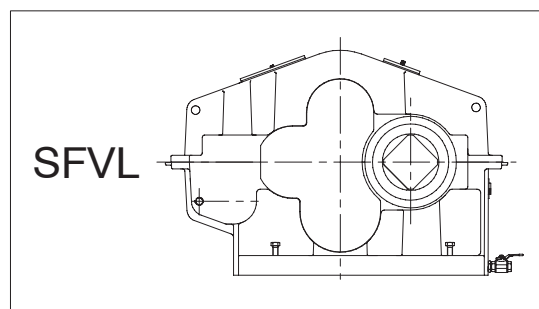
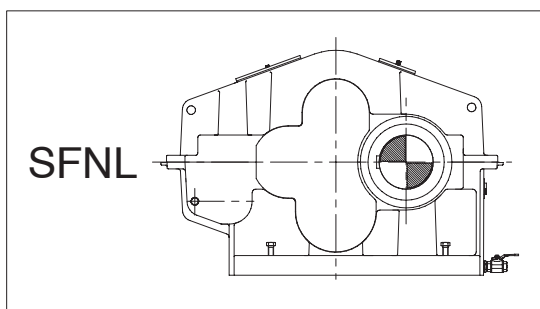
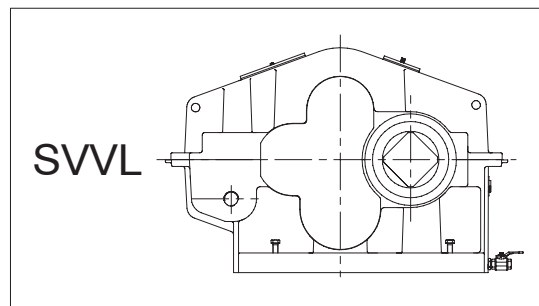
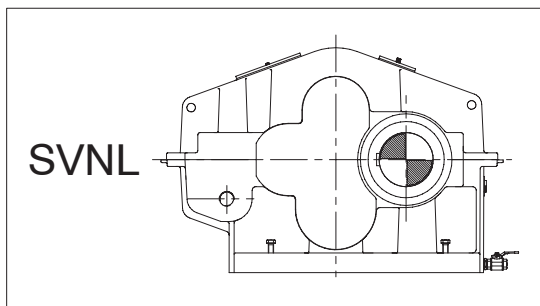
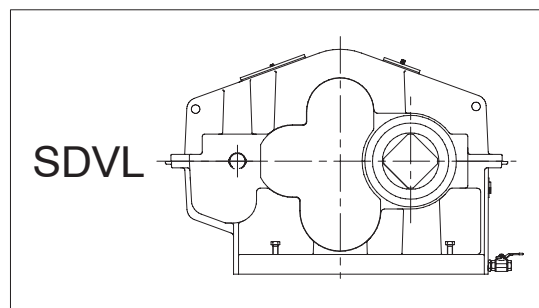
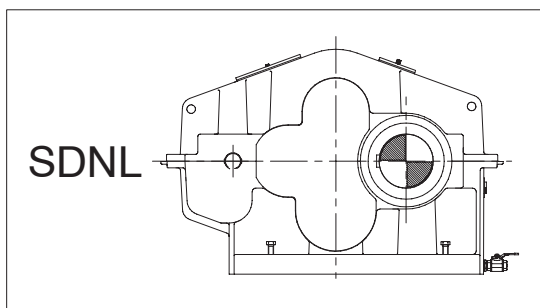


Operating Instructions

BA 5020 EN 06.07

DUORED-2 Helical Gear Units Types
SDNL, SDVL, SVNL, SVVL, SFNL, SFVL
Sizes 550 to 1200



FLENDER

Contents

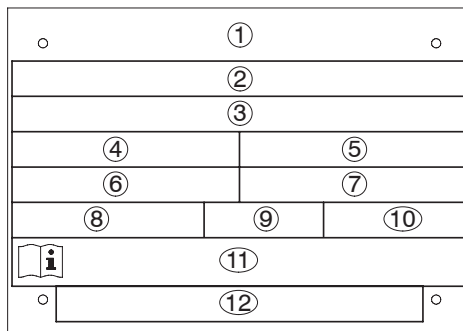
1.	Technical data	4
1.1	General technical data	4
1.1.1	Weights	5
1.1.2	Measuring-surface sound level	5
1.1.2.1	Measuring-surface sound level for helical-gear units	6
2.	General notes	7
2.1	Introduction	7
2.2	Copyright	7
3.	Safety notes	8
3.1	Proper use	8
3.2	Obligations of the user	8
3.3	Environmental protection	9
3.4	Special dangers	9
3.5	Warnings and symbols used in these Instructions	9
4.	Handling and storage	9
4.1	Scope of supply	9
4.2	Handling	9
4.3	Storage	10
4.4	Standard corrosion protection	10
5.	Technical description	11
5.1	General description	11
5.2	Housing	12
5.3	Toothed components	13
5.4	Lubrication	13
5.5	Bearings	13
5.6	Shaft seals	13
5.6.1	Radial shaft sealing rings	13
5.6.2	Taconite seals	14
5.6.3	Tacolab seals	14
5.7	Cooling	14
5.8	Couplings	15
5.9	Oil-temperature measurement	16
5.10	Oil-level monitoring system	17
5.11	Heating element	17
5.12	Bearing monitoring system	17
6.	Assembly	18
6.1	General information on installation	18
6.2	Installation of gear unit on housing base	18
6.2.1	Foundation	18
6.2.2	Description of installation work	19
6.2.2.1	Aligning surfaces, aligning thread	19
6.2.2.2	Mounting on a foundation frame	20
6.2.2.3	Mounting on a concrete foundation by means of stone bolts or foundation blocks	20
6.2.2.4	Mounting on a concrete foundation by means of anchor bolts	22
6.3	Connection of oil-supply unit	23
6.4	Gear units with oil-temperature measurement	23
6.5	Gear units with oil-level monitoring	23
6.6	Gear units with heating element	23
6.7	General note on add-on components	23
6.8	Final work	23

7.	Start-up	24
7.1	Procedure before start-up	24
7.1.1	Removal of conservation agent	24
7.1.2	Charging with lubricant	24
7.1.2.1	Oil quantities	25
7.2	Start-up	25
7.3	Removal from service	25
7.3.1	Interior conservation during longer disuse	26
7.3.1.1	Interior conservation with gear oil	26
7.3.1.2	Interior conservation with special conservation agent	26
7.3.1.3	Interior conservation procedure	27
7.3.2	Exterior conservation	27
7.3.2.1	Exterior conservation procedure	27
8.	Operation	28
8.1	General operating data	28
9.	Faults, causes and remedy	29
9.1	General information on faults and malfunctions	29
9.2	Possible faults	29
10.	Maintenance and repair	31
10.1	General notes on maintenance	31
10.2	Description of maintenance and repair work	32
10.2.1	Test water-content of oil	32
10.2.2	Changing the oil	32
10.2.3	Cleaning the venting screw	33
10.2.4	Re-charging Taconite/ Tacolab seals with grease	33
10.2.5	Cleaning the gear unit	33
10.2.6	Topping up oil	34
10.2.7	Check tightness of fastening bolts	35
10.2.8	General inspection of gear unit	35
10.2.9	Oil-supply unit	36
10.3	Lubricants	36
11.	Spare parts, service facility addresses	36
11.1	Stocking spare parts	36
11.2	Spare-part and service facility addresses	36
12.	Declaration by the manufacturer	41

1. Technical data

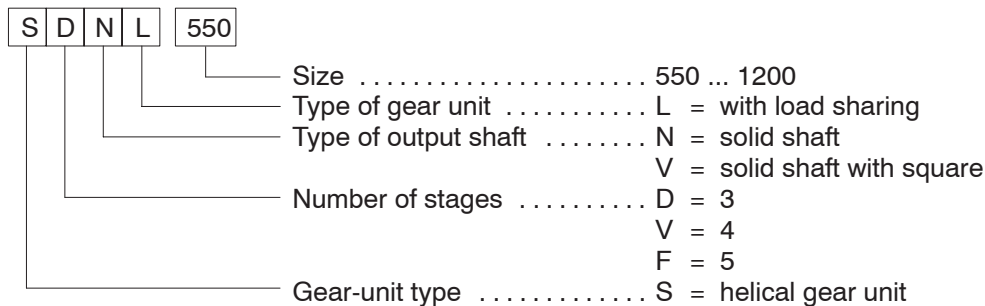
1.1 General technical data

The most important technical data are shown on the rating plate. These data along with the contractual agreements on the gear unit determine the limits of its proper use.



- | | |
|---|---|
| ① Company logo and production location | ⑦ Speed n_2 |
| ② Special information | ⑧ Type of oil |
| ③ Order no. - item - serial no. | ⑨ Viscosity of oil in VG class |
| ④ Type / Size *) | ⑩ Quantity of oil in litres for main gear housing |
| ⑤ Power rating P_2 in kW or T_2 in Nm | ⑪ Number of operating instruction(s) |
| ⑥ Speed n_1 | ⑫ Special information |

example *)



Data on weights and measuring surface sound levels of the various gear types are given in sections 1.1.1 and 1.1.2.

For further technical details, refer to the drawings in the gear-unit documentation.

1.1.1 Weights

Type	Approx. weight (kg) for size													
	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
SDNL	8000	10000	13000	16000	19000	23000	27000	32000	38000	44000	51500	54000	64000	68000
SDVL	7800	9800	12500	15500	18300	22300	26000	31000	37000	42500	50000	52000	62000	65500
SVNL	8000	10000	13000	16000	19000	23000	27000	32000	38000	44000	51500	54000	64000	68000
SVVL	7800	9800	12500	15500	18300	22300	26000	31000	37000	42500	50000	52000	62000	65500
SFNL	8000	10000	13000	16000	19000	23000	27000	32000	38000	44000	51500	54000	64000	68000
SFVL	7800	9800	12500	15500	18300	22300	26000	31000	37000	42500	50000	52000	62000	65500

Table 1.1: Weights (approx. values only)

Note: All weights are for gear unit without oil charge or attachments. For the exact weights, refer to the drawings in the gear-unit documentation.

1.1.2 Measuring-surface sound level

The measuring-surface sound level for the gear unit at a distance of 1 m can be found in tables 1.1.2.1.

The measurement is carried out to DIN 45635 parts 1 and 23 using the sound-intensity method.

The workplace of the operating personnel is defined as the area on the measuring surface at a distance of 1 metre, in whose vicinity persons may be present.

