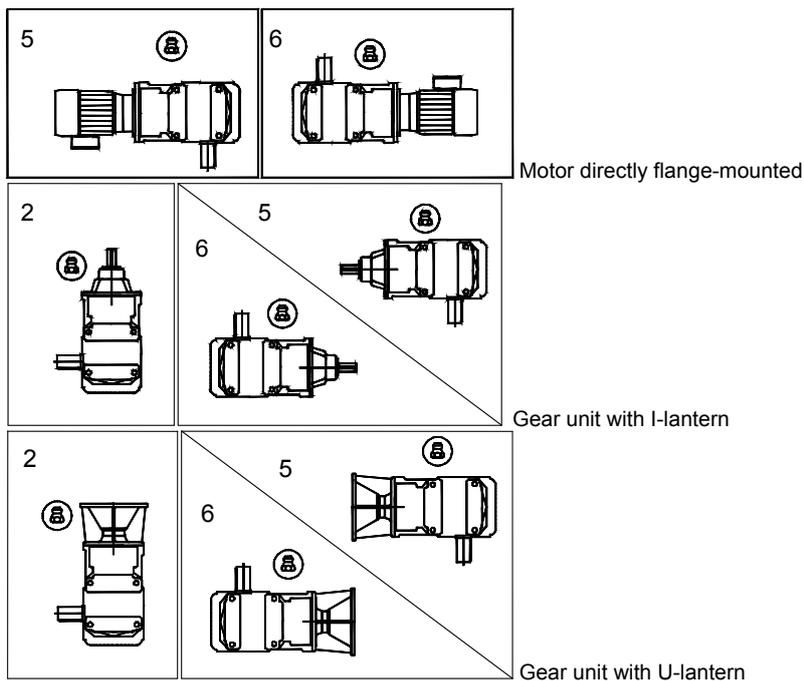




MAINTENANCE

Regreasing Facility for Roller Bearing Grease

 Roller bearing grease regreasing facility



MAINTENANCE

9.4 Greasing and Regreasing

9.4.1 General

On request, the drive unit can be equipped with regreasing facilities at the roller bearings that do not run in the oil bath. To achieve a longer service life, regreasing is necessary after 8000 hours of operation, or after 1 year at the latest.

9.4.2 Regreasing roller bearings

Regreasing is necessary only with the gear unit in a vertical mounting position with the motor at the top. The roller bearings are packed in the factory with Aral H grease. Only roller bearing greases approved by Premium Stephan are to be used for regreasing.



MAINTENANCE

9.4.3 Regreasing for gearboxes with regreasing devices

The following table gives the required regreasing quantities for gearboxes that are equipped with a regreasing device. It must be filled with the specified quantities of grease after 8000 hours of operation or after one year at the latest.

9.4.4 Regreasing quantities, bearings

Type	Intermediate shaft Three-stage	Output shaft
SK2.	3	6
SK3.	4	8
SK4.	5	11
SK5.	8	14
SK6.	15	18
SK7.	22	25
SK8.	30	35
SK9.	38	46
Gear unit regreasing quantities [g]		



MAINTENANCE

9.4.5 Regreasing for gearbox with IEC D flange motor and coupling lantern

9.4.5.1 General

Regreasing is necessary only with the gear unit in a vertical mounting position with the motor at the top. The roller bearings must be filled with a lithium-saponified grease at the factory. Only roller bearing greases approved by Premium Stephan are to be used for regreasing. On the use of a backstop, the lantern is packed in the factory with a lifetime lubrication comprising Petamo GY 193 grease.

The position of the optional grease nipple can be found in the chapter "Principle Sectional Drawings and Spare Parts Lists".

9.4.5.2 Regreasing

The table below indicates the required regreasing, depending on the gearbox sizes for the adapter (U – lantern). Regreasing of the adapter (U - lantern) is required after 6000 hours of operation or after one year at the latest.

Grease quantity [g]	Motor size, IEC and NEMA												
	63	71	80	90	100	112	132	160	180	200	225	250	280
	56		143 / 145		182 / 184		213 / 215		254 / 256		284 / 286		324 / 326
12	SI1-5 / SP1-5 / SK2-6												
15							SI2-5 / SP3-5 / SK3-6						
15							SI6-9 / SP6-8 / SK7-9						
30							SI6-9 / SP6-8 / SK7-9						



MAINTENANCE

9.4.6 Regreasing for gearbox with free drive shaft (I-lantern)

9.4.6.1 General

Regreasing is necessary only with the gear unit in a vertical mounting position with the motor at the top. The roller bearings must be filled with a lithium saponified grease at the factory. Only roller bearing greases approved by Premium Stephan are to be used for regreasing. On the use of a backstop, the lantern is packed in the factory with a lifetime lubrication comprising Petamo GY 193 grease.

The position of the optional grease nipple can be found in the chapter “Principle Sectional Drawings and Spare Parts Lists”.

9.4.6.2 Regreasing

The following table gives the required regreasing depending on the gearbox sizes for the adapter (I-lantern). Regreasing of the adapter (I-lantern) is necessary after 6000 hours of operation, or after one year at the latest.

Grease quantity [g]	Free Drive Shaft I			
	Ø19 x 40	Ø28 x 60	Ø38 x 80	Ø48 x 110
	Ø0,625“ x 1,5“	Ø1,125“ x 2,375“	Ø1,375“ x 3,125“	Ø2,125“ x 4,25“
12	SI1-3 / SP1-3 / SK2-4 Alternative : SI4-5 / SP4-5 / SK5-6			
15			SI4-5 / SP4-5 / SK5-6 Alternative : SI6-9 / SP6-8 / SK7-9	
30			SI6-9 / SP6-8 / SK7-9	

9.5 Choice of lubricant:



NOTE

We would like to point out that the recommendation of an oil/grease or inclusion in a Premium Stephan lubricant table does not imply that Premium Stephan assumes any liability at all for this lubricant, or for damage from incompatibility with the material being used.

9.5.1 Lubricant



NOTE

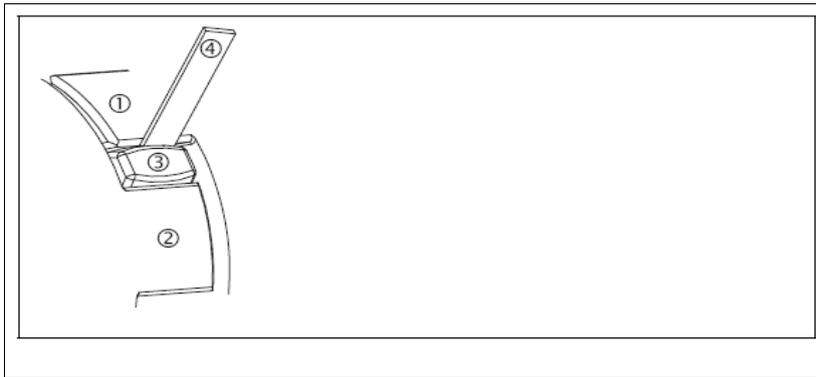
The lubricants given in the lubricant table are acceptable for Premium Stephan drive units. Special lubricants must be used for long-term storage, for example, or for special operating conditions. The respective lubricants are available for a surcharge.

Take the lubricant table legend below into account when choosing a lubricant.

CLP	Mineral oil
CLP PG	Poly glycol oil
CLP HC	Synthetic hydrocarbons or poly polyalphaolefin oil
CLP E	Ester oil (Water Hazard Classification 1)

Temperature Range			ISO VG class									
min ----- max		DIN (ISO)										
-10°C	Standard 16-56	40°C	CLP	VG 320	Degol BG 320 plus	BP Energol GR-XP 320	Alpha SP 320 Optigear BM 320 Tribol 1100/320	Renolin CLP 320 plus	Klüber GEM 1-320N	Mobilgear 600 XP320	Goya NT 320	Shell Omala F320
	Standard 66-96											
-30°C	Special 16-56	40°C	CLP HC	VG 320	Degol PAS 320	BP Energol EP-XF 320	Optigear Symthetik X320	Renolin Unisyn CLP 320	Klüber GEM 4-320N	Mobil SHC Gear 320 Mobil SHC 632	ELGreco 320	Shell Omala HD320
	Special 66-96											
-20°C	Special 16-96	60°C	HCE	VG 460	Aral Eural Gear 460		Optileb GT 460		Klüberoil 4UH1-460 N			Shell Cassida Fluig GL 460
	Special 16-96					60°C		E		VG 460	Aral Degol BAB 460	
-25°C	Roller bearing gear unit	60°C	Grease as per DIN 51818	VG 2-3								

9.6 Check wear to the clutch



- Hub 1
- Ring gear
- Hub 2
- Feeler gauge

MAINTENANCE

How to check for wear to the clutch:

