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## 1. Introduction

These operation instructions apply to all GFC elevator gear units. 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**



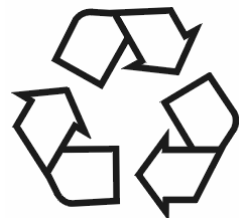
**Danger**  
**Possible consequences:**  
**Death, severe injuries or damage**



**Tips for use**



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



**Instructions for disposal**

**The elevator 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.**

The assembly, commissioning and the 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

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 touching
- Under certain operation conditions the surface temperatures of the gear unit may rise to 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



The GFC gear units are double-stage geared motors whose outstanding feature is a very high efficiency due to the selected reduction ratio. When releasing the brake, small deviations in the rope torque are sufficient to move the elevator.

**An operation of the elevator without safety catch is impermissible. When sizing the safety catch it has to be ensured that the brake remains fully operable.**

**In case of non-observance of the mentioned requirements, live or rotating parts of the gear unit may cause severe or lethal injuries.**

## 2. Gear unit delivery

### 2.1 Design of the elevator gear unit

GFC elevator gear units are designed for the operation at a frequency converter in the elevator shaft or in the machine interior. Figure 1 shows the individual sub-assemblies of the gear unit SSMVD (pinion gear – worm gear motor)

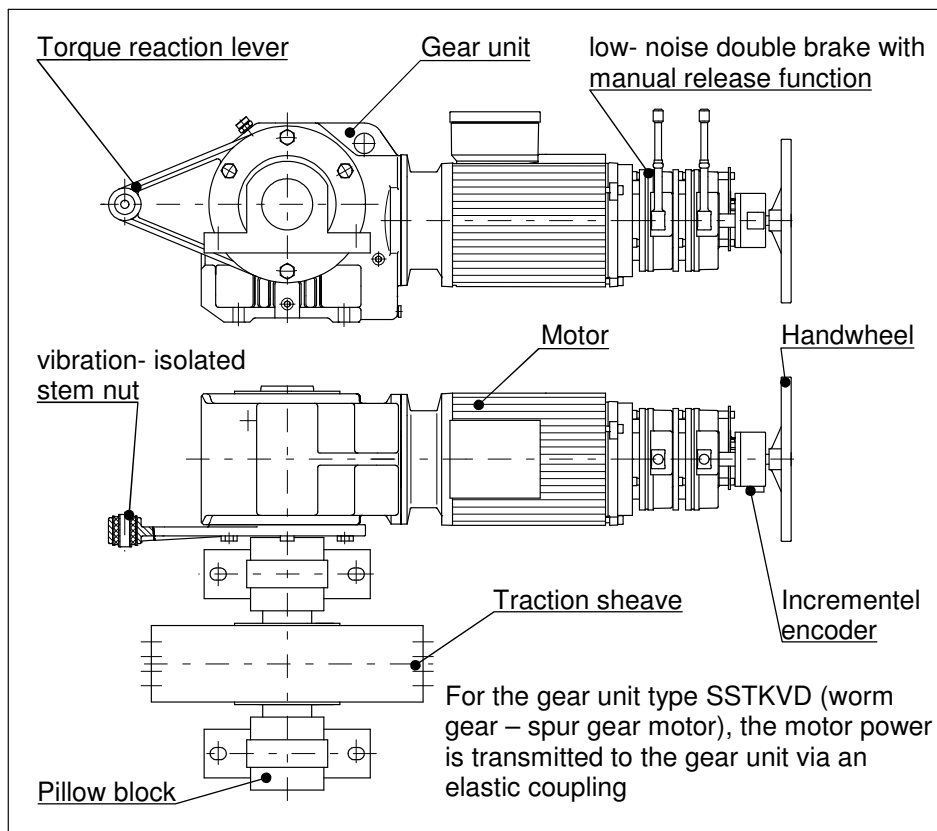


Figure 1

## 2.2 Name plate

Each gear unit has a name plate. The figure 2 shows the standard name plate. Deviations from this standard must be agreed on with GFC.