The sound level applies for the warmed-up gear unit at input speed n_1 and input power P_2 stated on the rating plate. If several figures are given, the highest speed and power values apply.

The measuring-surface sound level includes attached lubrication units (if applicable). With outgoing and ingoing pipes, the interfaces are the flanges.

If repeat measurements on site do not produce conclusive results with regard to measuring technology, the measurement achieved on the FLENDER test bench will apply.

The sound level stated in the table was obtained by statistical calculation by our Quality Control Dept. The gear unit may be expected to comply with these sound levels with statistical probability.

1.1.2.1 Measuring-surface sound level for helical-gear units

Measuring-surface sound level L_{pA} in dB(A) for helical-gear units																
Type	i_N	n_1 1/min	Gear-unit size													
			550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
SDNL SDVL	18	1500	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	.	1000	81	83	84	86	–	–	–	–	–	–	–	–	–	–
	22.4	750	78	80	80	81	81	81	82	82	83	–	–	–	–	–
	25	1500	86	86	–	–	–	–	–	–	–	–	–	–	–	–
	.	1000	81	81	82	82	83	84	–	–	–	–	–	–	–	–
	31.5	750	78	78	79	79	79	81	81	82	82	83	–	–	–	–
	35.5	1500	83	84	84	85	–	–	–	–	–	–	–	–	–	–
	.	1000	78	79	79	80	81	81	82	82	–	–	–	–	–	–
	50	750	75	75	76	76	77	77	78	78	79	80	–	–	–	–
SVNL SVVL	50	1500	83	84	85	86	86	87	88	–	–	–	–	–	–	–
	.	1000	79	79	81	81	81	82	83	83	84	84	85	85	86	86
	71	750	75	76	77	78	78	79	79	80	80	81	82	82	83	83
	80	1500	81	81	83	83	84	84	85	85	86	–	–	–	–	–
	.	1000	76	77	78	78	79	79	80	80	81	81	82	82	83	83
	112	750	73	73	75	75	76	76	77	77	78	78	79	79	80	80
	125	1500	78	79	80	81	81	82	82	83	83	84	84	85	85	–
	.	1000	73	74	75	76	76	77	77	78	79	79	79	80	80	81
	200	750	70	71	72	72	73	73	74	75	76	76	76	77	77	78
SFNL SFVL	224	1500	77	78	78	78	79	80	81	81	82	82	83	83	83	84
	.	1000	72	73	73	74	74	76	76	77	78	78	78	79	79	80
	355	750	69	69	70	70	71	72	73	73	74	74	75	76	76	77
	400	1500	75	75	76	76	78	78	79	79	80	80	81	82	82	83
	.	1000	70	70	71	71	72	73	74	74	75	75	76	77	77	78
	500	750	67	67	67	68	68	70	70	71	72	72	73	74	74	75
	560	1500	72	72	73	73	74	75	76	76	77	77	78	79	79	80
	.	1000	67	68	65	68	69	70	71	72	73	73	74	75	75	76
	800	750	64	64	65	65	65	67	68	68	69	69	70	71	71	72

2. General notes

2.1 Introduction

These Operating Instructions (BA) are an integral part of the gear unit supplied and must be kept in its vicinity for reference at all times.

Caution!

All persons involved in the installation, operation, maintenance and repair of the gear unit must have read and understood these Operating Instructions and must comply with them at all times. We accept no responsibility for damage or disruption caused by disregard of these Instructions.

The "DUORED Helical Gear Unit" described in these Operating Instructions has been developed for stationary use in general engineering applications. Possible areas of use for gear units of this type are, for instance, chemical industry, iron and steel industry, conveyor equipment, crane equipment, foodstuffs industry, cement industry and others.

The gear unit is designed only for the application described in section 1."Technical data". Possible use in any other area must be contractually agreed.

The gear unit described in these Instructions reflects the state of technical development at the time these Instructions went to print.

In the interest of technical progress, we reserve the right to make changes to the individual assemblies and accessories which we regard as necessary to preserve their essential characteristics and improve their efficiency and safety.

2.2 Copyright

The copyright to these Operating Instructions is held by **FLENDER AG**.

These Operating Instructions must not be wholly or partly reproduced for competitive purposes, used in any unauthorised way, or made available to third parties without our agreement.

Technical enquiries should be addressed to the following plant:

A. FRIEDR. FLENDER AG

D-46393 Bocholt

Tel.: 02871/92-0

Fax: 02871/92-2596

or to our customer-service addresses. A list of our customer-service addresses is given in section 11. "Spare parts, customer-service addresses".

3. Safety notes

3.1 Proper use

- The gear unit has been manufactured in accordance with the state of the art and is delivered in a condition for safe and reliable use. All changes to the gear unit on the part of the user which may affect its safety and reliability are prohibited. This applies equally to safety features designed to prevent accidental contact.
- The gear unit should be used and operated only within the context of the conditions laid down in the contract governing performance and supply.

3.2 Obligations of the user

- The user must ensure that all persons involved in the installation, operation, maintenance and repair of the gear unit have read and understood these Operating Instructions and comply with them at all times in order to:

- avoid injury or damage,
- ensure the safety and reliability of the unit,

and

- avoid disruptions and environmental damage through incorrect use.
- During transport, assembly, installation, dismantling, operation and maintenance of the unit, the relevant safety and environmental regulations must be complied with at all times.
- The gear unit should be operated, maintained or repaired by authorised, trained and qualified personnel.
- The gear unit must not be cleaned using high-pressure cleaning equipment.
- All work on the gear unit must be carried out with great care and with due regard to safety.
- All work on the gear unit must be carried out only when it is not in operation. The drive assembly must be secured against being switched on accidentally (e.g. by locking the key switch or removing the fuses from the power supply). A notice should be attached to the ON switch stating clearly that work is in progress.
- No welding work should be done on the gear unit. The gear unit must not be used as an earthing point for welding operations. Delicate teeth and bearings may be irreparably damaged by welding.
- If any changes are noticed during operation (e.g. overheating or unusual noises), the drive assembly must be switched off immediately.
- Rotating drive components such as couplings, gearwheels, belt drives etc. must be protected against accidental contact.
- If the gear unit is intended for installation in plant or machinery, the manufacturer of such plant or machinery must ensure that the contents of these Instructions are incorporated in his own instructions.
- Notices attached to the gear unit, e.g. rating plate, direction arrows etc. must always be observed. They must be kept free from dirt and paint at all times.
- All spare parts must be obtained from FLENDER.

3.3 Environmental protection

- When changing oil, the used oil must be collected in suitable containers. Any spillage of oil must be removed immediately.
- Conservation agent should be stored separately from used oil.
- Used oil, conservation agent, oil-binding agents and oil-soaked cloths must be disposed of in accordance with environmental legislation.

3.4 Special dangers

- Depending on operating conditions, the surface of the gear unit may heat up considerably.
Danger of burns!
- When changing oil, take care to prevent scalding by hot oil.

3.5 Warnings and symbols used in these Instructions



This symbol indicates safety measures which must be observed to avoid **personal injury**.

Caution!

This symbol indicates safety measures which must be observed to avoid **damage to the gear unit**.

Note: This symbol indicates general **operating procedures** which are of particular importance.

4. Handling and storage

Note: Observe the "Safety notes" in section 3.

4.1 Scope of supply

The products supplied are listed in the dispatch papers. Check immediately on receipt to ensure that all the products listed have actually been delivered. Damaged or missing parts must be notified in writing immediately.

4.2 Handling

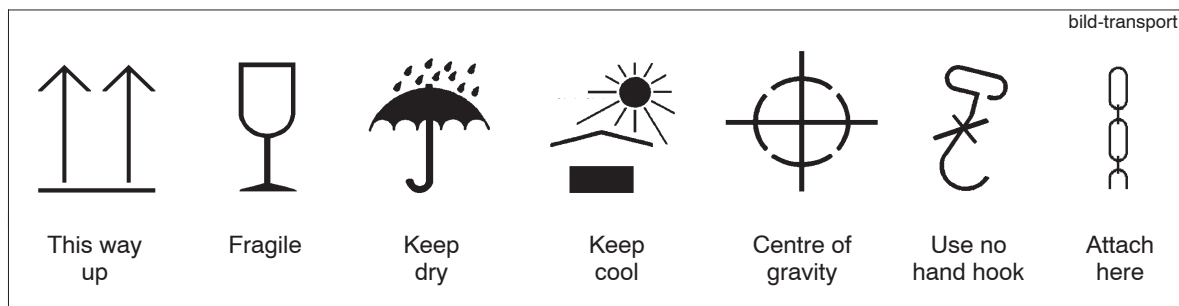


When handling FLENDER products use only lifting and handling equipment of sufficient load-carrying capacity!

The gear unit is delivered in the fully assembled state. Additional items (e.g. oil cooler, pipes and fittings) are delivered separately packaged.

Different forms of packaging may be used depending on the size of the unit and method of transport. Unless otherwise agreed, the packaging complies with the **HPE Packaging Guidelines**.

The symbols marked on the packaging must be observed at all times. These have the following meanings:



FLENDER

Caution!

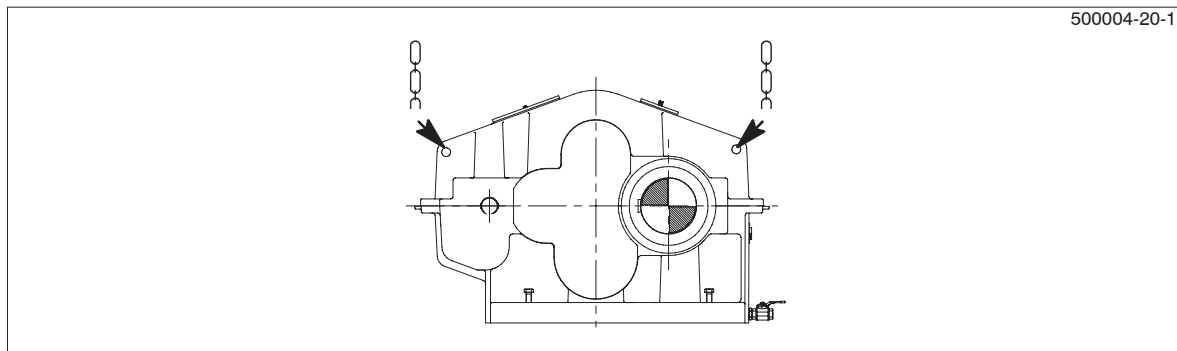
The gear unit must always be transported with due care to avoid danger to persons and property. Avoid bumping the ends of shafts as this may damage the gear unit.