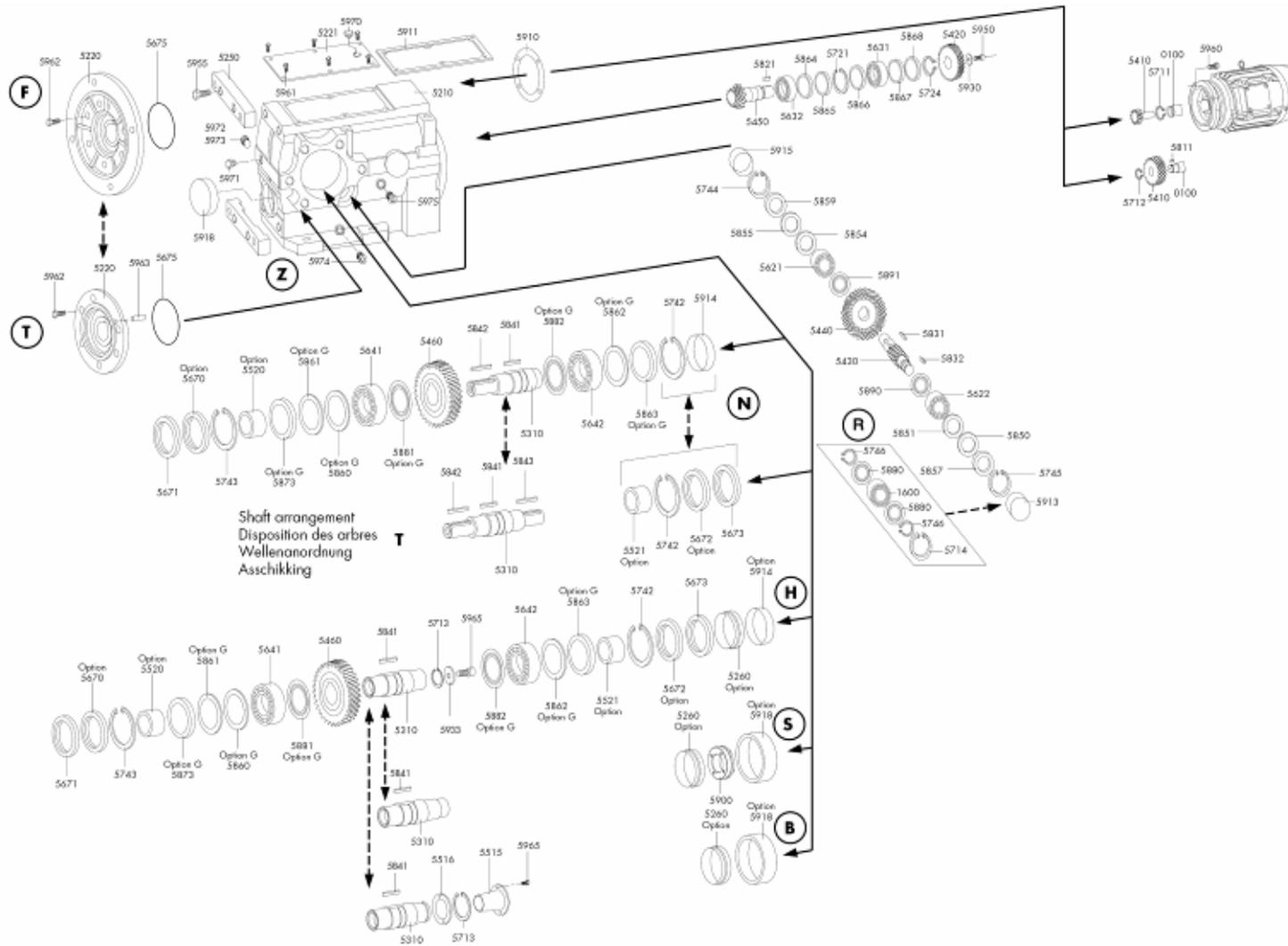
1. Open the inspection opening on the clutch housing:
 - Remove the screw plug.
2. Measure the distance between the hubs and the ring gear using a feeler gauge.
3. If the distance is greater than the value in the table, replace the ring gear.

Clutch, ROTEX®	Wear limit	Clutch, ROTEX®	Wear limit
Size	[mm]	Size	[mm]
24	3	48	4
38	3	55	5

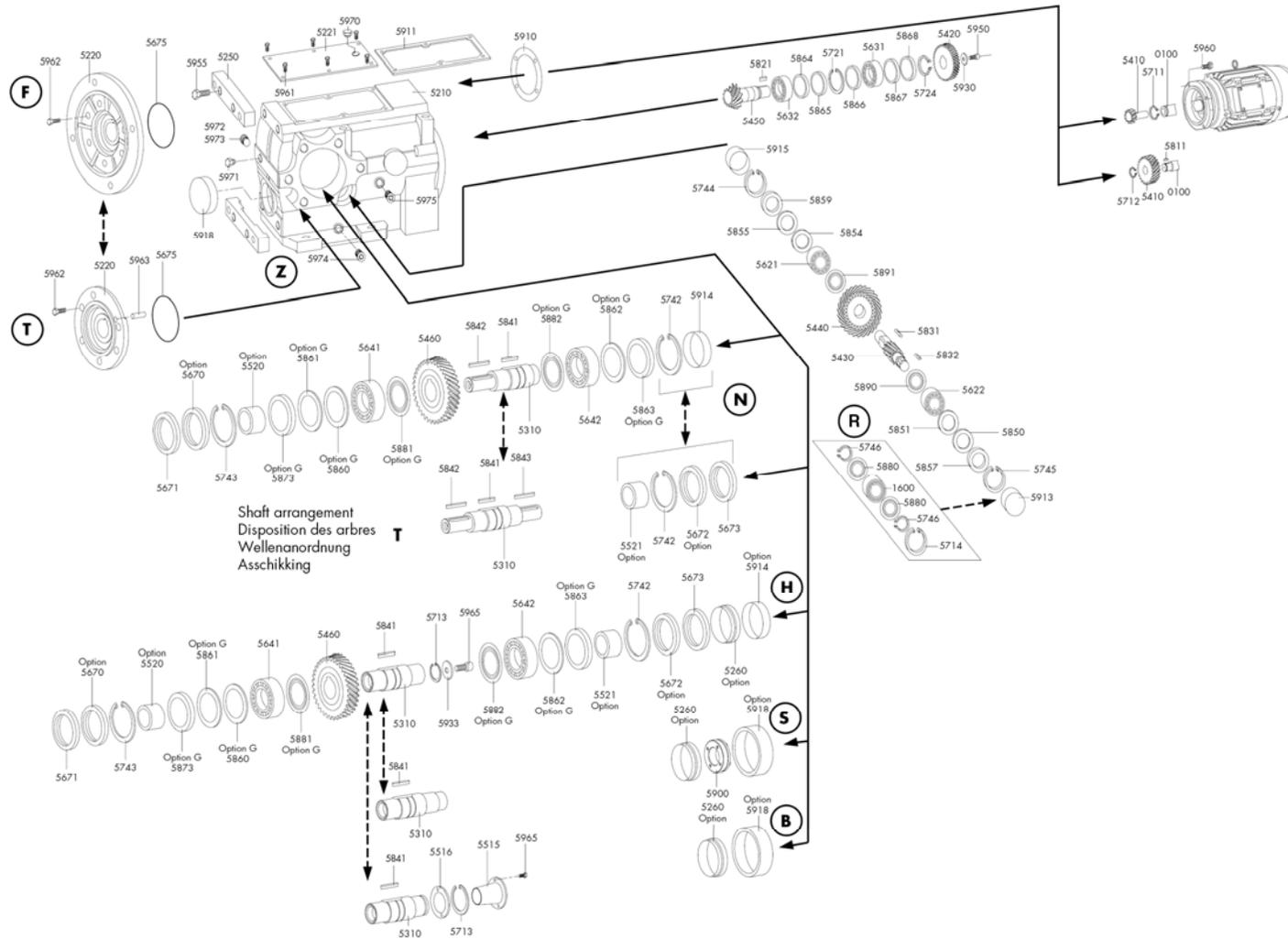
How to replace the ring gear of the clutch:

1. Unscrew the motor from the clutch housing.
2. Replace the worn-out ring gear with a new ring gear.
3. Seal the connection between the motor and clutch housing (U-mount) :
 - Use a liquid surface sealant, e.g. Loctite 510.
 - Observe the manufacturer's processing instructions.
4. Screw together the motor and gearbox.
5. Open the inspection opening on the clutch housing:
 - Remove the screw plug.
6. Visual inspection:
 - Are all clutch components correctly installed?
7. Carefully insert the screw plug.