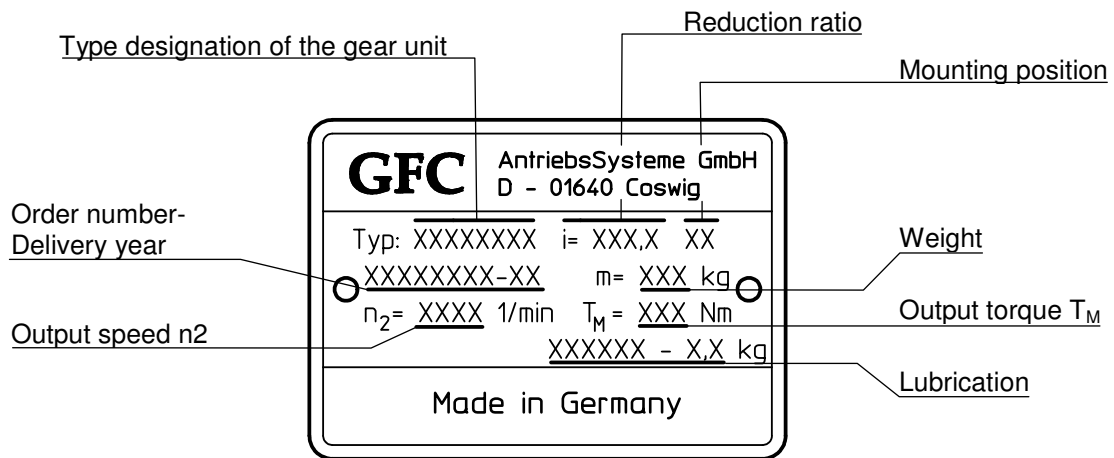


Figure 2

## 2.3 Delivery state

Check the products delivered immediately upon receipt for transport damage. Inform the forwarding company about 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 → long term protection
- Gear unit without oil filling → sufficient for 12 months

Protection of the outer gear unit parts:

- Bright 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



**Use suitable ropes, hooks and lifting devices with appropriate load bearing capacity when transporting the gear units.**

Summary list of the individual dimensions of the elevator gear unit:

Individual parts	SSMVD 80	SSMVD 100	SSMVD 125	SSMVD 160	SSMVD 250	SSTKVD 97	SSTKVD 118	SSTKVD 150
Gearing	47	83	128	204	660	54	95	157
Motor - 100M4	29	29				29	29	
Motor – 100LX4	39	39				39	39	
Motor – 112M4	46	46	46			46	46	46
Motor – 112MX4		58	58	58			58	58
Motor – 132M4		80	80	80			80	80
Motor – 132L4			98	98				98
Motor – 160M4			135	135				135
Motor – 160L4				160				
Motor – 180M4				217				
Motor – 180L4				240				
Motor – 225ME (17.0...45.0 kW)					420			
Traction sheave D330/...x110	28							
Traction sheave D330/...x158		50	50				50	50
Traction sheave D400/...x118		45	45	45		45	45	45
Traction sheave D450/...x118		75	75	75		75	75	75
Traction sheave D520/...x118		65	65	65		65	65	65
Traction sheave D520/...x158		95	95	95		95	95	95
Traction sheave D600/...x118		121	121	121		121	121	121
Traction sheave D600/...x138		145	145	145		145	145	145
Traction sheave D640/...x160					160			
Traction sheave D640/...x240					230			
Traction sheave D700/...x160					175			
Traction sheave D800/...x160					199			
Traction sheave D905/...x160					291			

For the transport of the gear unit at least three of the suspension points shown in the illustration have to be selected. In any case the traction sheave is to be used as suspension point with an appropriate webbing. Depending on the mounting position, the other suspension points must be selected.

For gear unit type SSMVD250, two eye lugs M30 can be screwed into the housing, since the cast-in eye is – as for the other gearing types - not available.

When using eye lugs, ensure that they have been firmly bolted to the housing.

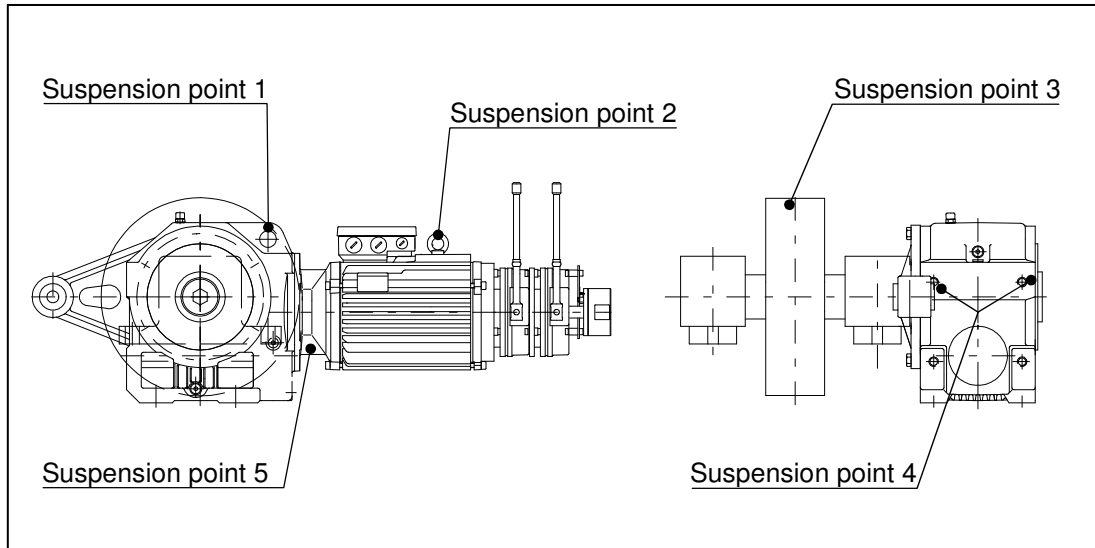


Figure 3

- |                     |                                  |
|---------------------|----------------------------------|
| Suspension point 1: | Use suspension chain             |
| Suspension point 2: | Use suspension chain or webbing  |
| Suspension point 3: | Use webbing                      |
| Suspension point 4: | Use eye lug and suspension chain |
| Suspension point 5: | Use webbing                      |



**Take great care when transporting the gear units to prevent injuries and damage.**

The elevator 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 subclause 2.4. Correct re-application of the protective agent can extend the storage period.