Note:

The gear unit must be transported using suitable equipment only. Never transport the gear unit with an oil charge.

Caution!

Use only the 4 eyes provided for attaching lifting equipment to the unit. Do not use the front thread at the end of the shaft for attaching ring bolts for transport purposes.



For drive units, where additional components (e.g. motor, coupling etc.) are mounted on the gear unit, an additional attachment point may be required because of the shift in the centre of gravity.

For a detailed illustration of the gear unit, refer to the drawings in the unit documentation.

The position of the attachment points is shown in the documentation for each specific order.

4.3 Storage

The gear unit must be stored in the position of use in a sheltered place. It must be placed on a vibration-free wooden base and covered over.



Do not stack gear units on top of one another.

Caution!

If the gear unit is being stored out of doors, it must be covered with particular care. It must be ensured that neither moisture nor foreign material can collect on the unit.

Note:

Provision for special environmental conditions during transport (e.g. transport by ship) and storage (climate, termites etc.) must be contractually agreed.

4.4 Standard corrosion protection

The gear unit is filled with conservation agent. The free shaft ends are painted for protection.

The properties of the outer paint coating are as follows: Resistance to acids, weak alkalis, solvents, atmospheric action, temperatures up to 120 °C (temporarily up to 140 °C) and to tropical-climate conditions.

Note:

Ensure that the paint is not damaged!
Mechanical damage (scratches), chemical damage (acids, alkalis) and thermal damage (sparks, welding beads, heat) cause corrosion which may cause failure of the exterior protective coating.

Note:

Unless otherwise agreed, we grant a guarantee of 6 months on the interior corrosion protection, and 24 months on the protective coating on the free shaft ends. The guarantee period commences on the date of delivery.

For longer periods of storage (> 6 months) we advise regular checking and, if necessary, renewal of the interior corrosion protection (see section 7 "Start-up").

5. Technical description

Note: Observe the "Safety notes" in section 3.

5.1 General description

The gear unit is supplied as a three-, four- or five-stage helical gear unit with load sharing.

Note: It is designed for installation in the horizontal position.

It can be operated in both directions of rotation. The only exceptions are gear types with backstop or overrunning clutch. If rotation reversal is required for these types of unit, our Customer Service Dept. should be consulted beforehand.

A number of shaft configurations (types and rotation directions) are possible. These are shown in the following table as solid shafts:

Type	Configuration			
	A	B	G	H
SDNL SDVL				
SVNL SVVL				
SFNL SFVL				

The gear units are characterized by a low noise level; this is achieved by ground helical gears with a high contact ratio and special sound-damping housings.

The good temperature characteristics of the gear unit are achieved by its high degree of efficiency, large housing surface and performance-related cooling system.

Note: Unless otherwise agreed by contract, the gear units must not be exposed to harmful environmental factors such as chemical products, high-air pollution and temperatures outside the range 0 to +20 °C.

5.2 Housing





The housing is made in two parts of cast iron. If necessary, the housing can also be made of spheroidal graphite cast iron and/or steel (welded design).

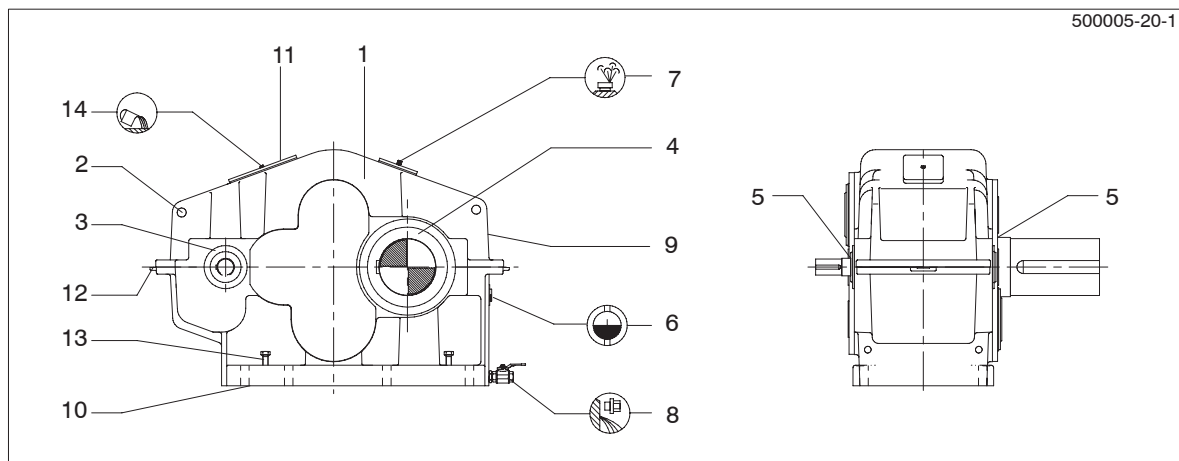
The housing is rigid in design and due to its form has excellent noise and temperature characteristics.

The housing is fitted with adequately dimensioned lifting eyes, inspection or assembly covers.

An oil sight glass for oil level checking, an oil drain cock for oil changes and a breather screw for aerating and ventilating are provided.

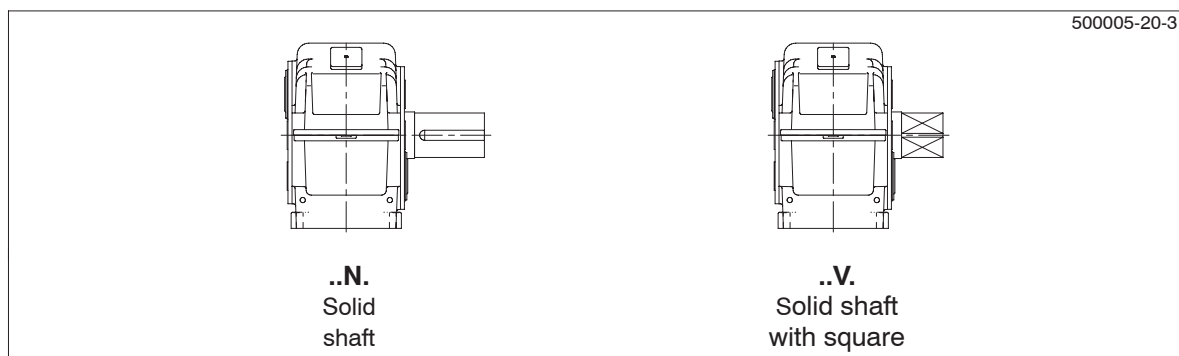
Colour codes for venting, oil inlet, oil level and oil drainage:

Venting:	yellow	
Oil inlet:	yellow	
Oil level:	red	
Lubrication points:	red	
Oil drain:	white	



- | | |
|-----------------------|---------------------------------|
| 1 Housing | 8 Oil drain cock |
| 2 Lifting eyes | 9 Rating plate |
| 3 Cover | 10 Gear-unit fastening |
| 4 Cover | 11 Inspection or assembly cover |
| 5 Shaft seals | 12 Alignment surfaces |
| 6 Oil sight glass | 13 Alignment thread |
| 7 Housing ventilation | 14 Oil inlet |

Output types



For a detailed illustration of the gear unit, refer to the drawings in the unit documentation.

5.3 Toothed components

The toothed components of the gear unit are case hardened. Helical-gear teeth are ground. The high quality of the teeth lead to a significant noise reduction and ensure safe and reliable running.

Load sharing ensures that the input power introduced is shared out between two lines and transmitted to the gear of the output shaft via the pinions of both lines. This results in dual use of the larger gear of the output stage and permits its design using smaller dimensions.

The gears are connected with the shafts by interference fits and parallel keys or by shrink fits. These types of joints transmit the torques generated with adequate reliability.

5.4 Lubrication

Lubrication of all geared parts and of the bearings is effected by combined splash and forced lubrication via a motor-driven pump.

Note: The Operating Instructions contained in an order-specific Appendix should be observed for operation and maintenance of the motor-driven pump and associated monitoring devices.
For technical details, refer to the order-specific equipment list.

5.5 Bearings

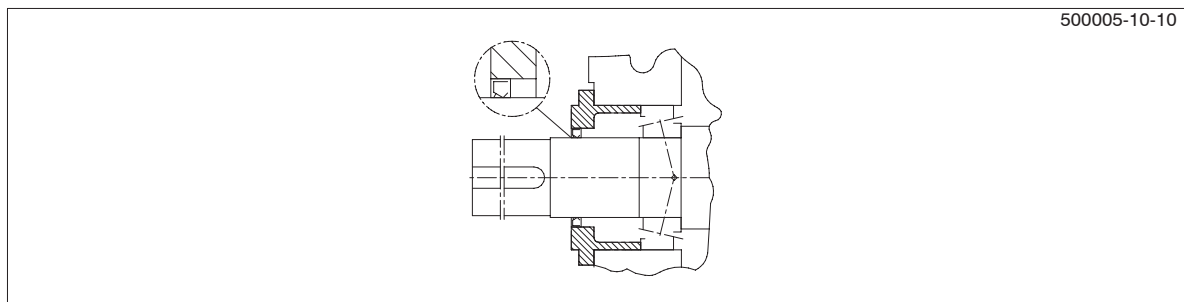
All shafts are mounted on anti-friction bearings.

5.6 Shaft seals

Depending on requirements, radial shaft sealing rings or Taconite/ Tacolab seals are mounted at the shaft exits to prevent oil from leaking from the housing and dirt from entering it.

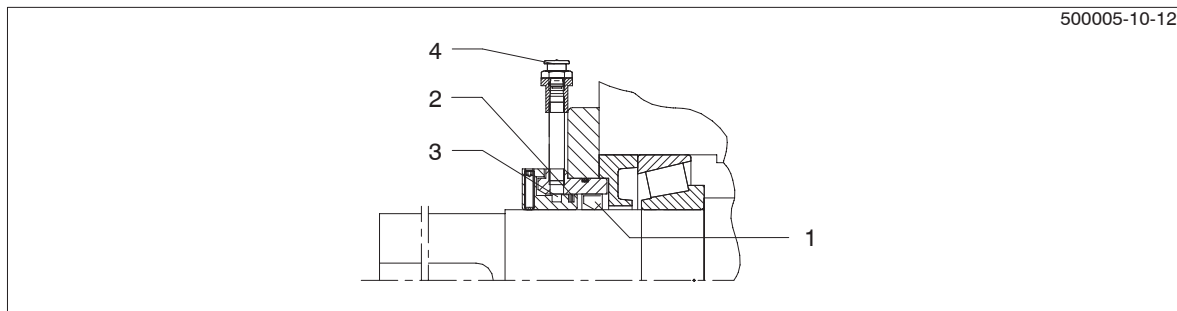
5.6.1 Radial shaft sealing rings

Radial shaft sealing rings are the standard type of seal. They are fitted with an additional dust lip to protect the actual sealing lip from external contamination.