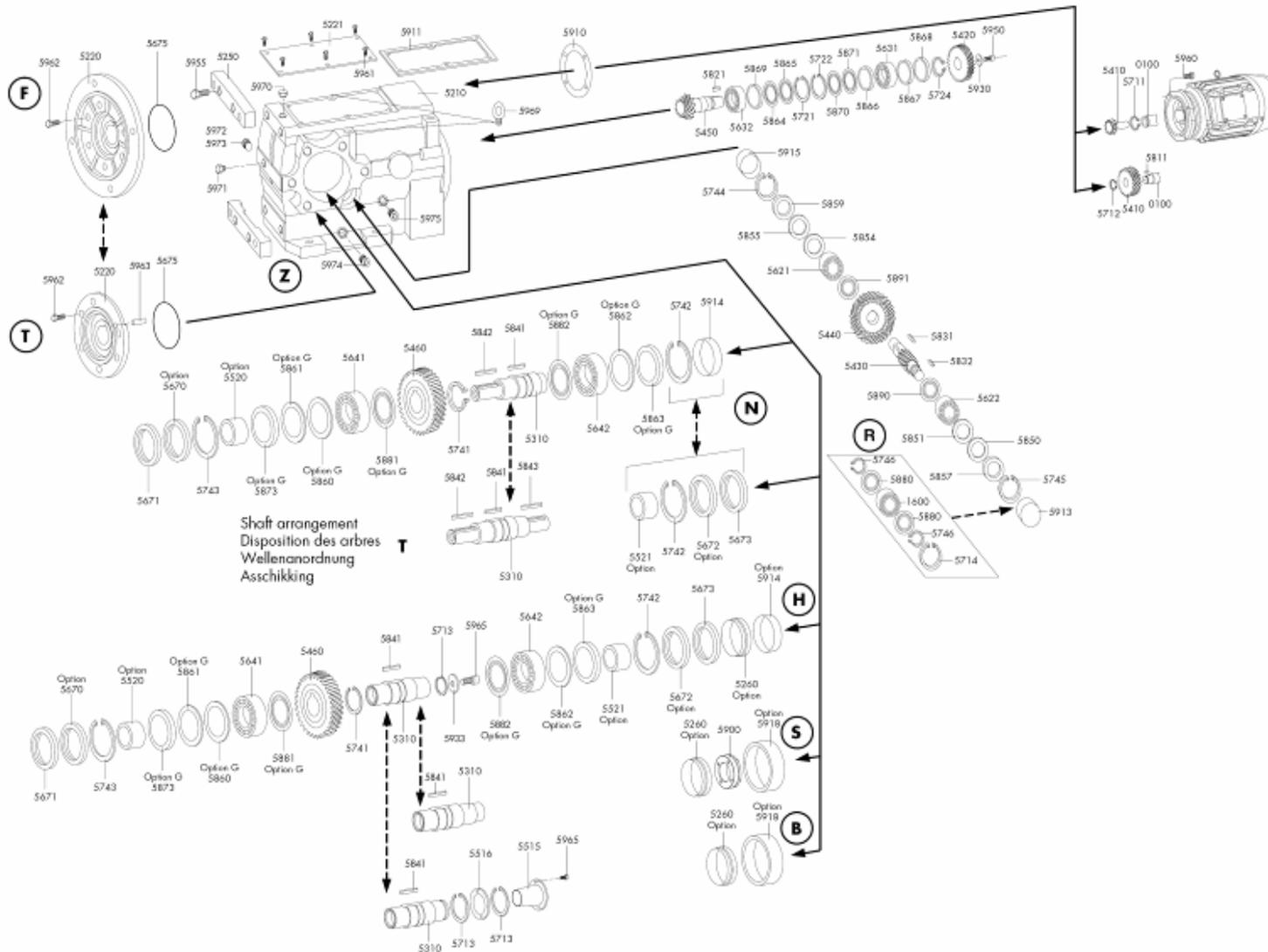
10.2 SK..3.C - three-stage



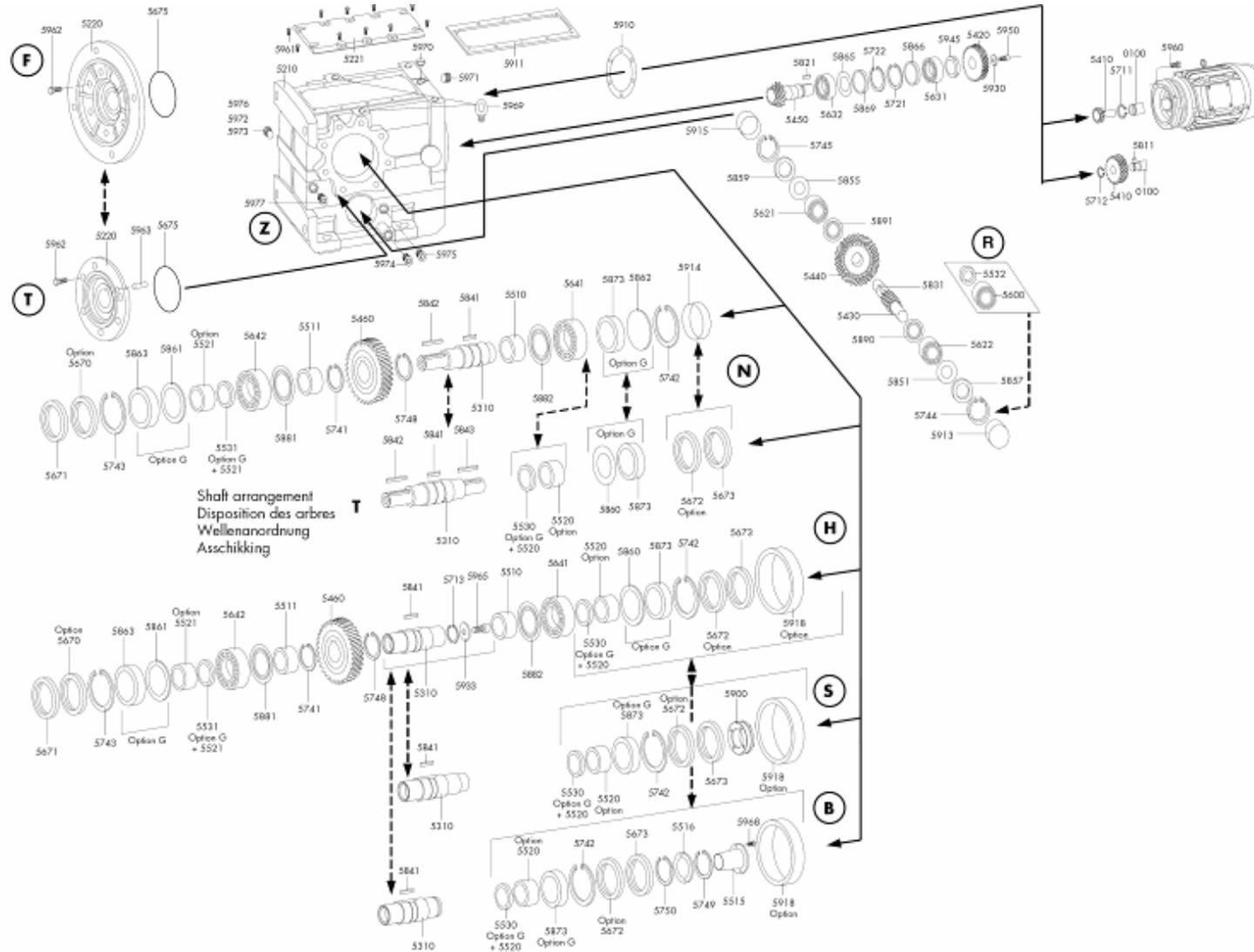
10.3 SK..4.C - three-stage



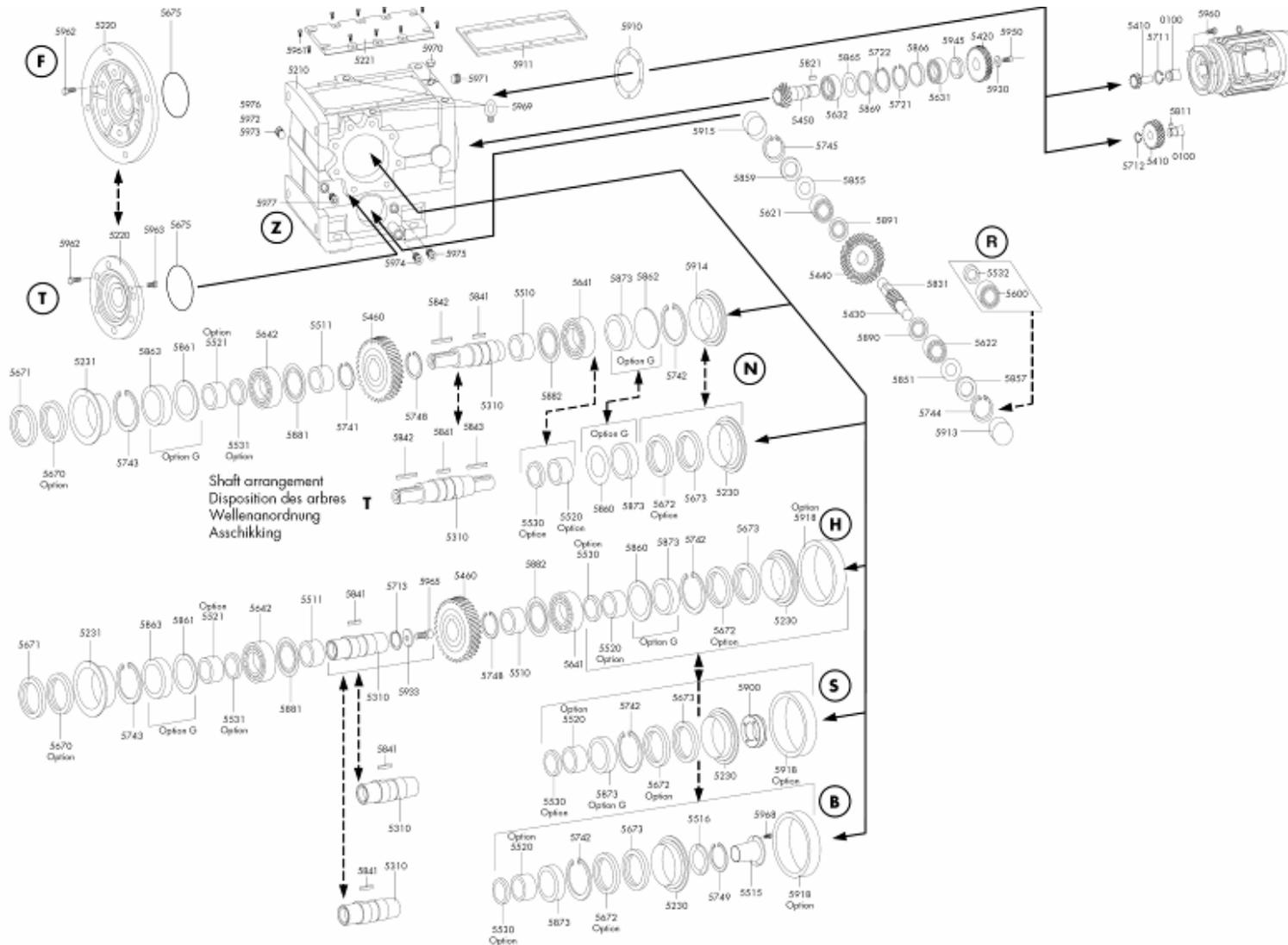
10.4 SK..5.C - three-stage



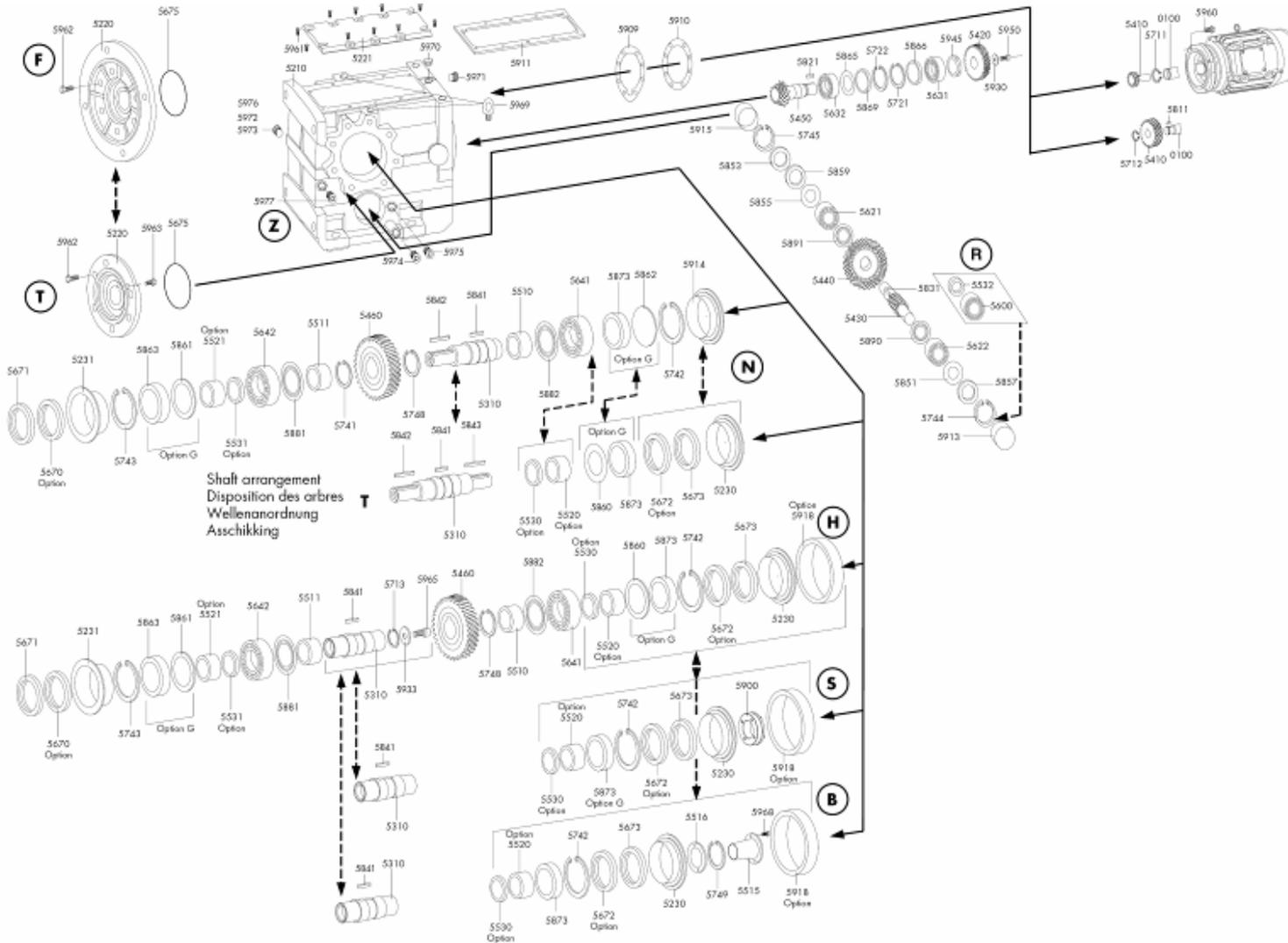
10.5 SK..6.C – three-stage



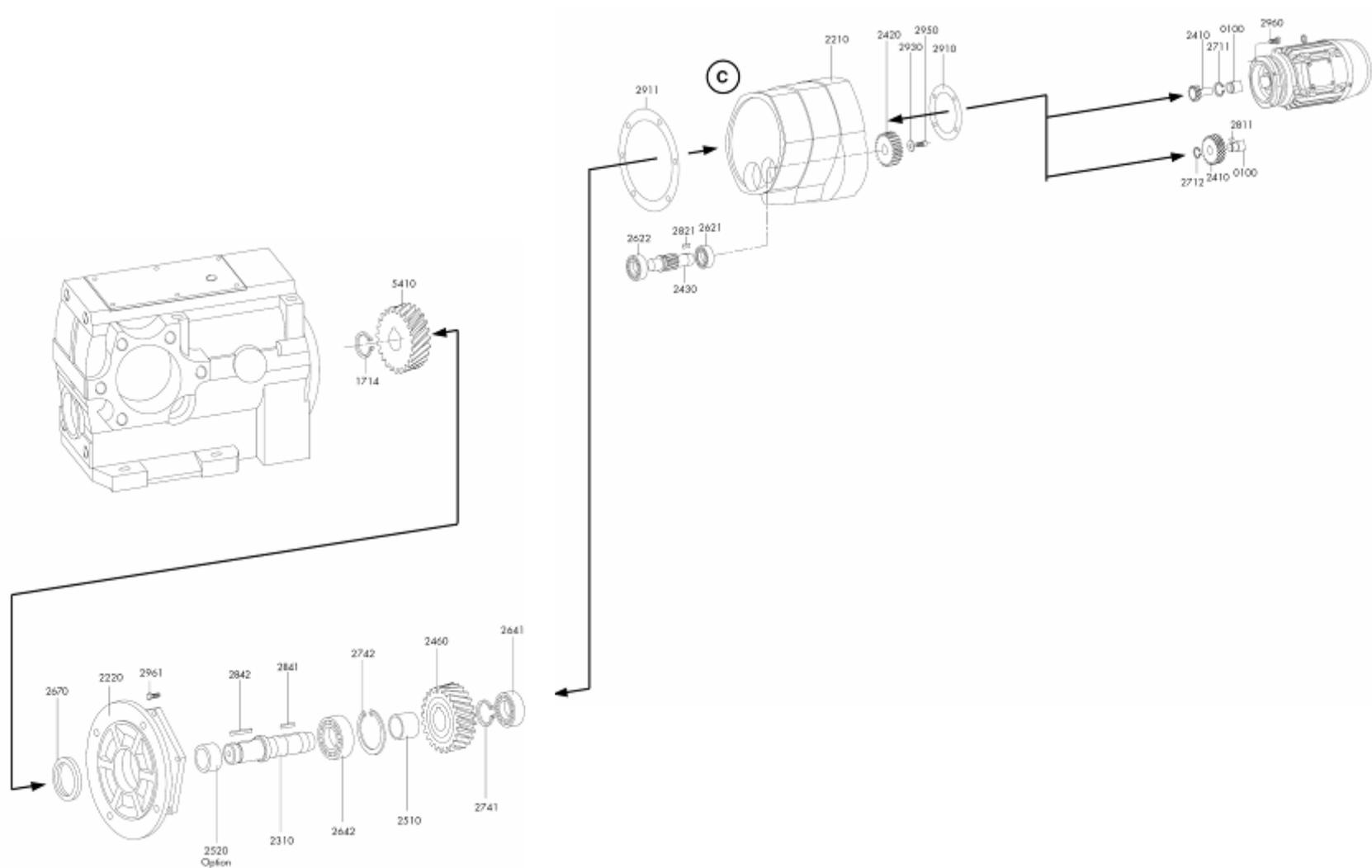
10.7 SK..8.C – three-stage



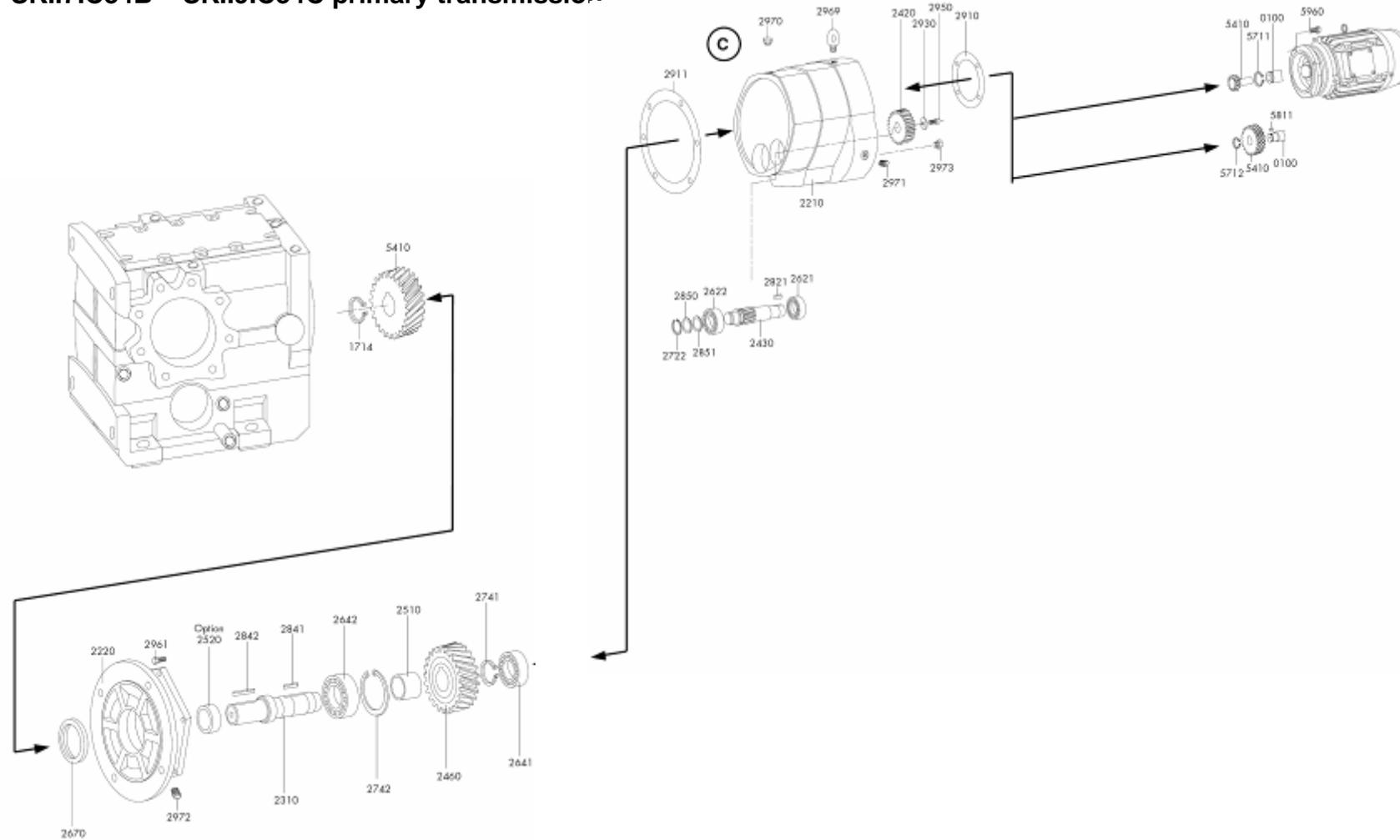
10.8 SK..9.C – three-stage



10.9 SK..2.C14B – SK..6.C14B primary transmission



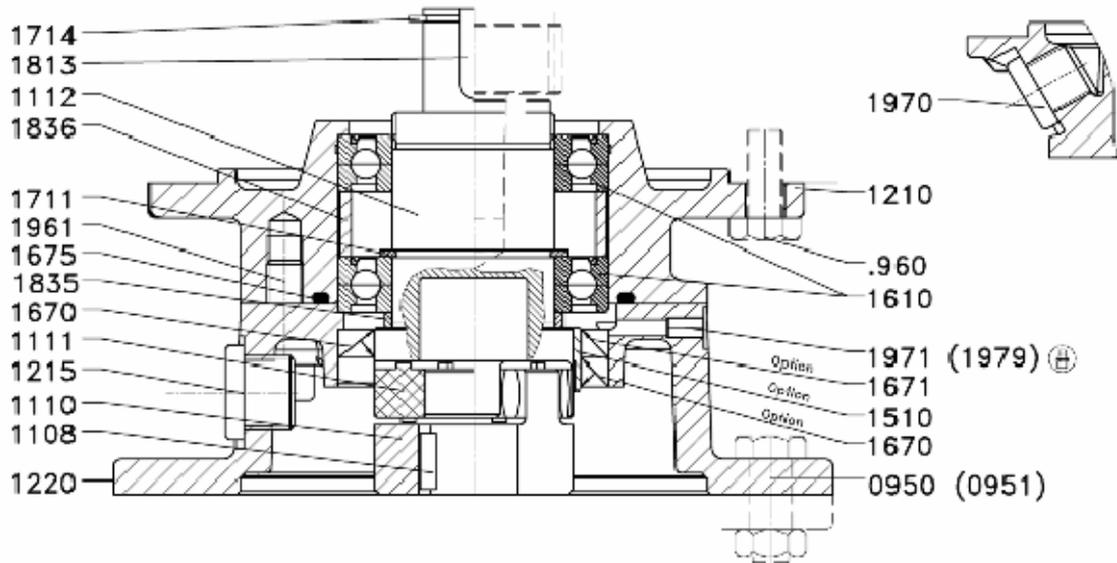
10.10 SK..7.C34B – SK..9.C34C primary transmission