### 3. Installation of the elevator gear unit

#### 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 (voltage, frequency, torque, output speed, reduction ratio) agreed on in the contract
- The gear unit is free of damage
- Ambient temperature: - 10 °C to 40° C
- Installation location must be free of chemicals, acids, gases, etc.

The gear unit must only be mounted in the position stated in the order (refer to para 4) since the construction and lubrication suit only this position.

The screw plug for checking the oil level, for draining oil and for venting must be freely accessible.

#### 3.2 Removal of the protective agent

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

Due to the danger of explosion, open fire is not permitted and sufficient ventilation must be provided.

### 3.3 Base / machine frame

The gear unit is to be fitted on an even, vibration absorbing and rigid base. The base must be designed for the weights and torques so that no additional loads resulting from distortion and twisting can act on the gear unit. The following design is based on the following bearing load of the pillow block on the clamping surface.

Gear unit type	SSMVD 80 SSTKVD 97	SSMVD 100 SSTKVD 118	SSMVD 125 SSTKVD 150	SSMVD 160	SSMVD 250
Thrust [kN]	13	25	37	52	92

The calculation of the screwed or through bolt connection used for fixing the pillow blocks is performed in accordance with VDI standard 2230; use bolts with a strength class of  $\geq 8.8$ . When using through bolt connections, ensure that the nut corresponds at least to the strength class of the bolt. Following fastening torques are recommended for the bolts used: (The connecting bolts are fit in factory with the corresponding fastening torque).

Gear unit type	SSMVD 80 SSTKVD 97	SSMVD 100 SSTKVD 118	SSMVD 125 SSTKVD 150	SSMVD 160	SSMVD 250
Thread size Connecting bolt	M12	M16	M16	M20	M24
Tightening torque (Nm) Connecting bolt	90	220	220	430	750
Thread size Connecting bolt	M10	M12	M12	M12	M20
Tightening torque (Nm) Connecting bolt	50	90	90	90	430

## 4. Assembly/ commissioning

### 4.1 Fitting of the torque reaction lever

The output torque must be taken up by a torque reaction lever mounted onto the housing by means of an elastic component.

The fastening bolt for the torque reaction lever has to be fixed on both sides. When designing the support for the bolt the following forces have to be accounted for.

Gear unit type	SSMVD 80 SSTKVD 97	SSMVD 100 SSTKVD 118	SSMVD 125 SSTKVD 150	SSMVD 160	SSMVD 250
Thrust [kN]	7.1	10.8	16.2	21.2	55.8

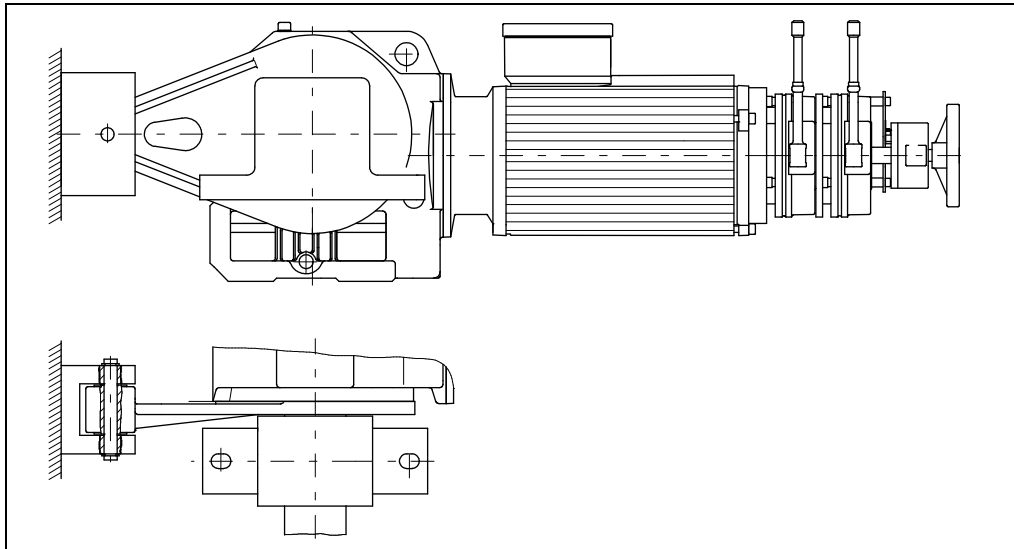


Figure 4



**Distortion of the torque reaction lever in axial direction is not permissible!**

#### 4.2 Oil level

If the vent screw plug is not fitted it has to be screwed into the housing according to the operating position.

Before commissioning, the gear unit has to be checked for the proper oil level. For the oil levels required for the respective mounting position, please refer to figures 5 to 7. To check the oil level remove the respective screw plug.

