

Operation instructions for

Escalator gear units of the type range:

SOG180-0002 – SOG180-0007



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1 Introduction

1.1 Important instructions

These operation instructions are valid for escalator gear units of the GFC AntriebsSysteme GmbH, hereinafter called GFC, of the helical worm gear units and helical worm gear motors units with the article numbers SOG180-0002 to SOG180-0007. The observance of the following instructions and notes is the prerequisite for fault-free operation. Non-observance of these instructions voids all warranty claims.

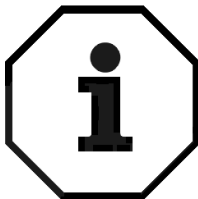
The warnings and notes, as well as the safety instructions included in these operation instructions have the following meaning:



Danger of electrical shock
Possible consequences:
Death or most severe injuries



Danger
Possible consequences:
Death, severe injuries or damage



Tips for use



Caution! The observance of the following operation instructions is the prerequisite for proper commissioning, maintenance and repair.



Instructions for disposal

The escalator gear units are designed in state-of-the-art technology and are supplied ready to operate. Any changes which affect the operational safety of the unit are not permitted. In general, the conditions for the operation of the gear unit stated in the order acknowledgement have to be observed.

Assembly, commissioning and maintenance work must only be carried out by trained personnel while observing

- **These operation instructions**
- **All the other operation instructions related to the present gear unit**
- **The currently valid national and regional instructions**

1.2 Safety instructions

In addition, the following safety instructions have to be observed:



- Work always has to be performed while the gear unit is switched off and protected against accidental start-up (key switch, sign).
- **Welding at the gear unit is not permitted and the gear unit must not be used for protective earth connection.**
- **Rotating parts must be protected against accidental contact.**
- **Under certain operation conditions, the surface temperature of the gear unit may rise up to 100 °C. Danger of burns!**
- **Faults at the gear unit (increased noise development, leaking oil, rising temperature, etc.) require an immediate shutdown.**
- **The manufacturer of the complete equipment is obliged to include these operation instructions in the operation instructions of the equipment.**

If the specified demands are not complied with, rotating parts of the gear unit can cause serious or fatal injuries.

2 Gear unit delivery

2.1 Design of the escalator gear unit with motor

Figure 2.1 shows the individual sub-assemblies of the SOG 180 gear unit.