10.11 SI Positions – Numbers

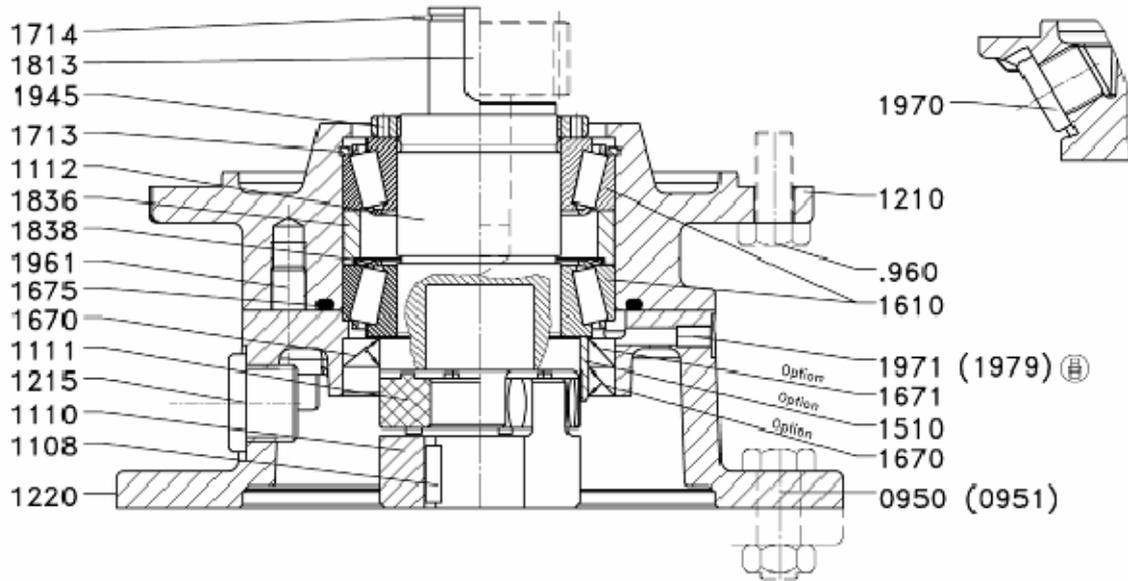
SK	Some spare parts are only available in "kits". We recommend contacting us.		
Position number	Description	Position number	Bearings and seals
0100	Motor	5621	Bearing
5210	Housing	5622	Bearing
5220	Flange (B5 or B14)	5631	Bearing
5221	Cover	5632	Bearing
5231 / 5230	Ring	5641	Bearing
5310	Output shaft	5642	Bearing
5410	pinion Z1	5671	Rotary shaft seal
5420	Wheel Z2		
5430	Pinion shaft Z3		
5440	Wheel Z4		
5450	Pinion shaft 25		
5460	Wheel Z6		
5510	Support ring		
5515 / 5516	Taper bushing		
5520 / 5521	Bearing race (option)		
5530 / 5531	Support ring		
5600	Backstop on intermediate shaft		
5675	Sealing (O-ring)		
571.	Retaining ring		
572.	Retaining ring		
573.	Retaining ring		
574.	Retaining ring		
5811	Feather key		
5821	Feather key		
5831	Feather key		
584.	Feather key		
5850 /5860 /5870	Support ring		
5851	Shim ring		
588. / 589.	Flinger		
5900	Shrink disc		
5910	Gasket		
5911	Gasket		
5913 / 5914 / 5915	End cover		
5918	Protection hood for hollow shaft		
5930	Washer		
5945	Shaft nut		
5950	Pin or nut		
596.	Pin or nut		
597.	Screw		