⇒ Gear unit type SSMVD80 ... SSMVD160

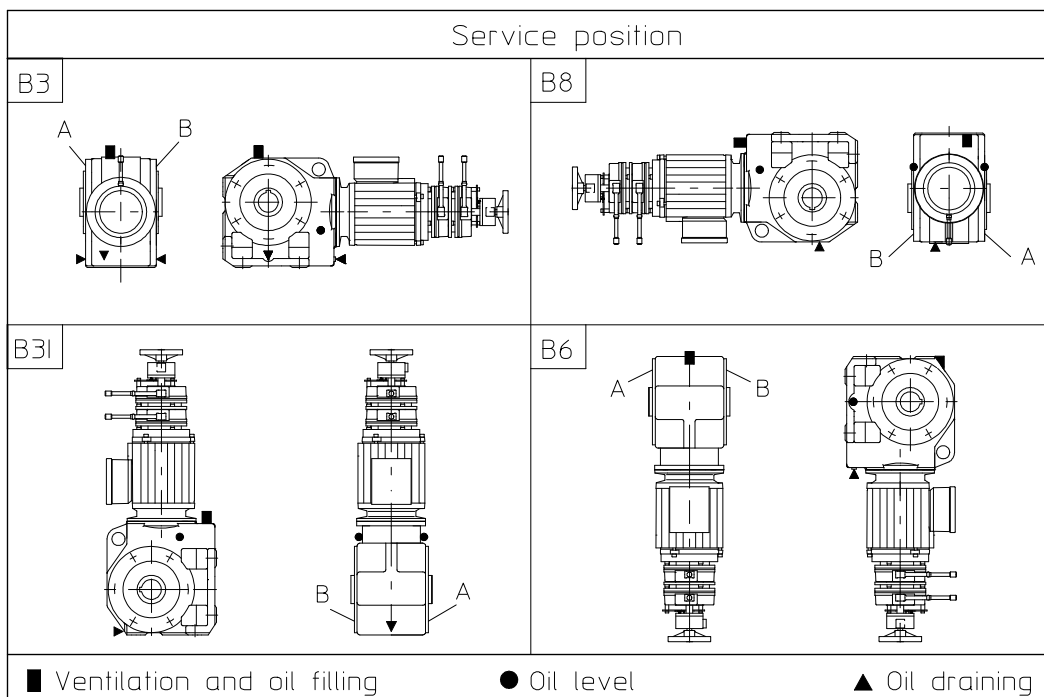


Figure 5

⇒ Gear unit type SSMVD250

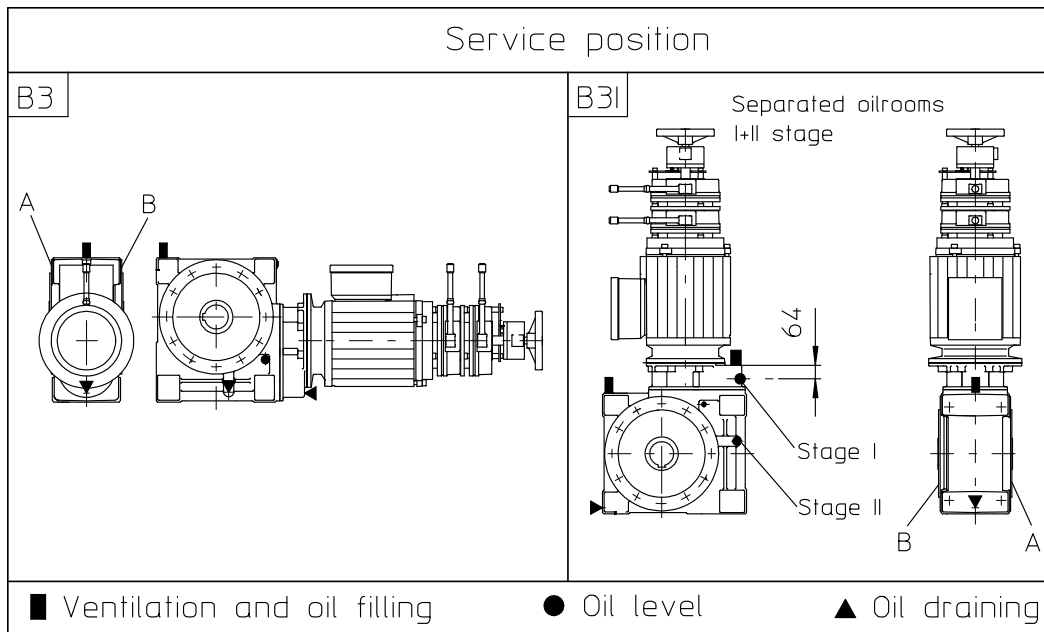


Figure 6

⇒ Gear unit type SSTKVD97 ... SSTKVD150

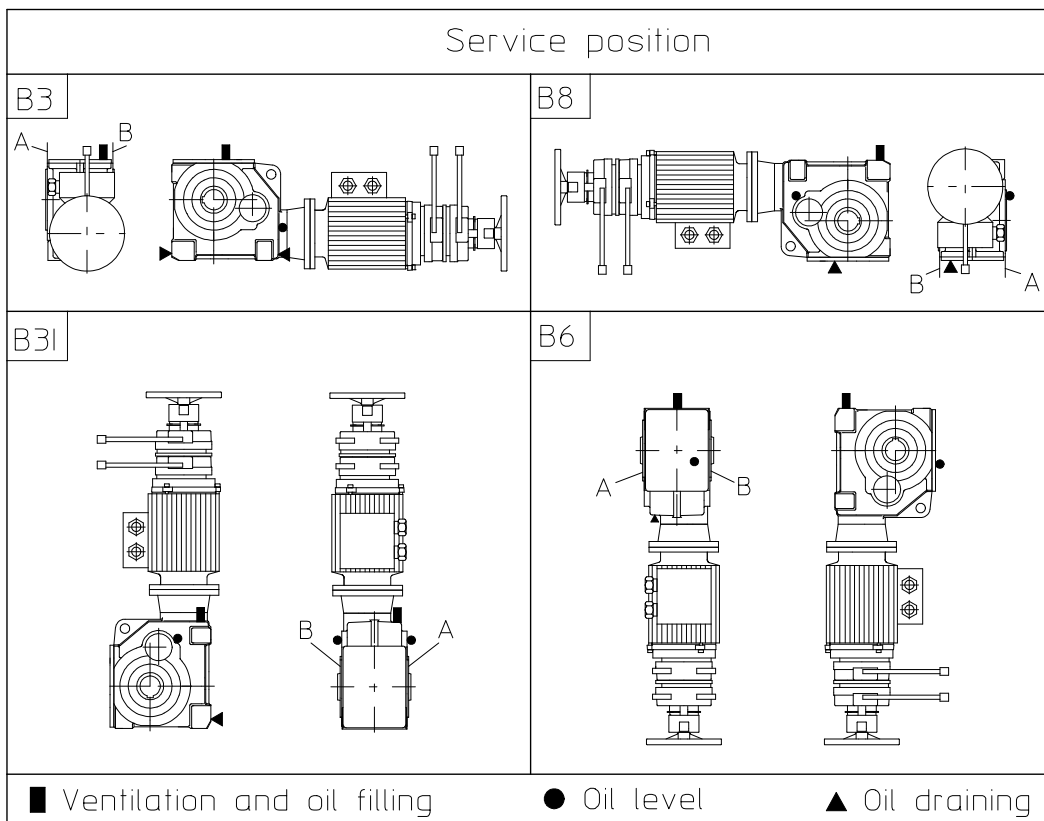


Figure 7

### 4.3 Connection of the motor



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

A circuit diagram is enclosed in the terminal box of all motors. This shows how the motor should be connected.

It has to be checked whether the enclosure protection type of the motor as indicated on the name plate is adequate for the actual ambient conditions.

It is strongly recommended to use a protective motor switch to safeguard against overload or phase failure. The overload relay must be set to the rated current at the respective rated voltage (see name plate). In addition, the motor temperature should be monitored using PTC thermistors or thermostats.

### 4.4 Connection of the brake

The brake is connected according to the terminal plan in the terminal box.



When carrying out work on the brake, the operation instructions have to be observed to ensure proper function and to prevent injuries and damage.

