



# OPERATING MANUAL FOR ANGULAR GEARBOXES

**BEVEL GEARBOXES** V, VS, VL, VLM AND VC SERIES

**WORM GEARBOXES** S, SL, SLM, SC AND SLC SERIES



[www.atek.de](http://www.atek.de)

## Table of Contents

1	NOTES	02
1.1	General	02
1.2	Safety and Warning Signs	02
2	GEARBOX DESIGNATIONS	03
3	MOUNTING SIDES	03
4	INSTALLATION POSITIONS	05
5	SAFETY PRECAUTIONS	06
6	TRANSPORT	07
7	STORAGE	07
7.1	Storage for up to 6 Months	07
7.2	Long-term Storage / Protection against Corrosion and Environmental Influences	07
7.2.1	Storage Location	08
7.2.2	Temperature	08
7.2.3	Relative Humidity	08
7.2.4	Oxygen and Ozone	08
7.2.5	Heating	08
7.2.6	Lighting	08
7.2.7	Shaft Seal Rings	08
7.2.8	Housing Surface	08
7.2.9	Unpainted Gearbox Parts	08
7.2.10	Oils	08
8	PAINTING	09
9	LUBRICATION	09
10	VENTING	09
11	SURFACE TEMPERATURE	10
12	TEMPERATURE MEASUREMENT	10
13	INSTALLATION	11
13.1	Preparations for Installation	11
13.2	installation position	11
13.3	Demands on the Installation Space	11
13.4	Installation of Attachments	12
13.5	Shaft-mounted Gearboxes	13
13.6	Flange-mounted Gearboxes	13
13.7	Mounting Bores	13
13.8	Shaft/Hub Connections with Shrink Discs	13
13.9	Shaft/Hub Connections with Jaw Coupling / Clamping Ring Hub	15
13.10	Motor Attachment	16
13.10.1	Special Points of Note for Attachment of VL Series Motors	16
13.10.2	Special Points of Note for Attachment of SL Series Motors	17
13.10.3	Special Points of Note for Attachment of Motors of Series VC, SC and SLC	18
13.10.4	Special Points of Note for Attachment of Motors of Series VLM and SLM	19
14	DOUBLE GEARBOXES / COMBINATIONS	21
15	COMMISSIONING	21
16	TRIAL RUN	21
17	MAINTENANCE	22
18	TROUBLESHOOTING CHART	27
19	DISPOSAL	27

## 1 Notes

### 1.1 General

This operating manual is intended to help you to commission the ATEK drive in accordance with relevant regulations. Assured properties of our gearboxes and the fulfilment of potential guarantee claims are conditional on compliance with these instructions. Therefore be sure to read the operating manual carefully before starting work on or commissioning the gearbox. Operating manuals must be kept in the immediate vicinity of the gearbox.

Further operating manuals for ATEK angular gearboxes, such as removing/installing shaft seal rings or ATEX applications, can be downloaded from the Internet or requested from ATEK. For ATEX applications, the ATEX operating manual for gearboxes for intended use in potentially explosive atmospheres must be observed with priority. Here you will also find the contact details for technical questions.

Further information can also be found under [www.atek.de](http://www.atek.de)

### 1.2 Safety and Warning Signs



This symbol draws attention to a general hazard.



This symbol draws attention to a hazard posed by electric current.



This symbol draws attention to a hazard posed by rotating parts.



This symbol draws attention to useful tips and information for the operator.

# Gearbox designations

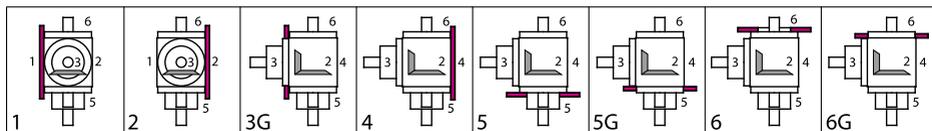
## 2 Gearbox Designations

Type	Size	Gear ratio	Style of mounting	Mounting side	installation position	$n_{2max}$	Version
V	65	1:01	A0	- 1 .	1 -	500	/ 0000 = Standard
VS	90	2:01	D0	- 1 .	1 -	500	/ 0000 = Standard
VL	140	3:01	A0	- 1 .	1 -	500	/ 0000 = Standard
Flange / motor shaft dia. x motor shaft length							
VLM	65	3:01	A0	- 1 .	1 -	500	/ 0000 = Standard
Motor type, IEC motor size, number of poles, auxiliary version, terminal box location (gearbox side)							
S	40	10:01	B03	- 1 .	1 -	500	/ 0000 = Standard
SL	50	10:01	B03	- 1 .	1 -	150	0000 = Standard
Flange / motor shaft dia. x motor shaft length							
SLM	50	10:01	B03	- 1 .	1 -	150	0000 = Standard
Motor type, IEC motor size, number of poles, auxiliary version, terminal box location (gearbox side)							
VC	65	3:01	C0	- 1 .	1 -	500	/ 0000 = Standard
Flange / motor shaft dia. x motor shaft length; Flange No. Coupling							
SLC	63	3:01	B01	- 1 .	1 -	500	/ 0000 = Standard
Flange / motor shaft dia. x motor shaft length; Flange No. Coupling							