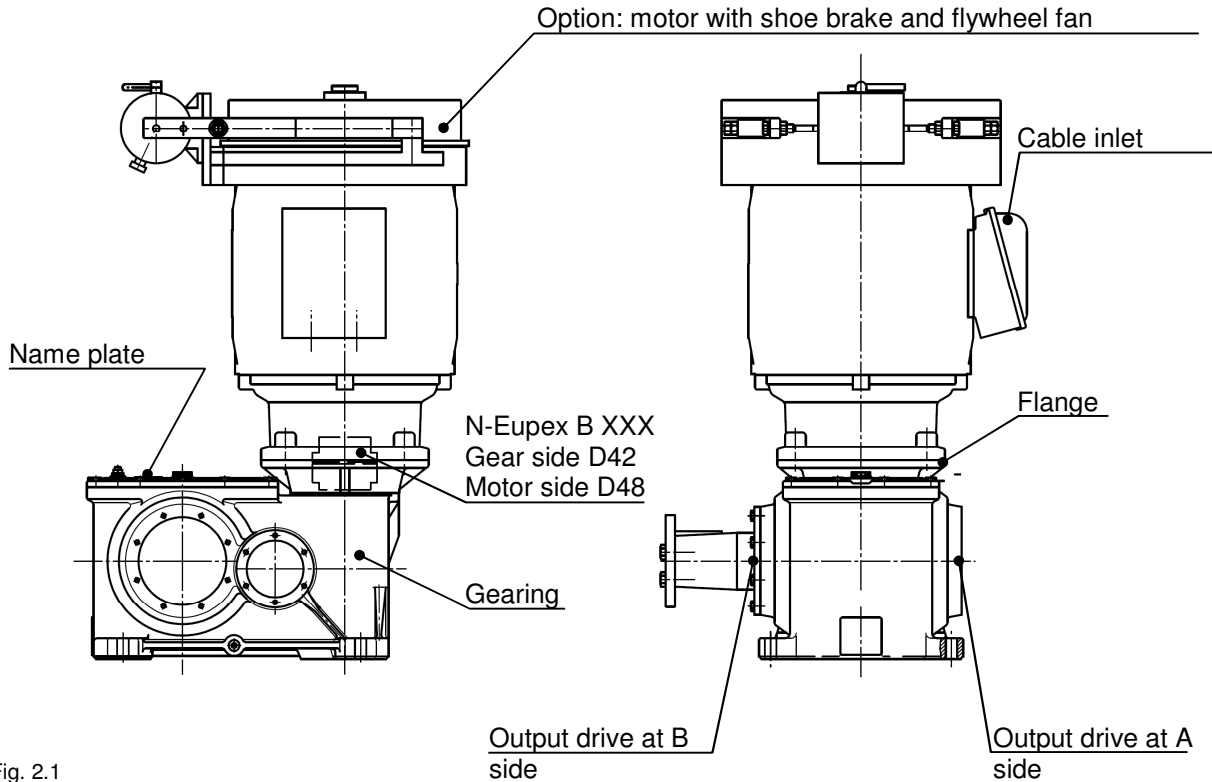


Fig. 2.1

2.2 Name plate

A name plate according to figure 2.2. is attached to each gear unit.

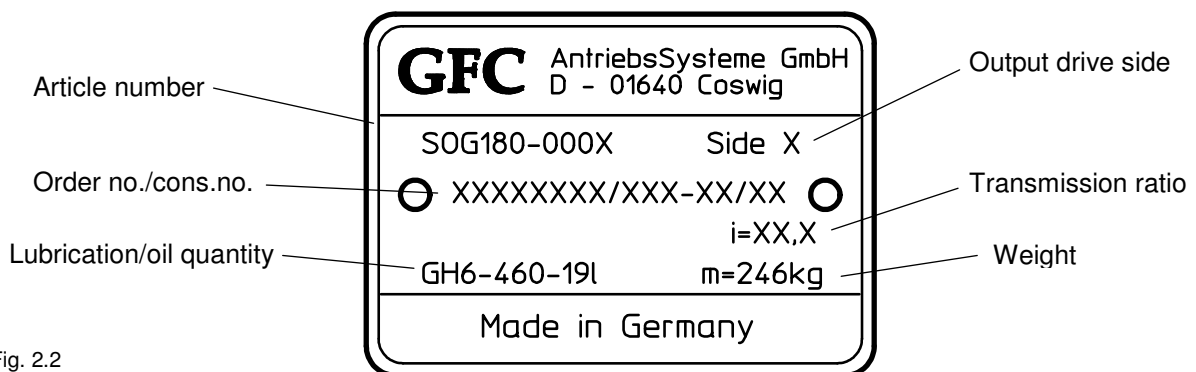


Fig. 2.2

2.3 Delivery state

Check the delivered products immediately upon receipt for transport damage and completeness. Advise the forwarding company or the customer service of GFC of any defects.

Before dispatch, each gear unit is submitted to a test run. During the warranty period, gear units may only be opened with prior consent of the manufacturer, otherwise all warranty claims will be void.

2.4 Protection

Protection of the internal parts of the gear unit:

Gear unit filled with oil ⇒ Sufficient for 36 months

Protection of the outer gear unit parts:

Uncoated parts ⇒ Sufficient for 6 months
External coating ⇒ 2-component coating based on polyurethane

Damage to the coating of the outer gear unit parts leads to failure of the corrosion protection and has to be touched up immediately.

The protection periods start immediately after the receipt of the gear unit.