### 4.5 Connection of the incremental sensor

For the pin assignment of the incremental sensor, please refer to the housing.



**The sensor must not be exposed to forces resulting from improper transport, fitting etc., since it may then either be destroyed or damaged.**

## 5. Pillow block

### 5.1 Clamping surface

To ensure the operational safety and a long service life of the bearings, we recommend to manufacture the clamping surface with a mean roughness  $R_a \leq 12.5 \mu\text{m}$ . The planeness tolerance, measured diagonally, should correspond to IT 7.

### 5.2 Load capacity of the pillow blocks

The max. axle load assigned to the gear unit type may not be exceeded.

Gear unit type	SSMVD 80 SSTKVD 97	SSMVD 100 SSTKVD 118	SSMVD 125 SSTKVD 150	SSMVD 160	SSMVD 250
max. axle load [kN]	20	35	50	70	110

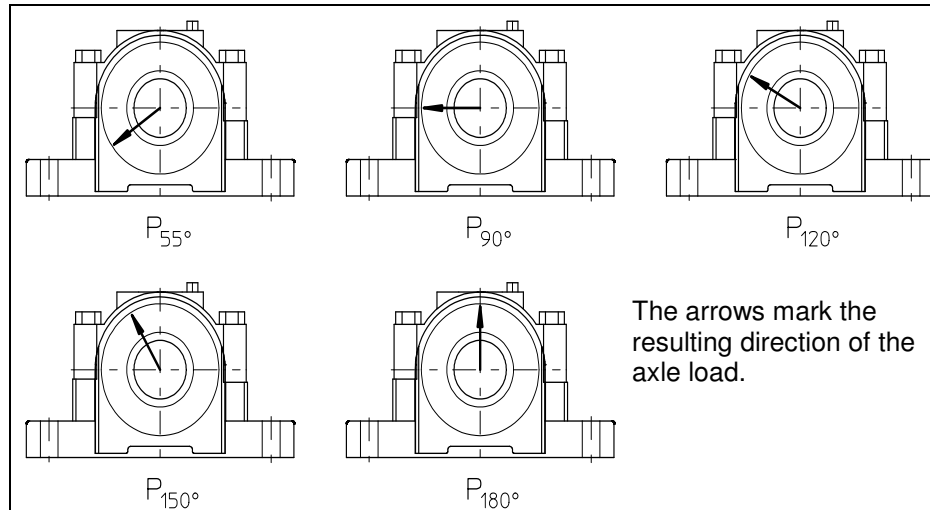


Figure 8



**For load directions ranging from 55° to 150°, the pillow blocks have to be secured on the clamping surface using pins or end stops in load direction.**

### 5.3 Lubrication

The spherical roller bearings are lubricated in the factory with the suitable amount of grease.