5.6.2 Taconite seals

Taconite seals were specially developed for use in a dusty environment. The penetration of dust is prevented by a combination of seal elements (radial shaft sealing ring, lamellar seal and grease-charged labyrinth seal).

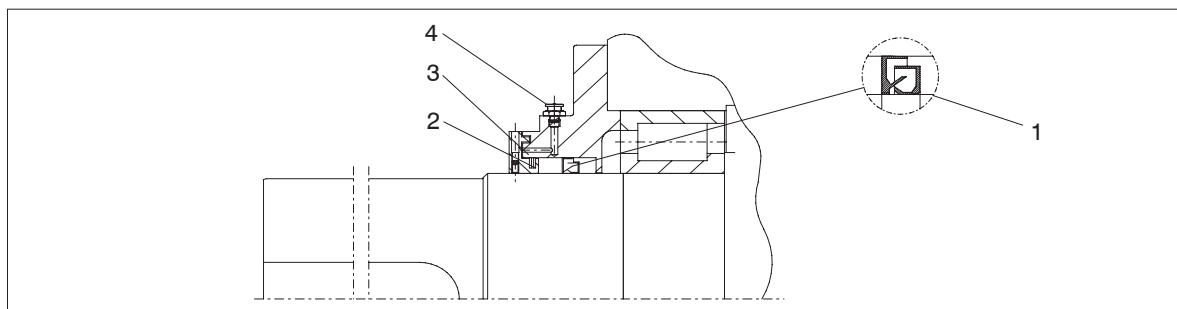


- | | | | |
|---|---------------------------|---|--|
| 1 | Radial shaft sealing ring | 3 | Grease-charged labyrinth seal (re-chargable) |
| 2 | Lamellar seal | 4 | Flat grease nipple AM10x1 to DIN 3404 |

Note: For re-charging the labyrinth seals with grease, the specified frequency must be observed (see section 10. "Maintenance and repair").

5.6.3 Tacolab seals

Tacolab-seals incorporate the advantages of labyrinth- and Taconite seals. These contactless seals prevent wear on the shafts, are maintenance-free and take care of a favourable temperature behaviour. As with Taconite seals in trusion of dust is prevented by a combination of three sealing elements (labyrinth rings, lamellar seals and grease filled, re-greasable labyrinth seals).



- | | | | |
|---|-----------------|---|--|
| 1 | Labyrinth seals | 3 | Grease-charged labyrinth seal (re-chargable) |
| 2 | Lamellar seal | 4 | Flat grease nipple AM10x1 to DIN 3404 |

Note: For re-charging the labyrinth seals with grease, the specified frequency must be observed (see section 10. "Maintenance and repair").

Gear units with splash lubrication and contacting shaft seals can be filled with the oil grade currently in use up to just below the vent plug.

5.7 Cooling

Cooling of the gear units is effected by a separate oil-supply unit.

Note: The Operating Instructions of the equipment manufacturer should be observed for operation of the oil-supply unit.

5.8 Couplings

Generally speaking, flexible couplings or hydraulic couplings combined with flexible couplings should be provided for the input drive.

In the case of gear unit types with solid output shaft, flexible couplings or gear couplings are, likewise, ordinarily used for the output shaft.

If rigid couplings or other input or output elements are used, which create additional radial or axial forces, (e.g. gear wheels, belt pulleys, disk flywheels, hydraulic couplings), these must be agreed by contract.

Caution!

Couplings with peripheral velocities on the outer diameter of up to 30 m/s, must be statically balanced. Couplings with peripheral velocities over 30 m/s, must be dynamically balanced.

For maintenance and operation of the couplings, refer to the specific operating instructions for the coupling.

Caution!

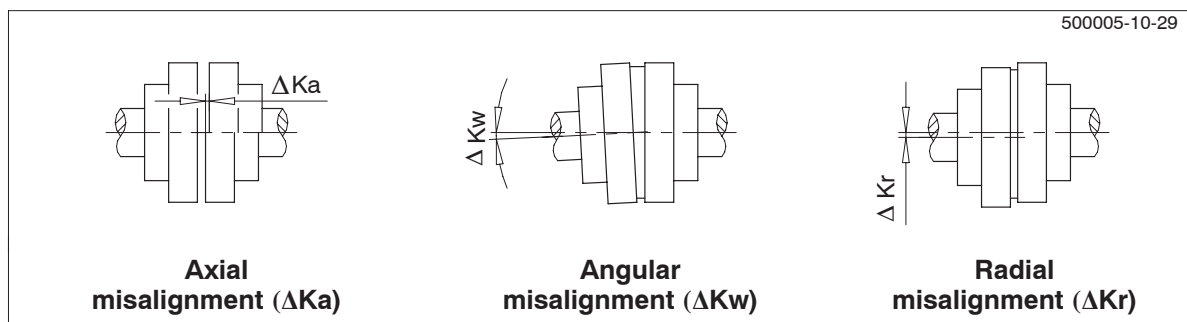
When installing the drives make absolutely certain that the individual components are accurately aligned in relation to each other. Inadmissibly excessive misalignments of the shaft ends to be connected due to axial and angular misalignments, result in premature wear and material damage.

Note:

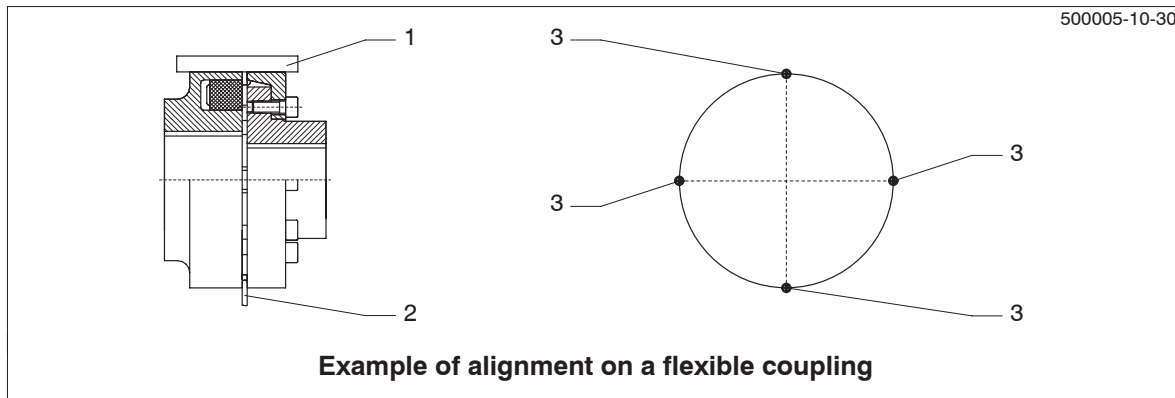
The smaller the radial and angular misalignment between coupling parts on the shaft ends to be connected, the longer the service life and the higher the reliability of the equipment, and the better the quietness of operation.

Misalignments of the coupling parts in relation to each other can be caused by inaccurate alignment during assembly, but also by actual operation of the equipment (expansion due to heat, shaft deflection, too soft machine frames etc.).

Possible misalignments



Alignment has to be effected in two axial planes arranged in vertical relation to each other. This can be done by means of a ruler (radial misalignment) and feeler gauge (angular misalignment), as shown in the illustration. The aligning accuracy can be increased by using a dial gauge or, optically, by using a laser.



1 Ruler

2 Feeler gauge

3 Measuring points

Caution!

The maximum permissible misalignments must by no means be exceeded during operation.

For the exact values please see Operating Instructions of coupling.

Angular and radial misalignments may occur at the same time. The sum of both misalignments must not exceed the maximum permissible value of the angular or radial misalignment.

Note:

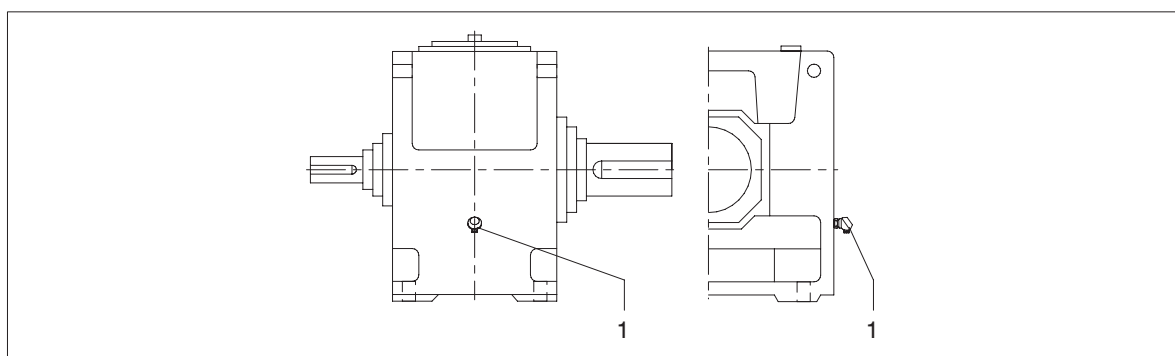
For alignment of the drive components (vertical direction), it is recommended to use packing or foil plates underneath the mounting feet. The use of claws with setscrews at the foundation for lateral adjustment of the drive components also offers advantages.

5.9 Oil-temperature measurement

Depending on the order specification, the gear unit may be fitted with a PT100 resistance thermometer for monitoring the oil temperature in the sump. In order to measure the temperatures or temperature differences, the PT100 resistance thermometer should be connected to a suitable instrument provided by the customer. The thermometer has a connection head (protection type IP54) for the wiring. A two-conductor circuit is fitted by the manufacturer. However, the customer may fit his own three- or four-conductor circuit if required.

Note:

A certain level of oil is necessary for reliable temperature measurement. For this reason, the resistance thermometer is not suitable for use with labyrinth seals.