10.12 Gearbox with IEC D flange-mounted motor and coupling lantern (U-lantern) SI1-5 / SP1-5 / SK2-6 # Motor IEC 63...90 / Nema 56...145, SI1 / SP1-2 / SK2 # Motor IEC 100...112 / Nema 56...184

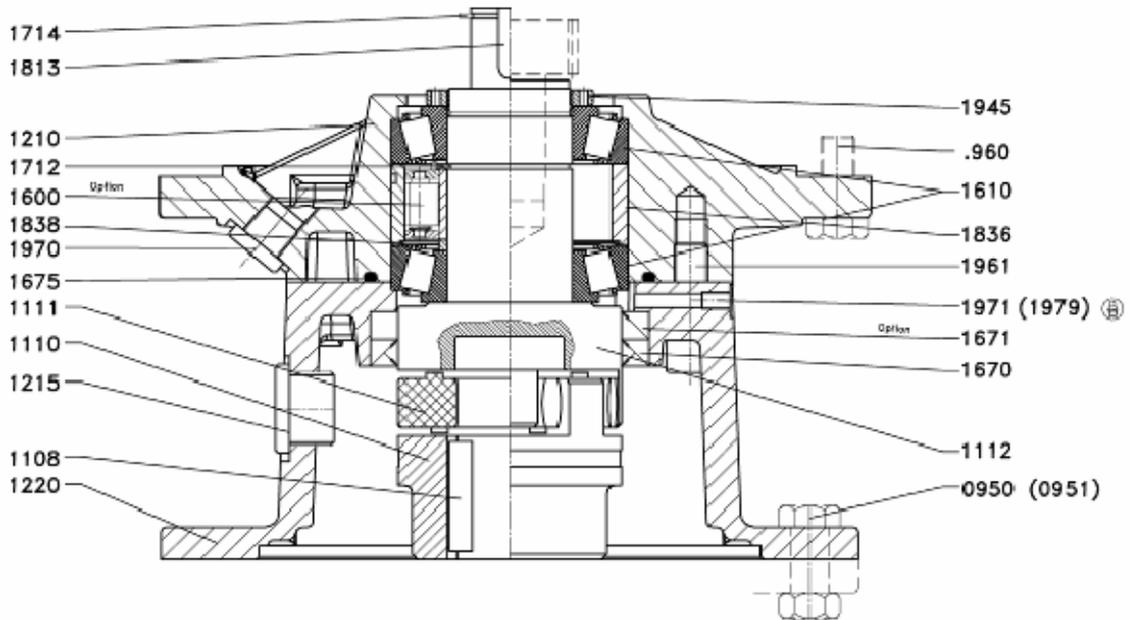


Coupling size: **24**

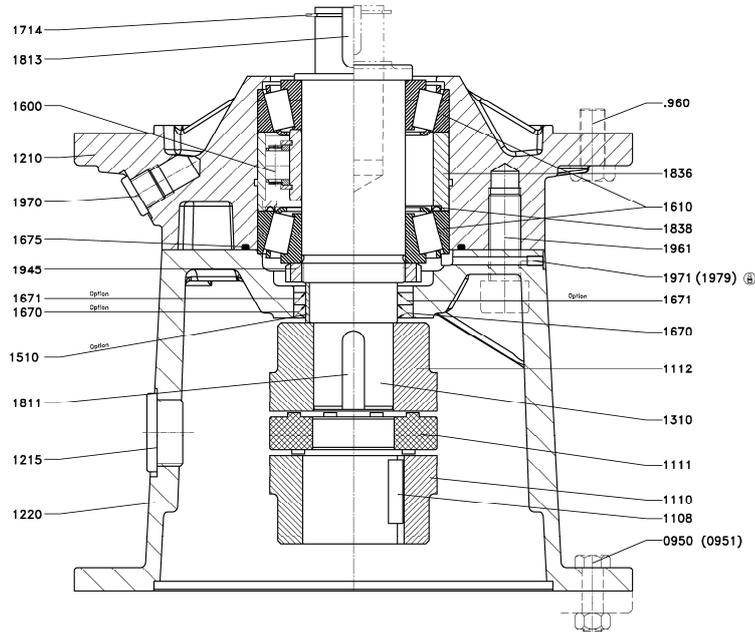
Item No.	Parts List	DIN	BG. Item No.
0950	Screw motor fastening		
0951	nut, motor fixing		
_960	Screw rear frame fastening		
1108	Parallel key, coupling motor		1200
1110	Coupling half, motor side		1200
1111	Dog, flexible element		1200
1112	coupling half gearside		1100
1210	Lantern/frame		
1215	Oil plug		1200
1220	Cover/flange/adapter		1200
1510	Bushing, high speed shaft (option)		1665
1610	Bearing, drive shaft	6009Z.C3	1100
1670	oil seal, high speed shaft	BASL NBR 55x75x8	
1670	Oil seal, high speed shaft (option)	BASL Viton 60x75x8	1665
1671	Oil seal, high speed shaft (option)	BA Viton 60x75x8	1665
1675	o-ring, flange	NBR 80x4	1200
1711	Retaining ring	DIN471	1100
1714	circlip, pinion Z1	DIN471	
1813	Key, pinion Z1		
1835	Support ring		1100
1836	Spacer ring, shaft unit		1100
1961	Screw cover/flange		1200
1970	Oil plug/breather		
1971	Oil plug		1200
1979	Lubricating nipple		1200

SI2-5 / SP3-5 / SK3-6 # Motor IEC 100...112 / Nema 182-184

Coupling size: 24

Item No.	Parts List	DIN	BG. Item No.
0950	Screw motor fastening		
0951	Nut, motor fixing		
_960	Screw rear frame fastening		
1108	Parallel key, coupling motor		1200
1110	Coupling half, motor side		1200
1111	Dog, flexible element		1200
1112	coupling half gear-side		1100
1210	Lantern/frame		
1215	Oil plug		1200
1220	Cover/flange/adapter		1200
1510	Bushing, high speed shaft (option)		1665
1610	Bearing, drive shaft	32009	1100
1670	oil seal, high speed shaft	BASL NBR 55x75x8	
1670	Oil seal, high speed shaft (option)	BASL Viton 60x75x8	1665
1671	Oil seal, high speed shaft (option)	BA Viton 60x75x8	1665
1675	o-ring, flange	NBR 80x4	1200
1713	Retaining ring		1100
1714	Circlip, pinion Z1		
1813	Key, pinion Z1		
1836	Spacer ring, shaft unit		1100
1838	Compression spring		1100
1945	Shaft nut, shaft unit		1100
1961	Screw cover/flange		1200
1970	Oil plug/breather		
1971	Oil plug		1200
1979	Lubricating nipple		1200

SI2-5 / SP3-5 / SK3-6 # Motor IEC 132...180 / Nema 213...286, SI6-9 / SP6-8 / SK7-9 # Motor IEC 100...160 / Nema 182...256

Coupling size: 38

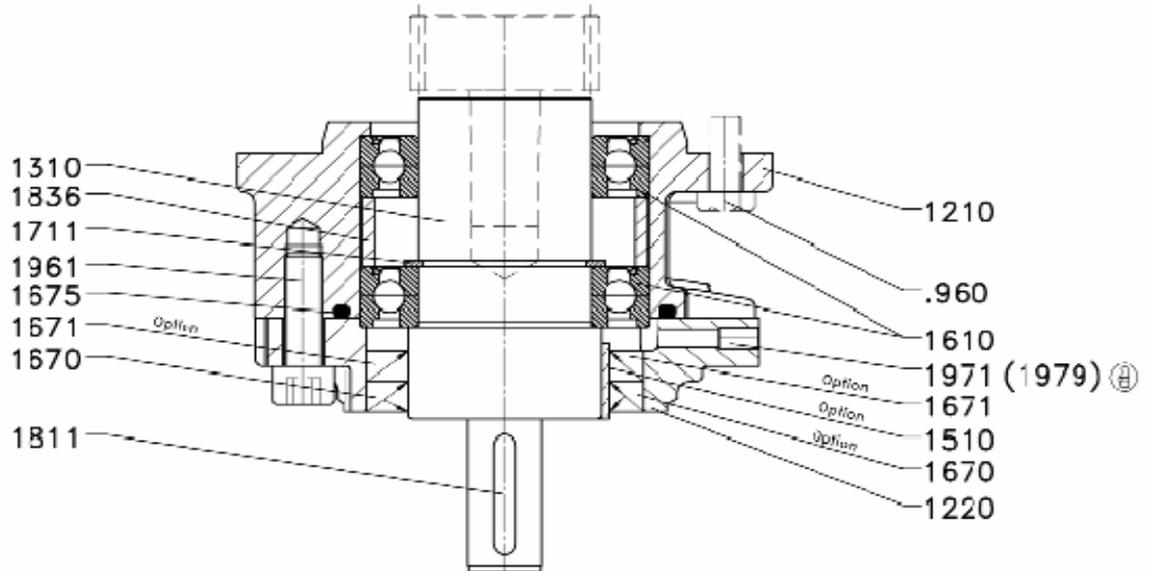
Item No.	Parts List	DIN	BG. Item No.
0950	Screw motor fastening		
0951	Nut, motor fixing		
_960	Screw rear frame fastening		
1108	Parallel key, coupling motor		1200
1110	Coupling half, motor side		1200
1111	Dog, flexible element		1200
1112	Coupling half gear-side		1100
1210	Lantern/frame		
1215	Oil plug		1200
1220	Cover/flange/adapter		1200
1600	Backstop kit		1100
1610	Bearing, drive shaft	30209	1100
1670	oil seal, high speed shaft	BASL Viton 80x100x10	
1671	Oil seal, high speed shaft (option)	BA Viton 80x100x10	1665
1675	O-ring, flange	NBR 92x4	1200
1712	Retaining ring		1100
1714	circlip, pinion Z1		
1813	Key, pinion Z1		
1836	Spacer ring, shaft unit		1100
1838	Compression spring		1100
1945	Shaft nut, shaft unit		1100
1961	Screw cover/flange		1200
1970	Oil plug/breather		
1971	Oil plug		1200
1979	Lubricating nipple		1200