The grease should be changed during the regular check after approx. 15.000 operation hours. For this, the traction sheave must be released so that the connection bolts at the pillow blocks can be removed. In order to avoid any danger, work on at the second pillow block can only be started after the first block has been completely assembled. The defined fastening torques according to para 3.3 must be observed. If required, grease can be refilled into the housing using the screwed-in grease nipple AH 1/8-27PTF DIN71412.

As lubricant, a high quality anti-friction bearing grease based on lithium soap consistency class according to DIN 51825 must be used (refer to para 8.2.4).

Gear unit type	SSMVD 80 SSTKVD 97	SSMVD 100 SSTKVD 118	SSMVD 125 SSTKVD 150	SSMVD 160	SSMVD 250
Lubricant quantity (g)	75	180	230	280	1000
Max. refiling quantity (g)	10	20	20	25	80

## 6. Traction sheave

If not stipulated otherwise in the order acknowledgement, the elevator manufacturer is responsible for the calculation of the traction capability and the specific groove pressure of the traction sheave.

## 7. Operation



**In case of problems during operation the drive has to be switched off immediately. Special attention should be paid to the noise, the operating temperature and oil leakages.**

If occurring faults cannot be located or the repair not be carried out, we recommend calling a service technician.

## 8. Inspection and maintenance

### 8.1 General maintenance instructions

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

Measure	Intervals	Comment
Check oil level	every 3 months	refer to para 4.2
Oil change	refer to para 8.2.1	refer to para 8.2.3
Clean outside of vent screw plug	every 3 months	Use naphtha or similar 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.
Clean gear unit	every 12 months	
Check fastening bolts for proper fit	every 12 months	Fastening torques according to valid regulations (e.g. VDI 2230) or para 3.3 Tools: Torque wrench
Check the grooves of the traction sheave for wear	every 3 months	refer to para 8.3

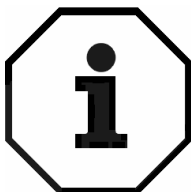
The inspection intervals mentioned above are part of the conditions of warranty.

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

### 8.2 Lubrication

#### 8.2.1 Lubrication instructions

The gearbox 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 change intervals:

Mineral oil:

1<sup>st</sup> oil change ⇒ after approx. 500 operation hours  
 further oil changes ⇒ after approx. 4,000 operation hours or 15 months

Synthetic oil:

1<sup>st</sup> oil change ⇒ after approx. 1,000 operation hours  
 further oil changes ⇒ after approx. 15,000 operation hours or 60 months

### 8.2.2 Checking the oil

1. Open oil draining screw plug and remove some oil
2. Check oil quality (colour, solids content)  
 ⇒ change oil if required (see para 8.2.3)
3. Check filling level
  - Loosen oil level plug → position see para 4.2
  - Check and correct oil level if required
  - Screw in oil level checking screw plug

### 8.2.3 Initial filling and oil change

⇒ Oil quantities in dependence of the operation position

Gear unit type	Operation position							
	B3		B3 I		B6		B8	
	l	kg	l	kg	l	kg	l	kg
SSMVD80	0.9	0.95	3.0	3.1	3.2	3.3	3.0	3.1
SSMVD100	1.7	1.8	5.4	5.7	5.0	5.3	4.3	4.5
SSMVD125	4.0	4.2	10.2	10.7	8.6	9.1	7.7	8.1
SSMVD160	6.0	6.3	21.0	22.1	15.0	15.8	15.0	15.8
SSMVD250	20.0	21.0	Stage I: 3.0 Stage II: 34.0	Stage I: 3.1 Stage II: 35.8	X	X	X	X
SSTKVD97	1.8	1.9	3.7	3.9	1.9	2.0	3.0	3.2
SSTKVD118	3.7	3.9	6.3	6.6	3.0	3.2	6.1	6.4
SSTKVD150	5.7	6.0	12.0	12.6	5.0	5.3	11.0	11.6

The listed quantities relate to synthetic oil filling. For calculating the quantity when using mineral oil, the volume (l) is multiplied by the factor 0.9.

When filling the gear unit for the first time, proceed as described below, starting from point 4.

Oil must be changed while the gear unit is still at operating temperature otherwise the oil will flow properly and it will be difficult to drain it completely.

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, as otherwise there will be a serious danger of burning due to hot oil!**

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

1. Place a collecting basin underneath the oil draining screw plug.
2. Remove the oil level checking, 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.  
     ⇒ Check via oil control screw plug
7. Screw in oil level checking screw plug.
8. Screw in vent screw plug.