1 PT100 resistance thermometer

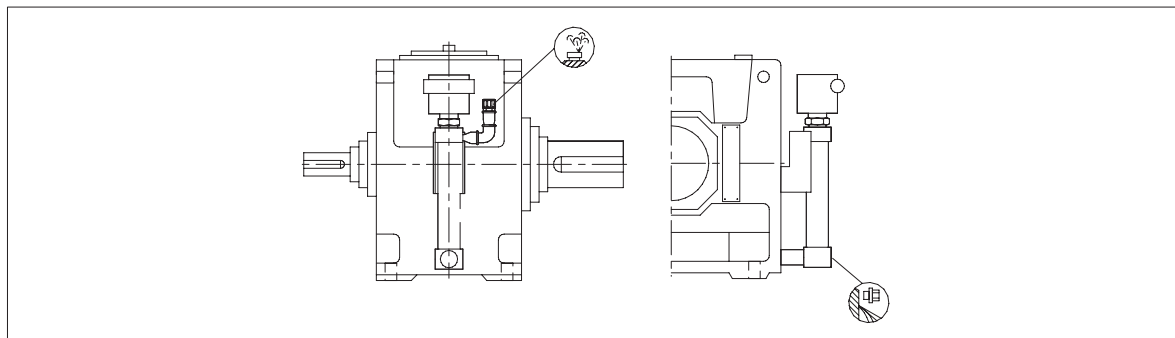
For a detailed illustration of the gear unit and the position of the add-on parts, please refer to the drawings of the gear-unit documentation.

For operation and maintenance, always observe the operating instructions indicated in the order-specific appendix.

For technical data, refer to the order-specific equipment list.

5.10 Oil-level monitoring system

Depending on the order specification, the gear unit may be fitted with an oil-level monitor in the form of a level limit switch. This monitoring is designed as a standstill monitoring (gear unit stop) and checks the level of the oil before the unit is started up. When the signal "oil level too low" is given, it should be wired in such a way that the drive motor cannot start and an alarm is given. During operation, any signal should be bridged.



For a detailed illustration of the gear unit and the position of the add-on parts, please refer to the drawings of the gear-unit documentation.

For operation and maintenance, always observe the operating instructions indicated in the order-specific appendix.

For technical data, refer to the order-specific equipment list.

If an oil-level monitoring device is in use, it is very important that the gear unit is in a horizontal position.

5.11 Heating element

At low temperatures, it may be necessary to heat the gear oil before switching on the drive unit, or even during operation. In such cases, one or two such heating elements may be provided if required. These convert the electrical energy into heat which is conducted to the surrounding oil. The heating elements are located in protective tubes inside the housing thus making it possible to replace them without draining off the oil.

The heating elements must be fully immersed in the oil bath. Due to the higher oil level required for radial shaft seals, only seals of this type are suitable for use with heating elements.

The heating elements are controlled by a temperature monitor which provides a signal when maximum and minimum temperatures are reached. The signal requires amplification.

Caution!

Never switch the heating element on unless it is fully immersed in the oil bath as there is a serious risk of fire.

Note: For operation and maintenance, always observe the instructions given in the order-specific appendix.

For technical details, refer to the order-specific equipment list.

5.12 Bearing monitoring system

Depending on order specification, the gear unit can be designed with measuring nipples for an SPM-instrument bearing-monitoring system (system 43). These nipples are intended for attachment of the shock-pulse sensor with rapid-action coupling and are located in the vicinity of the bearings to be monitored.

6. Assembly

Note: Observe the "Safety notes" in section 3.

Caution!

Assembly and/or disassembly of the DUORED helical gear unit must only be carried out by trained and qualified FLENDER personnel in accordance with the internal FLENDER assembly instructions and using the equipment required for such operations.

6.1 General information on installation

During the planning phase, sufficient space should be allowed around the gear unit for subsequent care and maintenance work.

Caution!

Exposure to direct sunlight may cause overheating. Protective features such as covers, roofing etc. should be provided as required.

Sufficient lifting equipment should be available before beginning the installation and assembly work.

Caution!

No welding work should be done on the drive. The drives must not be used as an earthing point for welding operations. Delicate teeth and bearings may be irreparably damaged by welding.

Caution!

All the fastening points provided by the design of the unit should be used.

To ensure proper lubrication, the installation position specified in the order must always be observed.

6.2 Installation of gear unit on housing base

6.2.1 Foundation

The foundation must be horizontal and level.

It should be designed in such a way that no resonance vibrations are created and that no vibrations are transmitted from adjacent foundations. Steel structures on which the unit is to be mounted must be rigid. It must be designed according to the mass and torque, taking into account the forces acting on the gear unit.

Careful alignment in relation to the machine on the output and input sides, allowing for elastic deformations due to operating forces, is required.

Fastening bolts or nuts must be tightened to the prescribed torque. For the correct torque, refer to item 10.2.7. Bolts of the minimum strength class 8.8 must be used.

If external forces are acting upon the gear unit, it is advisable to prevent displacement by means of lateral stops.

Note: For dimensions, space requirement, arrangement of supply connections (e.g. with separate oil-cooling units), refer to the drawings in the gear-unit documentation.

6.2.2 Description of installation work

- Remove the anti-corrosion paint on the shafts with benzene.

Caution! Do not allow the benzene to contact the shaft sealing rings.



**Ensure adequate ventilation. Do not smoke when working with benzene!
Explosion hazard!**

- Mount and secure input and output drive elements (e.g. coupling components) on shafts. These should be heated before mounting. For the correct joining temperatures, refer to the dimensional drawings in the coupling documentation.

Unless otherwise instructed, the components may be heated inductively, with a burner or in a furnace.



Take precautions to avoid burns from hot components!

Caution! Protect shaft sealing rings from damage and heating over +100 °C. Use heat-protection screens to reduce radiant heat.

Caution! The coupling components should be fitted using suitable equipment to avoid possible damage to the shaft bearings through axial joining forces. Always use suitable lifting equipment. When fitting the components, ensure that the shaft sealing rings and running surface are not damaged.

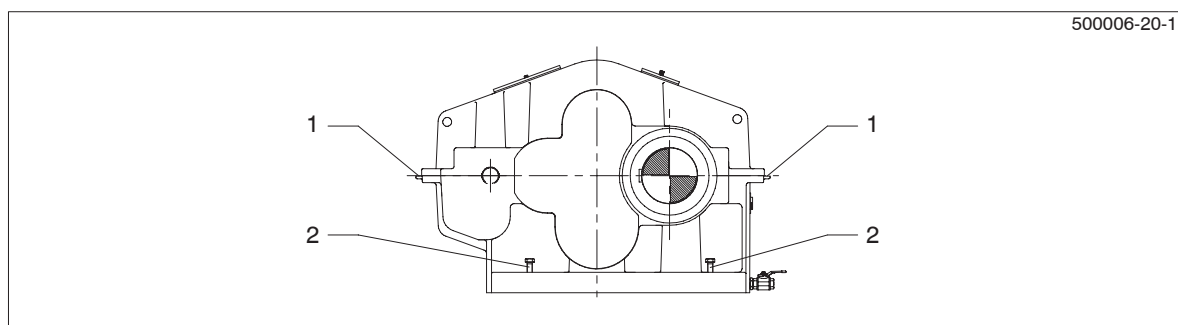
The components should be pushed smartly onto the shaft, up to the position specified in the order specific dimensional drawing.

Caution! Fit the coupling using suitable fitting equipment. Never use force or knock the couplings into position, as this will cause irreparable damage to the gearwheels, anti-friction bearings, retaining rings etc.

Note: Gear units whose weight requires the use of lifting gear must be attached at the points shown in section 4. "Handling and storage". When additional components are mounted on the gear unit, appropriate attachment points should be provided in accordance with the order-specific dimensional drawing.

6.2.2.1 Aligning surfaces, aligning thread

For preliminary alignment of the gear unit use the machined surfaces at the housing parting line. To facilitate alignment, alignment threads are provided on the housing base.



1 Alignment surfaces

2 Alignment thread

6.2.2.2 Mounting on a foundation frame

- Clean the lower surfaces of the gear-unit base.
- With suitable lifting gear, place the gear unit on the foundation frame.

Caution!

**Attachment of the carrying ropes must only be effected in the specified 4 lifting eyes (see Section 4., "Handling and Storage").
The gear unit must hang perfectly horizontally.**

- Tighten the foundation bolts to the specified torque (see item 10.2.7). If necessary use stops to prevent shifting.

Caution!

The gear unit must not be twisted when tensioning the fastening bolts.

The final fine alignment with the assemblies on the in- and output side must be carried out accurately by the shaft axes, using:

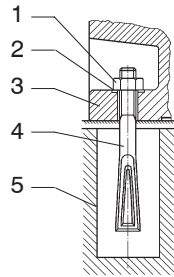
- rulers
- spirit level
- dial gauge
- feeler gauge, etc.

Only then should the gear unit be fastened and the alignment checked once again.

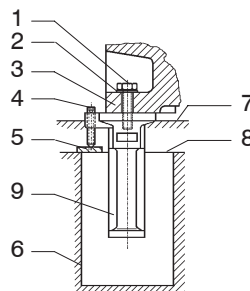
Note: The accuracy of the alignment process is an important factor in determining the life span of shafts, bearings and couplings. If possible, the deviation should be zero. For the special requirements for the couplings, refer to the specific operating instructions.

6.2.2.3 Mounting on a concrete foundation by means of stone bolts or foundation blocks

- Clean the lower surfaces of the gear-unit base.
- Hook the stone bolts with washers and hexagon nuts and/or foundation blocks with washers and fastening bolts into the foundation fastening points on the housing and tighten the hexagon nuts and/or fastening bolts to the specified torque (see Item 10.2.7) (see diagram below).



- | | |
|------------------|--------------|
| 1 Hexagon nut | 4 Stone bolt |
| 2 Washer | 5 Foundation |
| 3 Gear-unit base | |



- | | |
|--------------------|------------------------------|
| 1 Fastening bolt | 6 Foundation |
| 2 Washer | 7 Final foundation height |
| 3 Gear-unit base | 8 Prepared foundation height |
| 4 Set screw | 9 Foundation block |
| 5 Flat steel plate | |

- Using suitable lifting gear, place the gear unit on the concrete foundation.

Caution!

**Attachment of the carrying ropes must only be effected in the specified 4 lifting eyes (see Section 4., "Handling and Storage").
The gear unit must hang perfectly horizontally.**

- Gear unit
 - When using stone bolts,
align gear unit horizontally according to the input and output shafts using adapters;
 - when using foundation blocks,
align the gear unit horizontally according to the input and output shafts using the set screws.
- If applying considerable force, use stops to prevent the unit from shifting.
- Pour concrete into the recesses of the stone bolts and/or foundation blocks.