2.5 Transport and storage



- **Transport gear units with great care. This is necessary to prevent injuries and property damage.**
- **The gear units may only be stored in closed rooms and on level surfaces.**
- **The gear units must not be stacked on top of each other.**
- **It must be ensured that the gear units are protected from direct sunlight and from damage caused by impact shocks or vibrations during storage.**
- **The relative humidity must not exceed 70 %.**

The storage time is limited by the periods specified in section 2.4. Correct re-application of the protective agent can extend the storage period.

2.5.1 Gear units without motor



Use suitable eye lugs for the transport of the gear unit. Ensure that they have been firmly screwed to the housing.

Weight of the helical worm gear unit and the eye bolts to be used:

Gear unit type	Weight [kg]	Eye lugs
Suspension point for SOG 180 gear unit with oil	approx. 250	1x M10/ 2x M12

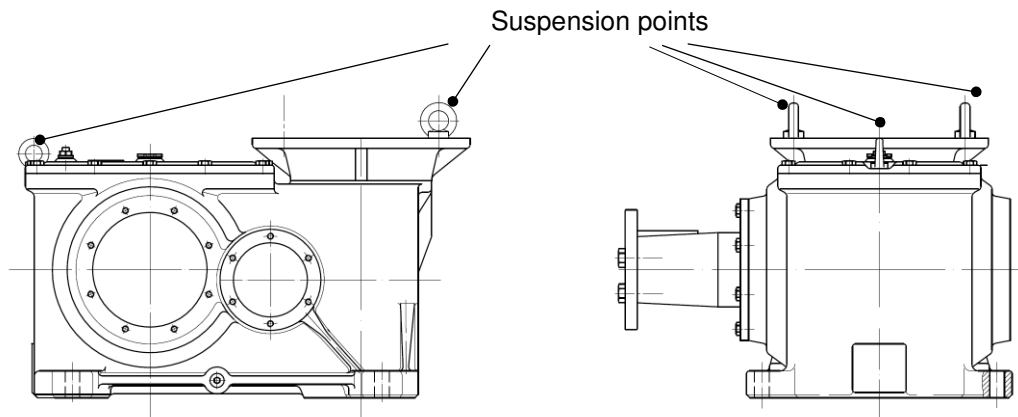


Fig. 2.3

2.5.2 Gear unit for motor



Use suitable webbing belts for transporting the gear unit with motor. Ensure that they have been firmly looped around the housing. Eye bolts in accordance with DIN 580 must not be used for safety reasons.

The total weight of the gear unit is added up from the data indicated on the name plates of the motor and the gear unit.

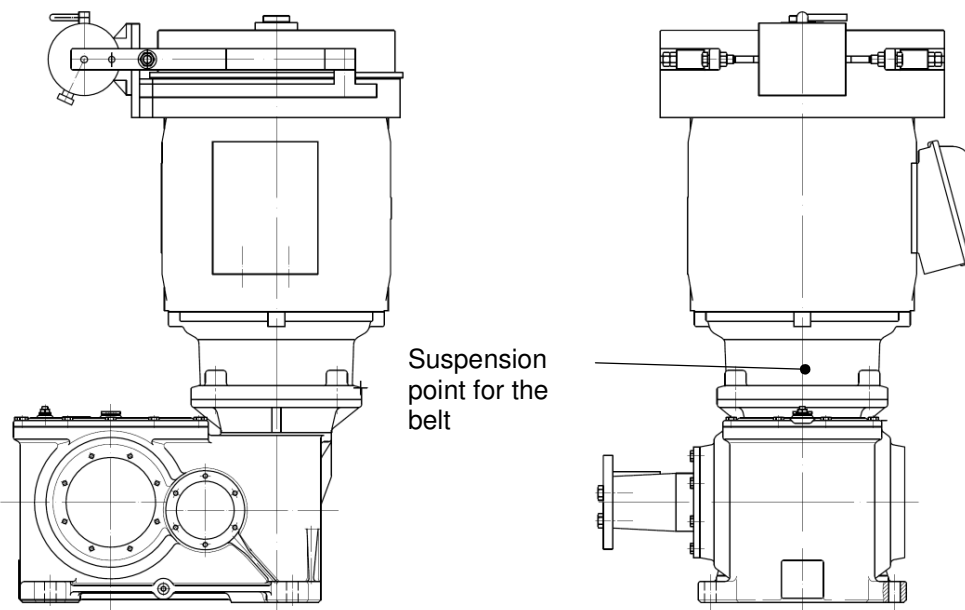


Fig. 2.4

3 Mounting the escalator gear units

3.1 Preliminary remarks

The gear unit may only be mounted if the following requirements are met:



- The indications on the name plate of the gear unit have to correspond to the values (power, output speed, transmission ratio, etc.) agreed on in the contract
- The gear unit must not be damaged
- Ambient temperature: -10°C to 40°C
- The installation location must be free of chemicals, acids,

The gear unit may only be mounted in position B3I (refer to section 4.2) since the construction and lubrication only suit this position.

The screw plug for draining oil and the vent screw plug with oil level indicator must be freely accessible.

3.2 Removing the protective agent

Before assembly, remove the corrosion protection agent from the uncoated parts. To achieve this, commercial cleaning agents can be used. To prevent the radial seals from being damaged, ensure that they do not come into contact with the cleaning agent.



- Due to danger of explosion, open fire is not permitted.
- Sufficient ventilation must be provided when removing the protective agent.

3.3 Machine frame

The gear unit is to be fitted on an even, vibration absorbing and rigid machine frame. The base must be designed for the acting weights and torques so that no additional loads resulting from distortion or twisting can act on the gear unit.

The sizing of the through connection for fastening the gear unit is made in accordance with VDI 2230; screws with a strength class ≥ 10.9 have to be used. Ensure that the nuts used correspond to at least the strength class of the screws used. The following fastening torques are recommended for the bolts used:

Gear unit type	SOG 180
Thread size Connecting bolt	M 20
Fastening torque [Nm] Connecting bolt	600

4 Assembly/commissioning

4.1 General instructions



- Deviating ambient temperatures are not permitted, please contact GFC.
- Safe operation can be ensured when observing the specifications on the name plate.
- The gear unit must not be exposed to heat accumulation and waste heat from other devices with temperatures exceeding 40 °C.

4.2 Operating position

Before commissioning, the gear unit has to be checked for the proper oil level. For the oil level required for the mounting position B3I, please refer to figure 4.1. To check the oil level, remove the vent plug with the oil level indicator (refer to section 6.3).

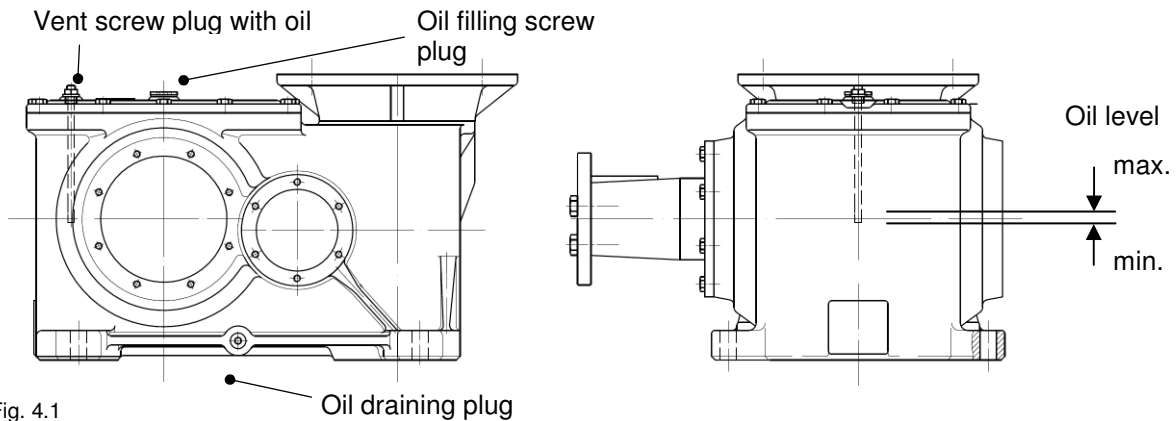


Fig. 4.1

4.3 Radial force acting upon the output drive

The permissible direction of movement of the resulting radial forces is determined in an angle of 25° to 35° (refer to figure 4.2). The equivalent radial load on the drive shaft is determined by the torque and the pitch circle diameter of the mounted transmission element.