#### 8.2.4 Lubrication 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	Esso	Klüber	Mobil	Shell
Synthetic oil	PG 460	Degol GS460	BP Energyn SG-XP460	Optiflex A 460		Klübersynth GH6- 460	Mobil Glygoyle HE 460	Shell Tivela S 460
Mineral oil	CLP 460	Degol BG460	BP Energol GR-XP460	Optigear BM 460	Spartan EP 460	Klüberoil GEM1-460	Mobilgear 634	Shell Omala 460
Anti-friction bearing grease		Aralup HLP2	BP Energrease LS-EP2	Optimol Olit2 EP	Beacon EP2	Centoplex 2	Mobilux EP2	Shell Alvania EP2

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

It is important to use the oil type specified on the name plate (CLP or PG).

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

#### 8.3 Traction sheave change



When changing the traction sheave, the instructions in para 1 have to be observed. In addition, it has to be ensured that lift cage and counterweight are secured.

### 8.3.1 Compact traction sheave

The traction sheave is replaced as a whole unit together with the sheave shaft and the pillow blocks.

Procedure:

1. Remove protective cap on the hollow shaft
2. Remove hexagon bolt using a cranked ring spanner
3. Secure gear unit and motor with ropes or hooks and remove the bolt from the torque reaction lever
4. Remove geared motor from the traction sheave
  - Version 1: Use assembly tools
  - Version 2: Use grease forcing bolt or a hydraulic cylinder (10t) for elevator gear units sizes SSMVD 125 ... 250 and SSTKVD150, refer to figure 9.

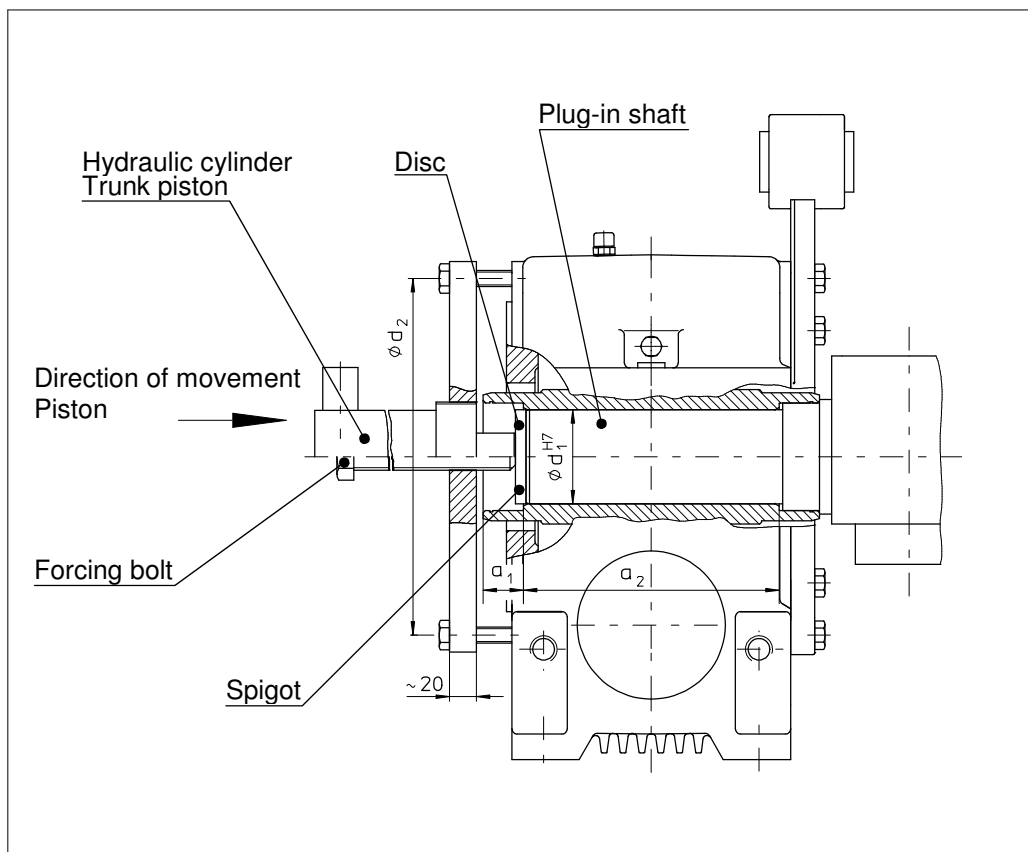


Figure 9

Pressure plate is fixed at the gear unit housing with at least 4 bolts. For the dimensions, refer to figure 10.