Note: Before pouring the concrete foundation, fill up the openings in the foundation blocks with polystyrene.
When the concrete has set, tighten the hexagon nuts of the stone bolts and/or fastening bolts **to the specified torque** (see Item 10.2.7).

Caution!

The gear unit must not be twisted when tensioning the hexagon nuts and/or fastening bolts.

The final fine alignment with the assemblies on the in- and output side must be carried out accurately by the shaft axes, using:

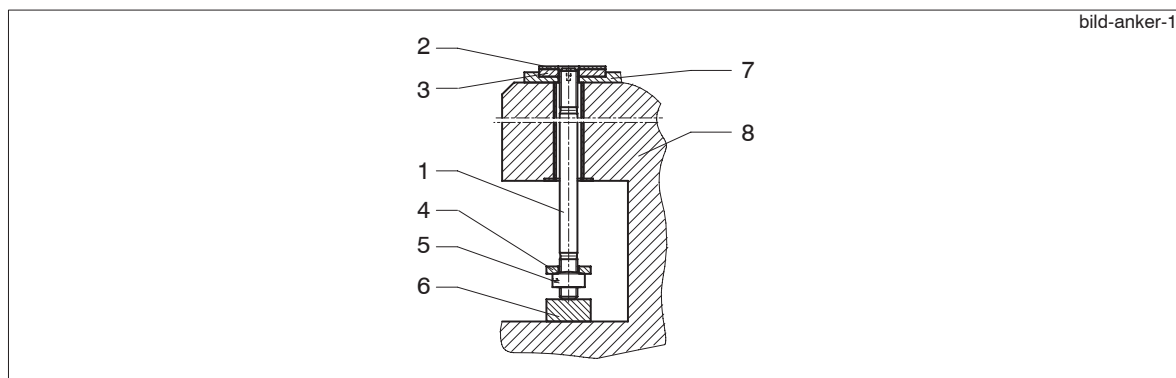
- rulers
- spirit level
- dial gauge
- feeler gauge, etc.

Only then should the gear unit be fastened and the alignment checked once again.

Note: The accuracy of the alignment process is an important factor in determining the life span of shafts, bearings and couplings. If possible, the deviation should be zero. For the special requirements for the couplings, refer to the specific operating instructions.

6.2.2.4 Mounting on a concrete foundation by means of anchor bolts

- Clean the lower surfaces of the gear-unit base.
- Place support on base plate.
- Insert anchor bolts.
- Place pressure plates in position and open hexagon nuts.
- Place wood under anchor bolts in such a way that the top edge stands back by about 10 mm.



1	Anchor bolt	4	Pressure plate	7	Fine-grained concrete filling
2	Support	5	Nut	8	Raw foundation
3	Base plate	6	Wood		

- Place gear unit on foundation

Caution!

**Attachment of the carrying ropes must only be effected in the specified 4 lifting eyes (see Section 4., "Handling and Storage").
The gear unit must hang perfectly horizontally.**

- Pull anchor bolts up, fit washer and screw nut in place by giving it a few turns

Note: A front-side thread is provided in the anchor bolts for this purpose.

- Align gear unit with base plates

Note: The values stamped into the screeds must absolutely be observed. Alignment tolerances in relation to the units on the input and output sides are to be in accordance with the permissible angular and longitudinal displacements of the couplings (see Coupling Drawings).

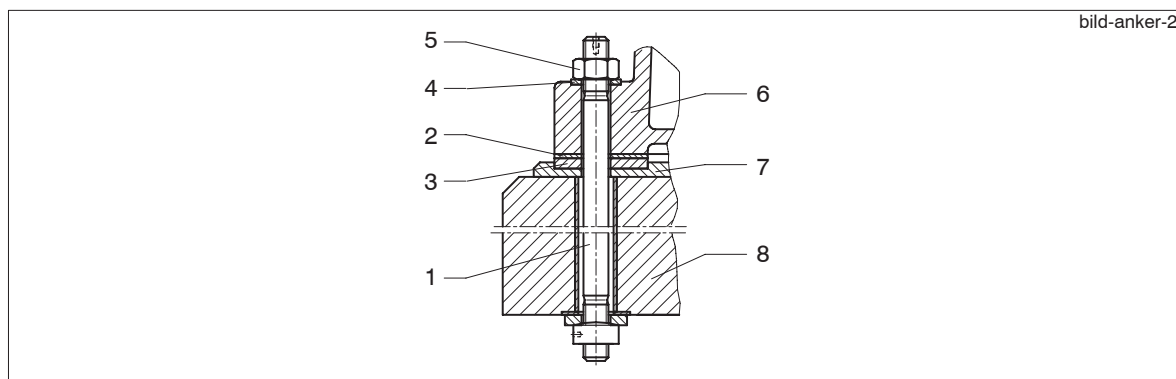
Record alignment dimensions.

Prior to bracing the anchor bolts, the fine-grained concrete filling must have set for at least 28 days.

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- Put anchor bolts under tension by tightening the nut with your fingers. Place hydraulic tensioning device in position. Initially tension bolts alternately to an initial tensioning force according to Table 10.2.

Note: The tensioning pressures and/or the initial tensioning forces should be recorded.



1	Anchor bolt	4	Washer	7	Fine-grained concrete filling
2	Support	5	Nut	8	Raw foundation
3	Base plate	6	Housing base		

6.3 Connection of oil-supply unit

- Remove blank flanges and/or plugs on the pressure and suction lines of the gear unit and of the oil-supply unit.
- Install connection pipes between oil-supply unit and gear unit and connect.
- Make sure the pipings are not twisted.

Caution! Observe Operating Instructions of "Oil-Supply Unit".

6.4 Gear units with oil-temperature measurement

- Connect resistance thermometer with evaluating instrument (to be provided by customer) electrically

6.5 Gear units with oil-level monitoring

- Connect oil-level monitor electrically

6.6 Gear units with heating element

- Connect temperature monitor electrically
- Connect heating elements electrically

6.7 General note on add-on components

Note: For operation and maintenance of the components described in items 6.3 to 6.6, observe the instructions in the order-specific appendix.
For technical details, refer to the order-specific equipment list.

6.8 Final work

- After installation of the gear unit check all screw connections for tight fit.
- In addition, a check must be made after tightening of the fixings to see that the alignment has not changed.
- Check by means of the order specific equipment list as well as the associated drawings whether all units which might have been removed for transport have been refitted.

7. Start-up

Note: Observe the "Safety notes" in section 3.

7.1 Procedure before start-up

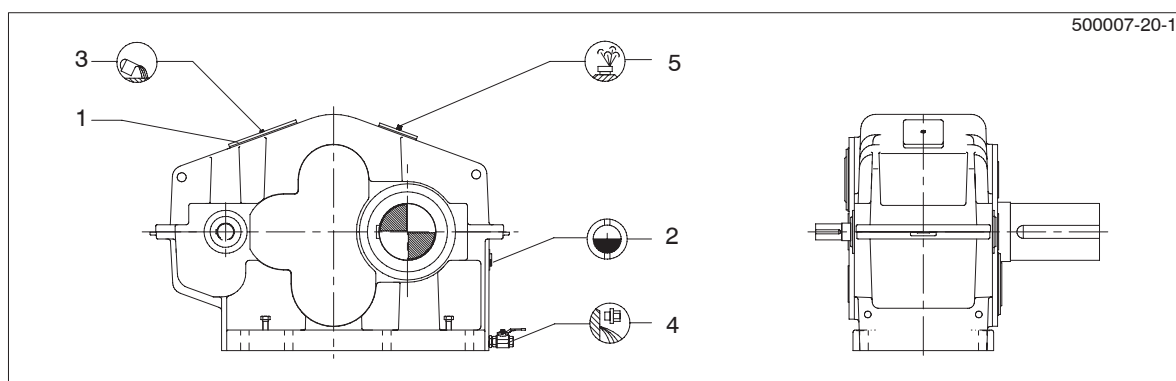
7.1.1 Removal of conservation agent

- Unscrew screw plug from oil drain cock.
- Open oil drain cock and discharge the residues of the preservation and running-in oil into a suitable container; dispose of the residues in accordance with regulations.



Remove any oil spillage immediately with an oil-binding agent.

- Close oil drain cock; reinsert screw plug into the oil drain cock.



1 Inspection
or assembly cover

2 Oil sight glass
3 Oil inlet

4 Oil drain cock
5 Venting or plug screw

For a detailed illustration of the gear unit, refer to the drawings in the unit documentation.

Caution!

Before start-up, replace the yellow plastic plug with venting screws with cap (see notice on gear unit).

7.1.2 Charging with lubricant

- Release the fastening bolts on the inspection or assembly cover and remove the cover (including seal) from the housing. Do not discard the seal.

Caution!

Top up gear unit with fresh oil using a filling filter (max. mesh 25 μ m) until the top mark on the oil-sight glass has been reached.

Note: For the correct type of oil (of various brands) to be used refer to the operating instructions BA 7300 EN supplied separately. Information on the type, viscosity and quantity of the oil is given on the rating plate on the gear unit.

The quantity of oil stated on the rating plate is an approximation only. The marks on the oil sight glass indicate the prescribed oil quantity to be filled in.

Note: With gear unit fitted with oil-supply unit, the oil circuit must also be charged. Be sure to observe the Operating Instructions of the oil-supply unit.

- Check oil level on oil sight glass.

Note: The oil level should be at the top mark of the oil sight glass.



Remove any oil spillage immediately with an oil-binding agent.

- Place the inspection or assembly cover (including seal) on the housing and replace and tighten the fastening bolts (see item 10.2.7).

7.1.2.1 Oil quantities

Type	Oil quantity (approx.) in litres for size													
	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
SDNL	400	480	580	660	750	860	1000	1150	1300	1450	1600	1600	1800	1800
SDVL	400	480	580	660	750	860	1000	1150	1300	1450	1600	1600	1800	1800
SVNL	400	480	580	660	750	860	1000	1150	1300	1450	1600	1600	1800	1800
SVVL	400	480	580	660	750	860	1000	1150	1300	1450	1600	1600	1800	1800
SFNL	400	480	580	660	750	860	1000	1150	1300	1450	1600	1600	1800	1800
SFVL	400	480	580	660	750	860	1000	1150	1300	1450	1600	1600	1800	1800

Table 7.1: Approximate figures for required oil quantities

7.2 Start-up

- At gear units with seals preventwears the adhesive tape on the in- and output cover must be removed.
- Check oil level of gear unit on oil sight glass.