Max. permissible equivalent radial load	
Gear unit type	F_R [N]
SOG 180	25000

F_R = equivalent radial load in N
 T = torque in Nm
 d = pitch circle diameter of the mounted transmission element in mm

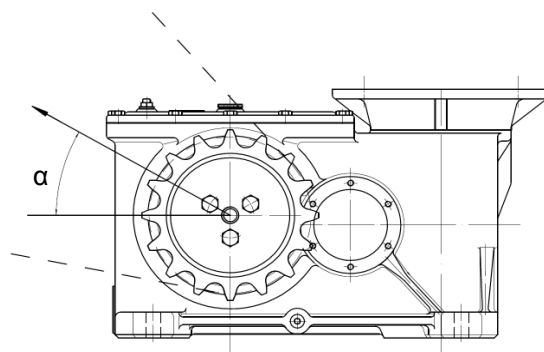


Fig. 4.2



- Bearings and shafts can be damaged if the permissible radial force is exceeded.
- Thrusts acting upon the output drive shaft are not permissible.

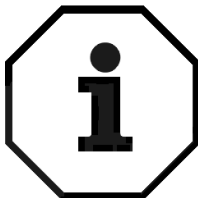
4.4 Connecting the motor

The gear unit with solid shaft as drive shaft is suitable for mounting a motor with coupling. When mounting the motor with coupling, a suitable anti-seizing compound, e.g. FUCHS LUBRITECH Gleitmo 800 must be applied to prevent frictional corrosion. The bolts required for the bolt connection of the flange, strength class ≥ 8.8 , are listed in the following table.

Gear unit type	SOG 180
Thread size	M12
Fastening torque [Nm]	76 – 94



Do not under any circumstances attempt to mount by striking with a hammer as this would cause damage to the tooth profiles, roller bearings, housing, and shaft.



The coupling can be mounted by means of a fitting tool or by heating the appropriate part. We recommend the use of flexible couplings to compensate for small inaccuracies in assembly. The couplings should be subject to static balancing, if possible.

- 1 Gear shaft end
- 2 Axial bearing
- 3 Coupling hub

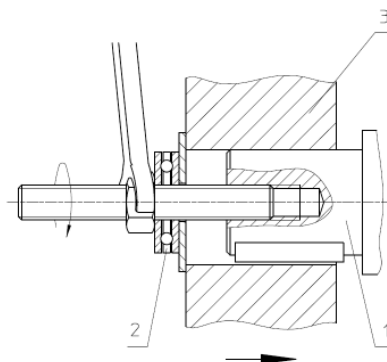


Figure 4.1



The operation instructions of the motor manufacturer and the coupling manufacturer have to be observed.



Work at the terminal box and live parts may only be carried out by trained personnel while observing the valid regulations.

5 Commissioning



Before commissioning, the oil level specified in accordance with the design has to be checked and adjusted, if necessary.

5.1 Running-in procedure

Before starting operation, check that the ventilation provided is not blocked by paint residues or other deposits. A blocked vent screw plug area leads to increased inner pressure and thus to leaks. Each gear unit should be run-in with no load for some time first and then at approx. 50% of the rated load for several hours. If, for certain circumstances, operation at partial load is not possible, the gear should be repeatedly stopped once an oil temperature of approx. 80 – 90 °C is reached. The specified characteristic values for the gear can only be transmitted by well-run-in gear units.

5.2 Checking the gear unit

During the running-in procedure, check the gear unit for

- **unusual noise and vibration**
- **the formation of smoke and vapour**
- **temperature (permissible operating temperature of approx. 110 °C)**

After the running-in procedure, check the gear unit for tightness.