SI6-9 / SP6-8 / SK7-9 # Motor IEC 180...280 / Nema 284...326

Coupling size: 48/55

Item No.	Parts List	DIN	BG. Item No.
0950	Screw motor fastening		
0951	Nut, motor fixing		
_960	Screw rear frame fastening		
1108	Parallel key, coupling motor		1200
1110	Coupling half, motor side		1200
1111	Dog, flexible element		1200
1112	Coupling half gear-side		1300
1210	Lantern/frame		
1215	Oil plug		1200
1220	Cover/flange/adapter		1200
1310	High speed shaft		1300
1510	Bushing, high speed shaft (option)		1665
1600	backstop kit		1300
1610	Bearing, drive shaft	32213	1300
1670	Oil seal, high speed shaft	BASL NBR 55x75x8	
1671	Oil seal, high speed shaft (option)	BA NBR 55x75x8	
1670	Oil seal, high speed shaft (option)	BASL Viton 60x75x8	1665
1671	Oil seal, high speed shaft (option)	BA Viton 60x75x8	1665
1675	O-ring, flange	NBR 130x4	1200
1714	circlip, pinion Z1		
1811	Key, high-speed shaft		1200
1813	Key, pinion Z1		
1836	Spacer ring, shaft unit		1300
1838	Compression spring		1300
1945	Shaft nut, shaft unit		1300
1961	Screw cover/flange		1200
1970	Oil plug/breather		
1971	Oil plug		1200
1979	Lubricating nipple		1200

10.13 Gearbox with free drive shaft (I-lantern)

SI1 / SP1-2 / SK2 # drive shaft $\varnothing 19 \times 40$ / input shaft $\varnothing 0,625'' \times 1,5''$ Alternative : SI2-3 / SP3 / SK3

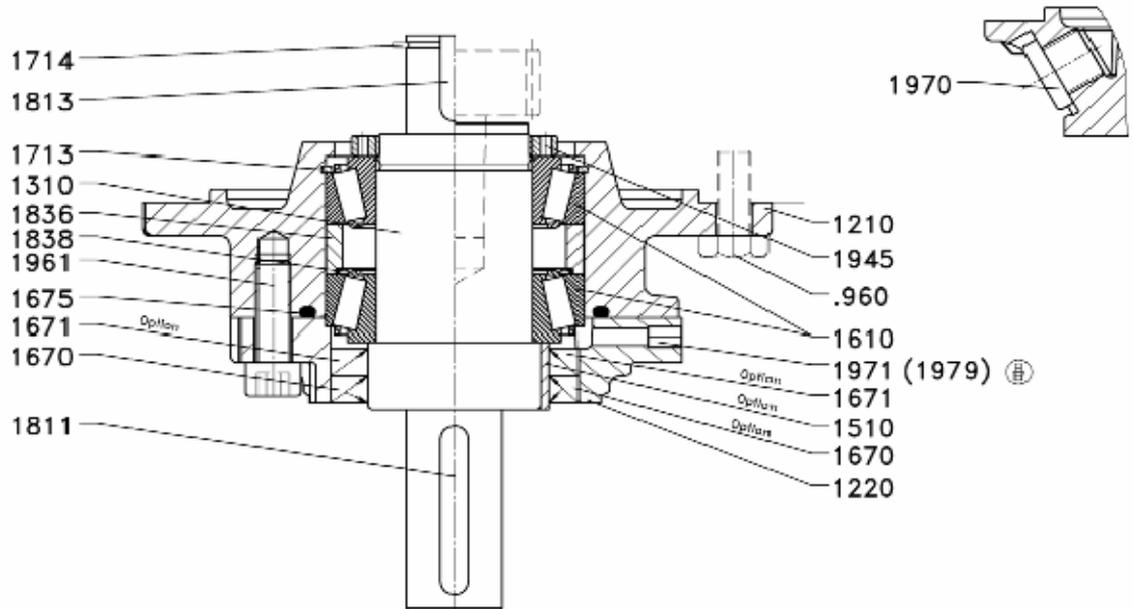


Motor IEC 63-112 / Nema 56-184

Alternative: Motor IEC 63-90 / Nema 56-145

Item No.	Parts List	DIN	BG. Item No.
_960	Screw rear frame fastening		
1210	Lantern/frame		
1220	Cover/flange/adapter		1200
1310	High speed shaft		1300
1510	Bushing, high speed shaft (option)		1665
1610	Bearing, drive shaft	6009Z.C3	1300
1670	Oil seal, high speed shaft	BASL NBR 55x75x8	
1670	Oil seal, high speed shaft (option)	BASL Viton 60x75x8	1665
1671	Oil seal, high speed shaft (option)	BA NBR 55x75x8	
1671	Oil seal, high speed shaft (option)	BA Viton 60x75x8	1665
1675	o-ring, flange	NBR 80x4	1200
1711	Retaining ring	DIN471	1300
1811	Key, high-speed shaft		1300
1836	Spacer ring, shaft unit		1300
1961	Screw cover/flange		1200
1970	Oil plug/breather	Only for alternative: SI3 / SP3 / SK3	
1971	Oil plug		1200
1979	Lubricating nipple		1200

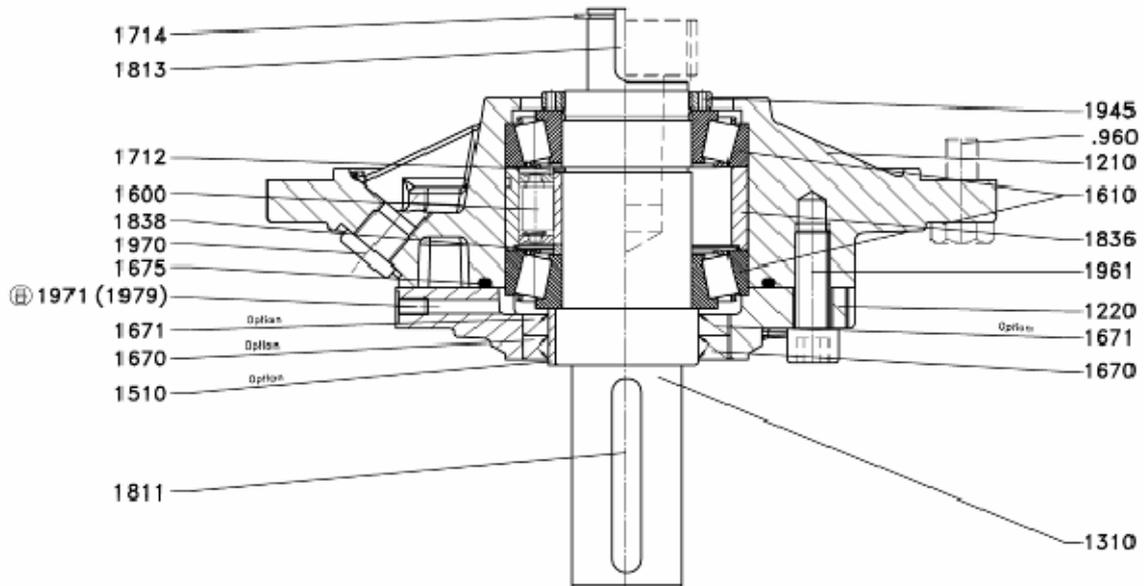
SI2-3 / SP3 / SK3-4 # drive shaft $\varnothing 28 \times 60$ / input shaft $\varnothing 1,125'' \times 2,375''$ Alternative : SI4-5 / SP4-5 / SK5-6