Note: When the oil has cooled down, the oil level should be at the top mark of the oil sight glass. When the oil is hot, it may slightly exceed the top mark. The oil level must, by no means, drop below the bottom mark; top up, if necessary.

- Fully open the shutoff valves in the oil supply and drain line of the oil-supply unit.
- Check oil filling of the oil-supply unit and switch the unit on.

Note: Be sure to observe the Operating Instructions of the oil-supply unit.

Caution!

The gear unit must only be operated together with the oil-supply unit. For this purpose, the oil-supply unit should be switched on at least 2 minutes prior to startup of the gear unit.

7.3 Removal from service

- To take the gear unit out of service, first switch off the drive assembly.



Secure the drive assembly to prevent it from being started up accidentally. Attach a warning notice to the start switch.

- The oil-supply unit must not be switched off until the gear unit has come to a complete standstill.
- During longer periods of disuse, start the unit up briefly at intervals of approx. 3 weeks. If it is to remain out of service for longer than six months, fill it with conservation agent (see item 7.3.1).

7.3.1 Interior conservation during longer disuse

Depending on the type of lubrication or shaft sealing, the following types of internal corrosion protection can be used.

7.3.1.1 Interior conservation with gear oil

Gear units with splash-lubrication systems and contacting shaft seals can be filled with the correct type of service oil up to a point just below the venting screw.

7.3.1.2 Interior conservation with special conservation agent

Gear units with pressure-feed oil lubrication, closed-circuit oil cooling or non-contacting shaft seal rings should be run for a short time (app. 3 minutes) in idling mode with preservative prior to prolonged storage.

For preservation of the gear unit, we recommend the preservatives listed in the Tables below:

Storage stability	Preservative	Special measures
up to 24 months	Castrol Alpha SP 220 S	<p>Close gear unit, replace venting screw or air filter with a yellow plug screw, (replace the original parts before start-up)</p> <p>in the case of Tacolab seals the air gap between the cover and labyrinth ring on the drive must be closed using an adhesive tape.</p> <p>Storage in enclosed dry rooms.</p>
<p>For storage periods longer than 24 months, renew the preservative agent. For storage periods longer than 36 months, FLENDER should be consulted before.</p>		

Table 7.2: Preservation measures when using mineral oil or PAO base synthetic oil

Storage stability	Preservative	Special measures
up to 36 months	Special corrosion inhibitor oil TRIBOL 1390 1)	<p>Close gear unit, replace venting screw or air filter with a yellow plug screw, (replace the original parts before start-up)</p> <p>in the case of Tacolab seals the air gap between the cover and labyrinth ring on the drive must be closed using an adhesive tape.</p> <p>Storage in enclosed dry rooms.</p>
<p>For storage periods longer than 36 months, FLENDER should be consulted before.</p>		

Table 7.3: Preservation measures when using PG base synthetic oil

1) tropics-proof, saltwater-proof, ambient temperature max. 50 °C

7.3.1.3 Interior conservation procedure

- Switch the gear unit off and drain the oil as described in section 10. "Maintenance and repair".
- Drain oil from the oil-supply unit in accordance with separate Operating Instructions.
- Pour in the conservation agent given in Table 7.2 or 7.3 through the venting hole or the opening in the inspection cover until it reaches the top mark on the oil dipstick.
- Close the venting hole or the opening in the inspection cover.
- Start up oil-supply unit and gear unit without load for a short period of time.
- Unscrew screw plug from oil drain cock.

Note: Check condition of sealing ring (the sealing ring is vulcanized onto the oil drain plug); use new oil drain plug, if necessary.

- Open oil drain cock and empty preservative into a suitable container; dispose of preservative in accordance with regulations.



The conservation agent emerging from the gear unit may be hot. Wear gloves to avoid scalding.

- Close oil drain cock; reinsert screw plug into the oil drain cock.

Caution!

Before re-starting the gear unit, replace the plug screw with the venting screw or air filter. See also item 7.1.1

7.3.2 Exterior conservation

Duration of protection	Conservation agent	Layer thickness	Remarks
less than 12 months	Tectyl 846 K19	approx. 50 µm	Long-term wax-based conservation agent, resistant to sea water and tropical conditions (soluble with CH compounds)

Table 7.4: Exterior protection of shaft ends and other bare surfaces

7.3.2.1 Exterior conservation procedure

- Clean the surfaces
- For separation between the sealing lip of the shaft seal and the preservation, the shaft should be brushed with grease in way of the sealing lip.
- Apply conservation agent

8. Operation

Note: Observe the "Safety notes" in section 3.

8.1 General operating data

During operation, the unit must be monitored for:

- overheating (In continuous operation, the gear unit is designed for a temperature of 90 °C with mineral oil. For higher temperatures, synthetic oils must be used. The maximum short-term operating temperature is 100 °C. See also section 10.)
- changes in running noise
- possible oil leakage at the housing and shaft seals

and

- correct oil level (see section 7. "Start-up")

Note: To check the oil level, stop operation of gear unit. When the oil is hot, the oil level should slightly exceed the top mark of the oil sight glass. The oil level must, by no means, drop below the bottom mark of the oil sight glass; top up, if necessary.

Caution!

If any irregularities are noticed during operation, or if the pressure monitor in the oil-cooling system (if installed) triggers the alarm, switch the drive assembly off at once. Determine the cause of the fault using the table in section 9.

This table contains a list of possible faults, their causes and suggested remedies.

Should it not be possible to identify the cause, or the unit cannot be repaired with the facilities available, you are advised to contact one of our customer-service offices for specialist assistance. See section 11.

9. Faults, causes and remedy

Note: Observe the "Safety notes" in section 3.

9.1 General information on faults and malfunctions

Note: Faults and malfunctions occurring during the guarantee period and which require repair work on the gear unit, must be carried out only by FLENDER Customer Service. In the case of faults and malfunctions occurring after the guarantee period, and whose cause cannot be precisely identified, we advise our customers to contact our Customer Service.

Caution!

FLENDER will not be bound by the terms of the guarantee or otherwise be responsible in cases of improper use of the gear unit, modifications carried out without the consent of FLENDER, or use of spare parts not supplied by FLENDER.



To remedy faults and malfunctions, the gear unit must always be taken out of service.

Secure the drive assembly to prevent it from being started up accidentally. Attach a warning notice to the start switch.

9.2 Possible faults

Faults	Causes	Remedy
Changes in gear noise	Damage to gear teeth	Contact Customer Service. Check teeth on all components, replace any damaged parts.
	Excessive bearing play	Contact Customer Service. Adjust bearing play.
	Defective bearing	Contact Customer Service. Replace defective bearing.
Loud noises in area of gear-unit fastening	Fastening has worked loose	Tighten bolts / nuts to prescribed torque. Replace damaged bolts / nuts.
Increased temperature at bearing points	Oil level in housing too low	Check oil level at room temperature, top up if necessary
	Oil too old	Check date of last oil change, change oil if necessary. See section 10.
	Oil pump defective	Check oil pump or replace if necessary. Consult operating instructions for oil-supply unit.
	Bearing defective	Contact Customer Service. Check bearings and replace if necessary
Oil leakage from gear unit	Inadequate sealing of housing cover or joints	Check seals, replace if necessary, seal joints
	Radial shaft sealing rings defective	Check radial shaft sealing rings, replace if necessary

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Faults	Causes	Remedy
Water in oil	Oil froths in sump	Check oil state using test-tube method for water contamination. Have oil analysed by laboratory.
	Gear unit exposed to cold air from machine-room ventilator causing condensation	Protect gear unit with suitable insulation. Close air outlet or alter its direction.
Operating temperature too high	Oil level in housing too high	Check oil level and adjust if necessary
	Oil too old	Check date of last oil change, change oil if necessary. See section 10.
	Oil contaminated	Change oil. See section 10.
	Defective oil pump	Check oil pump or replace if necessary. Consult operating instructions for oil-supply unit.
Fault in oil-supply unit		Consult operating instructions for oil-supply unit

Table 9.1: Faults, causes and remedies

10. Maintenance and repair

Note: Observe the "Safety notes" in section 3.

10.1 General notes on maintenance

Note: Maintenance and repair work should be done with great care by trained and qualified personnel only.

Caution!

The periods stated in table 10.1 depend on the conditions under which the gear unit is operated. Only average periods can therefore be stated here. These refer to:

a daily operating time of	24 hours,
a duty factor of	100%,
an input-drive speed of	1500 1/min,
and a maximum oil temperature of	90 °C (mineral oil only)
	100 °C (synthetic oil only)

Note: Under different conditions, the frequencies stated below should be adjusted accordingly.

Measures	Periods	Remarks
Check oil temperature	Daily	
Check for unusual gear unit noise	Daily	
Check oil level	Monthly	
Check gear unit for leaks	Monthly	
Test oil for water content	After 400 service hours, once per year at least	See item 10.2.1
First oil change after start-up	After 400 service hours	See item 10.2.2
Subsequent oil changes	Every 18 months or 5000 service hours 1)	See item 10.2.2
Clean venting screw	Every 3 months	See item 10.2.3
Re-grease Taconite/ Tacolab seals	Every 3000 service hours, every 6 months at least	See item 10.2.4
Clean gear unit housing	Simultaneously with oil change	See item 10.2.5
Check tightness of fastening bolts	After first oil change, thereafter every second oil change	See item 10.2.7
Complete inspection of gear unit	Approx. every 2 years along with oil change	See item 10.2.8

Table 10.1: Maintenance and repair work

1) when using synthetic oils the periods can be tripled.

10.2 Description of maintenance and repair work

10.2.1 Test water-content of oil

For detailed information on testing the water-content of oil, apply to the lubricant manufacturer.

10.2.2 Changing the oil

Caution!

When changing the oil, always re-charge the gear unit with the same type of oil. Never mix different types of oil or oils made by different manufacturers. Never mix synthetic oils with mineral-based oils or with other synthetic oils. When changing from mineral-based oil to synthetic oil or from one type of synthetic oil to another, flush the gear unit well with the new type of oil beforehand.