5.3 Check list for commissioning

Inspection		Information	Date: Signature:
Does the identification of the gear unit meet the requirements of the specification?	yes/no	Section 2.2	
Is there any damage visible at the gear unit?	yes/no	Section 2.3	
Have all mounting instructions been observed and performed?	yes/no	Section 3	
Does the operating position of the gear unit correspond to the actual mounting position?	yes/no	Section 4.2	
Does the oil level correspond to the mounting position?	yes/no	Section 4.2	
Do the external radial forces meet the permissible specifications?	yes/no	Section 4.3	
Has a gear unit inspection been performed?	yes/no	Section 5.2	

Inspection/maintenance

6 Inspection and maintenance

6.1 General maintenance instructions

The maintenance of the gear units covers the following inspection and maintenance tasks indicated in section 1.

Intervals	Measures	Remarks
After 2,000 operation hours	- Oil change	Refer to section 6.4
Every 3 months	- Check oil and oil level	Refer to section 6.3
	- Clean the vent screw plug	Refer to section 6.5
	- Clean gear unit	
	- Check bearings and tothing for signs of overheating and unusual noise	Refer to section 6.7
	- Check seals visually for leakage	Refer to section 6.6
Every 12 months	- Check painting visually for damage	Damage to painting has to be touched up immediately to avoid corrosion
	- Check fastening screws for proper fit	Refer to section 3.3 Tools: Torque wrench
Every 15,000 operation hours, at least every 60 months	- Synthetic oil change	Refer to section 6.4

The inspection intervals mentioned above are part of the conditions of warranty.

Only use original GFC spare parts for maintenance work. Refrain from any modifications, since otherwise safe operation of the equipment may not be guaranteed.

6.2 Lubrication instructions

The gear unit is lubricated with splash lubrication. This type of lubrication ensures that the roller bearings are automatically supplied with oil.



Ensure that no mineral oil is used in gear units which have been designed for synthetic lubricants. In addition, it is not permissible to mix mineral and synthetic oils. When changing or refilling oil, the oil used has to meet the requirements specified on the name plate.

Oil quantity for operating position B3I

Gear unit type	Volume [l]
SOG 180	19

Fastening torques [Nm]

Vent screw plug with oil level indicator	40
Oil draining plug	40
Oil filling screw plug	170

Inspection/maintenance

6.3 Oil level check and oil check

1. The oil level check may only be performed if the gear unit has **cooled down** and is at **standstill**.
2. Open oil draining screw plug and remove some oil
3. Check oil quality (colour, solids content)
⇒ Change oil if required (see section 6.4 "Oil change")
4. Check filling level:
 - 4.1 Remove vent screw plug with oil level indicator (for the position, refer to section 4.2)
 - 4.2 Check and correct oil level if required (Before reading the filling level, fully screw in the oil level indicator.)
 - 4.4 If the sealing ring is damaged, replace by a new one.
 - 4.5 Fit vent screw plug with oil level indicator and seal while observing the appropriate torque (see section 6.2).



After long-term operation under full load, it may be possible that the oil level slightly exceeds the upper mark. In this case, the oil may not be drained despite the increased oil level.

6.4 Oil change

Oil must be changed while the gear unit is still warm, otherwise high oil viscosity will render complete oil draining difficult.

The oil to be filled in must have a minimum temperature of 20 °C.



- **Before starting the oil change ensure that the surface of the gear unit is only lukewarm, otherwise there will be a serious danger of burning due to hot oil!**
- **All screws have to be fitted with a seal and the respective torque (refer to section 6.2).**

For the position of the screw plugs and vent screw plugs, refer to section 4.2.

1. Place a collecting basin underneath the oil draining screw plug.
2. Remove the oil draining and vent screw plugs.
3. Drain oil completely.
4. Rinse gear unit with low-viscosity oil
⇒ Check compatibility with the lubricant used
5. Screw in oil draining screw plug.
6. Fill new oil through vent hole.
⇒ Lubricant table (refer to section 6.7.)
⇒ Check via oil level indicator (see section 6.3)
7. Fit vent screw plug with oil level indicator and seal while observing the appropriate torque (see section 6.2).