Motor IEC 71-160 / Nema 56-256
Alternative: Motor IEC 80-132 / 56-215

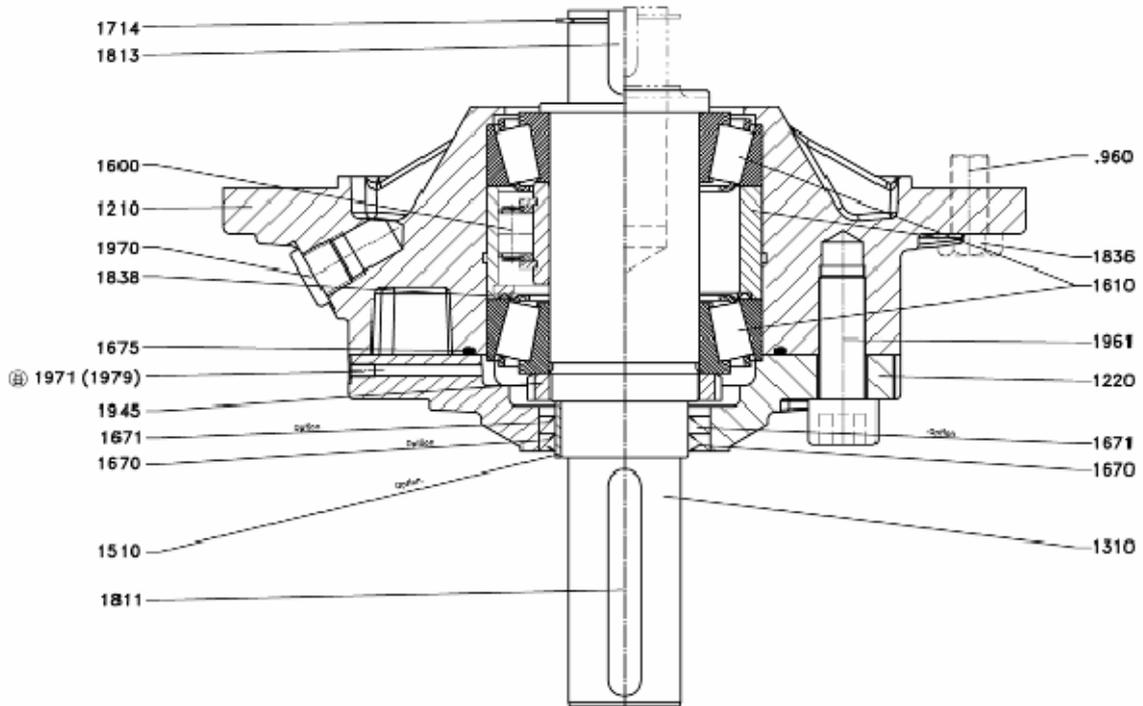
Item No.	Parts List	DIN	BG. Item No.
_960	Screw rear frame fastening		
1210	Lantern/frame		
1220	Cover/flange/adapter		1200
1310	High speed shaft		1300
1510	Bushing, high speed shaft (option)		1665
1610	Bearing, drive shaft	32009	1300
1670	oil seal, high speed shaft	BASL NBR 55x75x8	
1670	Oil seal, high speed shaft (option)	BASL Viton 60x75x8	1665
1671	Oil seal, high speed shaft (option)	BA NBR 55x75x8	
1671	Oil seal, high speed shaft (option)	BA Viton 60x75x8	1665
1675	o-ring, flange	NBR 80x4	1200
1713	Retaining ring		1300
1714	Circlip, pinion Z1		
1811	Key, high-speed shaft		1300
1813	Key, pinion Z1		
1836	Spacer ring, shaft unit		1300
1838	Compression spring		1300
1945	Shaft nut, shaft unit		1300
1961	Screw cover/flange		1200
1970	Oil plug/breather		
1971	Oil plug		1200
1979	Lubricating nipple		1200

**SI4-5 / SP4-5 / SK5-6 # drive shaft $\varnothing 38 \times 80$ / input shaft $\varnothing 1,375'' \times 3,125''$ /
Alternative : SI2,3,6-9 / SP3,6-8 / SK3,4,7-9**



Motor IEC 80-180 / Nema 56-286
Alternative: Motor IEC 80-160 / Nema 56-256

Item No.	Parts List	DIN	BG. Item No.
_960	Screw rear frame fastening		
1210	Lantern/frame		
1220	Cover/flange/adapter		1200
1310	high speed shaft		1300
1510	Bushing, high speed shaft (option)		1665
1600	backstop kit		1300
1610	Bearing, drive shaft	30209	1300
1670	oil seal, high speed shaft	BASL NBR 55x75x8	
1670	Oil seal, high speed shaft (option)	BASL Viton 60x75x8	1665
1671	Oil seal, high speed shaft (option)	BA NBR 55x75x8	
1671	Oil seal, high speed shaft (option)	BA Viton 60x75x8	1665
1675	o-ring, flange	NBR 92x4	1200
1712	Retaining ring		1300
1714	circlip, pinion Z1		
1811	Key, high-speed shaft		1300
1813	Key, pinion Z1		
1836	Spacer ring, shaft unit		1300
1838	Compression spring		1300
1945	Shaft nut, shaft unit		1300
1961	Screw cover/flange		1200
1970	Oil plug/breather		
1971	Oil plug		1200
1979	Lubricating nipple		1200

SI6-9 SP6-8 / SK7-9 # drive shaft $\varnothing 48 \times 110$ / input shaft $\varnothing 2,125'' \times 4,25''$


Motor IEC 100-280 / Nema 182-405

Item No.	Parts List	DIN	BG. Item No.
_960	Screw rear frame fastening		
1210	Lantern/frame		
1220	Cover/flange/adapter		1200
1310	High speed shaft		1300
1510	Bushing, high speed shaft (option)		1665
1600	backstop kit		1300
1610	Bearing, drive shaft	32213	1300
1670	Oil seal, high speed shaft	BASL NBR 55x75x8	
1670	Oil seal, high speed shaft (option)	BASL Viton 60x75x8	1665
1671	Oil seal, high speed shaft (option)	BA NBR 55x75x8	
1671	Oil seal, high speed shaft (option)	BA Viton 60x75x8	1665
1675	O-ring, flange	NBR 130x4	1200
1714	Circlip, pinion Z1		
1811	Key, high-speed shaft		1300
1813	Key, pinion Z1		
1836	Spacer ring, shaft unit		1300
1838	Compression spring		1300
1945	Shaft nut, shaft unit		1300
1961	Screw cover/flange		1200
1970	Oil plug/breather		
1971	Oil plug		1200
1979	Lubricating nipple		1200

11 Troubleshooting and Fault Removal

11.1 General



If the drive unit should unexpectedly malfunction and you cannot correct the fault yourself, please contact your nearest Rexnord service centre quoting the following information.

- Data on type identification plate
- Type and extent of malfunction
- Purpose for which the drive unit is used
- Time and conditions under which the malfunction occurred

Fault	Possible Cause	Removal
Drive unit doesn't run	Power supply interrupted	Check connection
	Incorrect electrical connection	Check compliance with name plate power supply
	Load too high	Reduce load. Check drive-machine assignment
Drive shaft doesn't turn when motor running	Connection elements missing or are faulty	Check attachment
	Power flow interrupted due to break in the gearbox	Inform Premium Stephan customer service
	Clutch disengaged	Engage clutch
Unusual running noise	Overload	Reduce load
	Damage in gearbox or motor	Inform Premium Stephan customer service
Temperature too high	Overload	Reduce load Check drive-unit/machine assignment
	Heat removal inadequate	Improve cold air supply Clean gearbox / motor
	Not enough lubricant	Fill lubricant according to stipulation
Unfastened fastening element	Vibrations	Avoid vibrations
Oil leak	Air removal not installed	Install air removal (screw, filter, and so on)
	Air removal soiled	Clean air removal
	Oil expansion container not installed	Install oil expansion container
	Oil plug/breather loose	Tighten oil plug/breather
	Incorrect oil level for size in use	Check size; see Chapter 8, position of the oil lubrication components
	Shaft seals defective	Replace shaft seals
	Transport damage (e.g. hairline cracks)	Check drive unit for transport damage.

12 Branch offices and distribution partners

	India Premium Transmission Limited	Tel: + 91 20 27488886	Fax: + 91 20 27450287
	Belium MGH	Tel: + 32 275 30041	Fax: + 32 275 30049
	Denmark Busck	Tel: + 45 74431 880	Fax: + 45 74431 881
	Finland VEM Motors Finland OY	Tel: + 358 40 7395808	Fax: + 358 40 7395808
	France PTP Industry	Tel: + 33 329526272	Fax: + 33 3 2941 8040
	Japan HJ Corporation	Tel: + 81 352243305	Fax: + 81 352243300
	Malaysia TOTAL DRIVE Transmissions SDN. BHD	Tel: + 60 3 5226030	Fax: + 60 3 5226090
	Norway Busck AS	Tel: + 47 64 86 0804	Fax: + 47 64 86 0801
	Spain Sociedad Industrial	Tel: + 34 943 457200	Fax: + 34 943 463356
	Sweden Busck & Co. AB	Tel: + 46 31 870909	Fax: + 46 3187 2712
	Thailand System Corporation LTD.	Tel: + 66 2 4682999	Fax: + 66 2 4683338

**When compiling these operating instructions, great care and importance was attached to ensuring the published information is correct. In view of continuous further development and improvements, we reserve the right to supply products that may vary slightly compared to the information provided in this publication.
If you have any questions or require further information on our products, please contact one of our service or sales branches.**