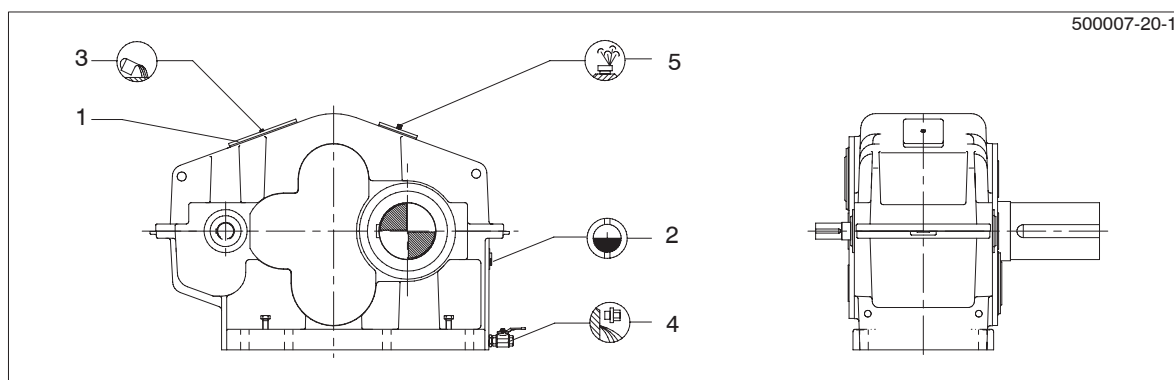
When changing the oil, the housing must be flushed with oil to remove sludge, metallic particles and oil residue. Use the same type of oil as is used for normal operation. High-viscosity oils should be heated beforehand. Ensure that all residues have been removed before filling with fresh oil.

Note: Drain the oil while it is still warm, i.e. immediately after switching the machinery off.

- Stop the gear unit by switching off the drive assembly



Secure the drive assembly to prevent it from being started up accidentally. Attach a warning notice to the start switch.



- | | | | | | |
|---|---------------------------------|---|-----------------------|---|----------------|
| 1 | Inspection
or assembly cover | 2 | Oil sight glass | 4 | Oil drain cock |
| 3 | Oil inlet | 5 | Venting or plug screw | | |

For a detailed illustration of the gear unit, refer to the drawings in the unit documentation.

- Place a suitable collecting vessel underneath the oil drain cock.
- Unscrew venting screw.
- Unscrew screw plug from oil drain cock.

Note: Check the condition of the sealing ring (the sealing ring is vulcanised onto the oil drain plug). If necessary, use a new oil drain plug.

- Open oil drain cock and discharge oil into the vessel.



The oil emerging from the housing is hot. Wear gloves to prevent scalding. Remove any oil spillage immediately with an oil-binding agent.

- Close oil drain cock; reinsert screw plug into the oil drain cock.
- Release the fastening bolts on the inspection or assembly cover and remove the cover (including seal) from the housing. Do not discard the seal.

Caution!

Top up gear unit with fresh oil using a filling filter (max. mesh 25 µm) until the top mark on the oil-sight glass has been reached.

Note: For the correct type of oil (of various brands) to be used refer to the operating instructions BA 7300 EN supplied separately. Information on the type, viscosity and quantity of the oil is given on the rating plate on the gear unit.

The quantity of oil stated on the rating plate is an approximation only. The marks on the oil sight glass indicate the prescribed oil quantity to be filled in.

Note: With gear unit fitted with oil-supply unit, the oil circuit must also be charged. Be sure to observe the Operating Instructions of the oil-supply unit.

- Check oil level on oil sight glass.

Note: The oil level should be at the top mark of the oil sight glass.



Remove any oil spillage immediately with an oil-binding agent.

- Place the inspection or assembly cover (including seal) on the housing and replace and tighten the fastening bolts (see item 10.2.7).
- Replace the venting screw

10.2.3 Cleaning the venting screw

Remove any dust which has collected on the venting screw. It should be cleaned at least every 3 months. To do this, the venting screw is removed, cleaned with benzine or similar agent and dried. It can also be cleaned by blowing out with compressed air.

10.2.4 Re-charging Taconite/ Tacolab seals with grease

- Stop the gear unit by switching off the drive assembly



Secure the drive assembly to prevent it from being started up accidentally. Attach a warning notice to the start switch.

- Inject approx. 30 g lithium-based bearing grease into each of the lubrication points of the Taconite/ Tacolab seal. The lubrication points are fitted with flat grease nipples type AM10x1 to DIN 3404.



Remove and dispose of any old grease emerging from the seals.

10.2.5 Cleaning the gear unit

- Stop the gear unit by switching off the drive assembly



Secure the drive assembly to prevent it from being started up accidentally. Attach a warning notice to the start switch.

- Remove any corrosion.

Caution!

Never clean the gear unit with high-pressure cleaning equipment.

10.2.6 Topping up oil

- Stop the gear unit by switching off the drive assembly



Secure the drive assembly to prevent it from being started up accidentally. Attach a warning notice to the start switch.

- Release the fastening bolts on the inspection or assembly cover and remove the cover (including seal) from the housing. Do not discard the seal.

Caution!

Top up gear unit with fresh oil using a filling filter (max. mesh 25 μm) until the top mark on the oil-sight glass has been reached.

Note: Always top up with the same type of oil as already in the gear unit (see item 10.2.2). Information on the type, viscosity and quantity of the oil is given on the rating plate on the gear unit.

Note: With gear unit fitted with oil-supply unit, the oil circuit must also be charged. Be sure to observe the Operating Instructions of the oil-supply unit.

- Check oil level on oil sight glass.

Note: The oil level should be at the top mark of the oil sight glass.



Remove any oil spillage immediately with an oil-binding agent.

- Place the inspection or assembly cover (including seal) on the housing and replace and tighten the fastening bolts (see item 10.2.7).

10.2.7 Check tightness of fastening bolts

- Stop the gear unit by switching off the drive assembly



Secure the drive assembly to prevent it from being started up accidentally. Attach a warning notice to the start switch.

- Check tightness of all fastening bolts with a torque wrench

The tightening torques of the hub screws are shown in the Assembly Drawing (see Section 1., "Technical Data").

Note: To be able to check the 4 internally arranged hub screws, the relevant bearing end cover has to be unscrewed. After having checked the tightening torque, the bearing end cover must be refitted oil-tight.

Thread size	Tightening torque	Initial tensioning force
M 42	4070 Nm	526000 N
M 48	6140 Nm	693000 N
M 56	9840 Nm	959000 N
M 64	14300 Nm	1268000 N
M 72 x 6	20800 Nm	1600000 N
M 80 x 6	28900 Nm	1950000 N
M 90 x 6	41650 Nm	2550000 N
M 100 x 6	57800 Nm	3200000 N

Table 10.2: Tightening torques and/or initial tensioning forces of the foundation bolts

All other bolts on the gear unit should be checked for tightening torques according to the table shown below:

Thread size	Strength class	Tightening torque (with $\mu = 0.14$)
M 10	8.8	49 Nm
M 12	8.8	86 Nm
M 16	8.8	210 Nm
M 20	8.8	410 Nm
M 24	8.8	710 Nm
M 30	8.8	1450 Nm
M 36	8.8	2530 Nm
M 42	8.8	4070 Nm
M 48	8.8	6140 Nm
M 56	8.8	9840 Nm
M 64	8.8	14300 Nm

Table 10.3: Tightening torques

Note: Damaged bolts should be replaced with new ones of the same type and strength class.

10.2.8 General inspection of gear unit

The general inspection of the gear unit should be carried out by the FLENDER Customer Service as our engineers have the experience and training necessary to identify any components requiring replacement.

Caution!

Assembly and/or disassembly of the DUORED helical gear unit must only be carried out by trained and qualified FLENDER personnel in accordance with the internal FLENDER assembly instructions and using the equipment required for such operations.

10.2.9 Oil-supply unit

Be sure to observe the Operating Instructions of the oil-supply unit.

10.3 Lubricants

The oil selected for use in the gear unit must be of the viscosity (VG class) stated on the rating plate. The viscosity class applies for the contractually agreed operating conditions.

FLENDER must be consulted for any change in operating conditions.

Note: For the correct type of oil (of various brands) to be used refer to the operating instructions BA 7300 EN supplied separately.

We are familiar with the composition of these lubricants and, as far as we are currently aware, they possess the properties with regard to bearing capacity, corrosion resistance, micropitting-bearing capacity and compatibility with seals and interior paint coatings which are necessary for the type of gear unit in question.

We therefore advise our customers to select one of the lubricants stated in the instructions BA 7300 EN, taking into account the VG class given on the rating plate.

Note: This recommendation is in no way intended as a guarantee for the quality of the lubricant supplied. Each lubricant manufacturer is responsible for the quality of his own product.

Should you not wish to follow our recommendation, you assume responsibility for the technical suitability of the lubricant used.

11. Spare parts, service facility addresses

11.1 Stocking spare parts

By stocking the most important spare and consumable parts on site, you can ensure that the gear unit is ready for use at any time.

To order spare parts, refer to the spare-parts list.

For further information, refer to the spare-parts drawing stated in the list.

We guarantee only the original list of spare parts supplied by us.

Caution!

Please note that spare parts and accessories not supplied by us have not been tested or approved by us. The installation or use of such products may therefore impair essential characteristics of the gear unit, thereby posing an active or passive risk to safety. FLENDER will assume no liability for damage caused by spare parts and accessories not supplied by FLENDER.

Please note that certain components often have special production and supply specifications and that we supply you with spare parts which comply fully with the current state of technical development as well as current legislation.

When ordering spare parts always state the following:

Order no. / Item	Type / Size	Part no.	Quantity
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11.2 Spare-part and service facility addresses

When ordering spare parts or the services of our specialist engineers, apply to FLENDER AG.

Adressen - Deutschland

(2007-03-01)

A. Friedr. Flender AG	Alfred-Flender-Straße 77 46395 Bocholt	Postfach 1364 46393 Bocholt	Tel.: (0 28 71) 92 - 0 Fax: (0 28 71) 92 - 25 96	contact@flender.com www.flender.com
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(2007-03-01)

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12. Declaration by the manufacturer

Declaration by the manufacturer

in accordance with EC Engineering Directive 98/37/EC, Appendix II B

We hereby declare that the components:

**DUORED-2 Helical Gear Units Types
SDNL, SDVL, SVNL, SVVL, SFNL, SFVL
Sizes 550 to 1200**

described in these Operating Instructions are intended for incorporation in a machine, and that it is prohibited to put them into service before verifying that the machine into which they are incorporated complies with the EC Directives (original edition 98/37/EG including any subsequent amendments thereto).

This Manufacturer's Declaration takes into account all the unified standards (inasmuch as they apply to our products) published by the European Commission in the Official Journal of the European Community.

Bocholt, 2007-06-20



Signature (Director HDE Engineering)