Inspection/maintenance

6.5 Cleaning the vent screw plug



Use common cleaning agents for cleaning. The handling of open fire is strictly prohibited and sufficient ventilation must be provided since there is an increased danger of explosion.

6.6 Visual inspection for leakage

Check the gear unit for oil leakage. The gear unit cover and the radial seals have to be checked in particular. Should any traces of leaking oil be found, clean the gear unit and check again after 24 hours. In case this problem persists, please contact the customer service of GFC.

6.7 Bearing and tothing check



The check has to be performed while the gear unit is running.
The distance to the gear unit must be selected as to avoid any contact with the rotating parts.

The gear unit is checked for unusual noise and vibration. Should they occur, the gear unit has to be shut down immediately. Please contact the customer service of GFC.

6.8 Lubricant selection and lubricant table

Refer to the following table to determine the lubricant to be used at an ambient temperature of – 10 °C to +40°C. For other temperatures, a suitable lubricant has to be selected by GFC.

Lubricant	Marking DIN 51517/3 or DIN 51825	Aral	BP	Optimol	Klüber	Mobil	Shell
Synthetic oil	PG 460	Degol GS460	BP Energol SG- XP460	Optiflex A 460	Klübersynth GH6- 460	Mobil Glygoyle HE 460	Shell Tivela S 460

The companies are listed in alphabetical order and so there is no correlation between the sequence of names and the oil quality. We recommend using these lubricants or equivalents.

It is important to observe the required oil type (PG).

However, we cannot guarantee that each lubricant selected is perfectly suitable.

6.9 Spare parts

To procure the correct spare parts, the serial and article numbers of the gear unit stated on the name plate are required.

Only use original GFC spare parts for repair and maintenance tasks; otherwise a safe function of the gear unit cannot be guaranteed. All warranty claims are void if the maintenance work has not been carried out correctly or if unapproved spare parts have been used.

7 Faults

7.1 General instructions



In case of faults, the safety instructions in section 1 have to be observed.



During the warranty period, repairs may only be performed by the manufacturer. If you would like to perform repairs yourself, please contact the GFC customer service.

7.2 Possible occurring faults

Fault	Possible cause	Measures
Oil leaks at the gear unit	<ul style="list-style-type: none"> - Defective radial seals - Dirty or defective air vent 	<ul style="list-style-type: none"> - Clean the air vent - Contact GFC customer service
Oil leaks at the screw plugs	<ul style="list-style-type: none"> - Screw plugs not properly screwed in 	<ul style="list-style-type: none"> - Check fastening torques and radial seals
Oil leaks at the air vent	<ul style="list-style-type: none"> - Incorrect oil level or wrong oil - Unfavourable mounting position 	<ul style="list-style-type: none"> - Check oil and oil level
Increased operating temperature	<ul style="list-style-type: none"> - Mounting distances too low - Additional heat supplied - Damage to tothing or bearing - Oil level too low - Outdated or contaminated oil 	<ul style="list-style-type: none"> - Contact GFC customer service - Check oil level - Change oil
Blows or unusual vibration	<ul style="list-style-type: none"> - Defective motor coupling or gear support 	<ul style="list-style-type: none"> - Check coupling and gear support
Unusual running noise or vibration	<ul style="list-style-type: none"> - Oil level too low - Damage to tothing or bearing - Changed bearing backlash 	<ul style="list-style-type: none"> - Contact GFC customer service - Check oil level
Output drive shaft does not turn despite turning drive shaft	<ul style="list-style-type: none"> - Defective coupling - Broken gear axle 	<ul style="list-style-type: none"> - Contact GFC customer service

8 Disposal



- ⇒ Housing parts, gear wheels, shafts as well as roller bearings are to be disposed of as scrap steel
- ⇒ Parts made of cast iron are also to be disposed of as scrap steel, in case there is no separate collection
- ⇒ Worm wheels made of bronze have to be disposed of accordingly
- ⇒ Used oil and cleaning cloths have to be collected and disposed of in accordance with the applicable environmental regulations