	SS 80.1 SST 97	SS 100 SST 118	SS 250	SS 125 SST 150	SS 160
$\phi d_1^{H7}$	45	60	115	70	80
$\phi d_2$	165	215	480	265	330
sxt	M10x16	M12x20	M16x29	M12x20	M16x23
$a_1$	24	30	38	30	25
$a_2$	132	158	284	190	220
Zentrierung DIN 332	DM12	DM16	DM24	DM20	DM20

Figure 10

5. Secure traction sheave with ropes and hooks and remove the fastening bolts at the pillow block/ machine frame
6. Fasten new traction sheave shaft with pillow block bearings on the machine frame
7. Apply lubricant (e.g. Gleitmo 800) to the traction sheave shaft in the hollow shaft area of the gear motor to prevent fretting corrosion
8. Mount gear unit motor to the traction sheave shaft according to figure 11.
  - Version 1: Use a threaded rod
  - Version 2: Use a hydraulic cylinder (10t) for elevator gear units sizes SSMVD125 ...250 and SSTKVD150

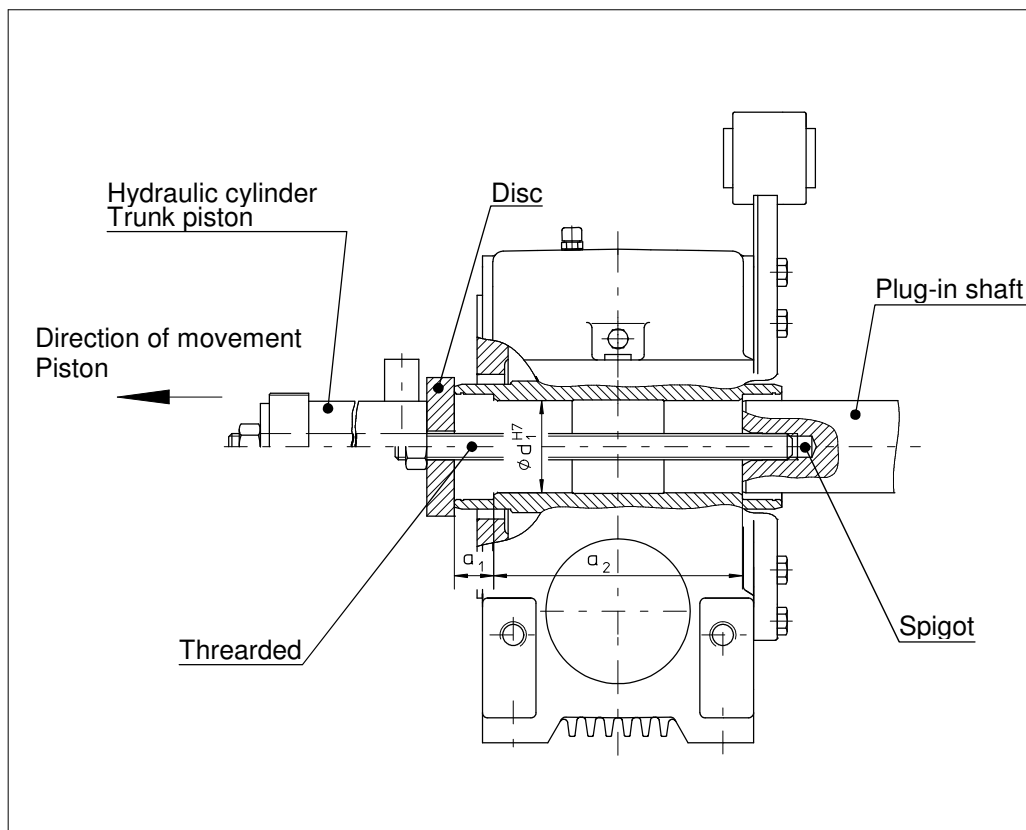


Figure 11

The dimensions can be seen in figure 10.

9. Align the gear unit and secure the torque reaction lever against distortion with the bolt.
10. Secure the traction sheave shaft using a washer and the hexagon bolt
  - ⇒ the bolt must be inserted using a medium strength threadlocking adhesive (e.g. Loctite 243).
11. Seal the hollow shaft using the protective cap

**After finishing the work, all fastening bolts have to be checked for their proper tightness with a torque wrench.**

### 8.3.2 Separated traction sheave

Procedure:

1. Secure traction sheave ring against falling down by accident.
2. Loose the fastening bolts and remove the traction sheave ring from the hub (use forcing bolts, if required).
3. Clean spigot ring
4. Mount the new traction sheave ring secured against falling down and the cable glands with the existing fastening bolts.
  - ⇒ Fastening torques according to thread size of para 3.3
  - ⇒ Secure the connection by using a medium strength threadlocking adhesive (e.g. Lotite 243)

By using traction sheaves from different manufacturers, different fastening elements will be required. When indicating the GFC commission number, the required fastening elements will be listed.

In case the hexagon bolt DIN 609 cause problems during assembly, these may be replaced by hexagon set screws DIN 933 and 6 dowels pins DIN 1481-D12. The required bores  $\varnothing 12H9$  have to be positioned regularly at the perimeter.

### 8.4 Spare parts

To procure the correct spare parts, the commission number and the gear unit type stated on the name plate are required

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

## 9. Disposal



- ⇒ Used parts, gear wheels, shafts as well as anti-friction bearings are to be disposed of a scrap steel
- ⇒ Parts made of cast iron are also to be disposed of as scrap steel, inc ase there is no separate collection.
- ⇒ Worm wheels, motor windings and brake magnets contain to a large extent non-ferrous metal and have to be disposed of accordingly.
- ⇒ Collect used oil and dispose of in accordance with the currently valid regulations.