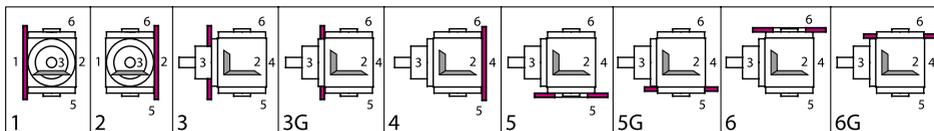
## 3 Mounting Sides

### Type V

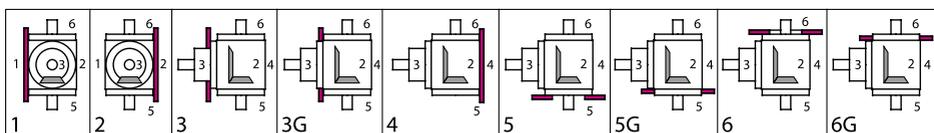
Mounting sides Type A0 – D0



Mounting sides Type E0- E0/HSD

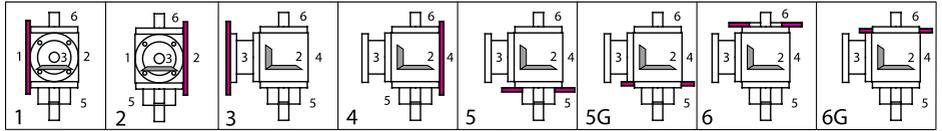


### Type VS

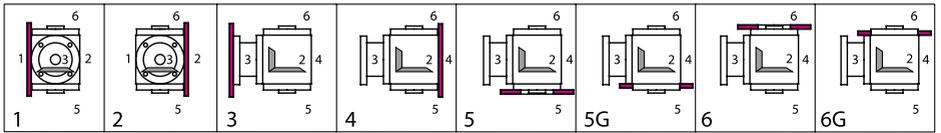


Type VL/VLM

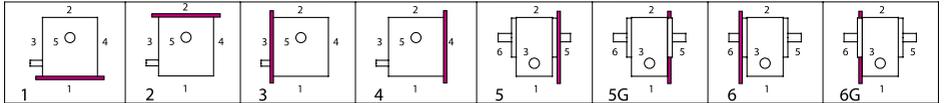
Mounting sides Type A0 – D0



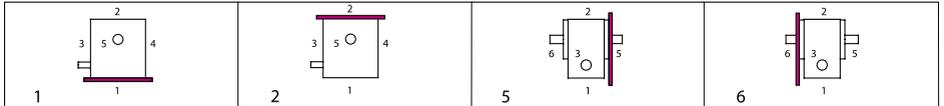
Mounting sides Type E0- E0/HSD



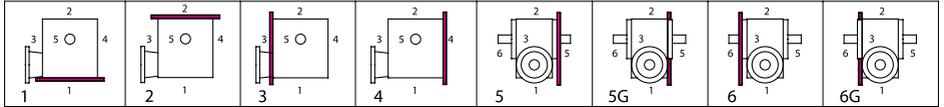
Type S 040 -100



Type S 125 - 200



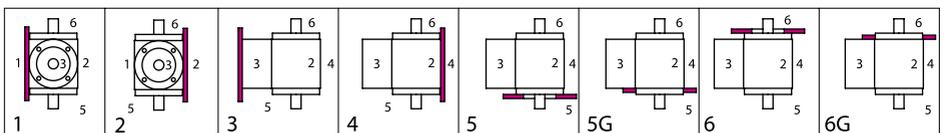
Type SL/SLM 040 - 100



Type SL/ SLM 125 - 200

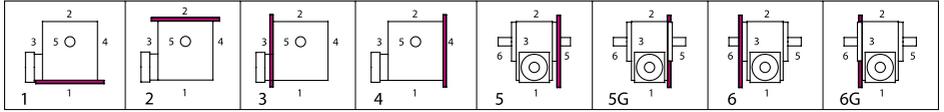


Type VC



# Installation positions

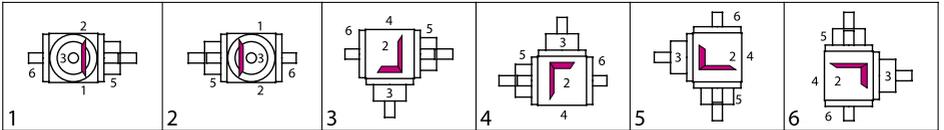
Type SLC



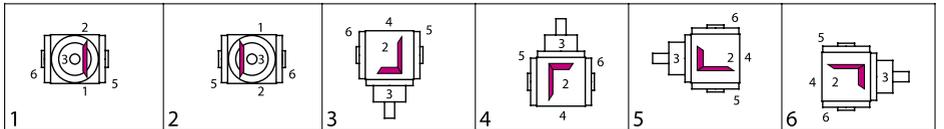
## 4 Installation Positions

Type V

Installation positions Type A0 – D0

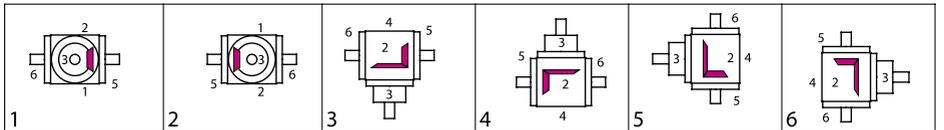


Installation positions Type E0- E0/HSD



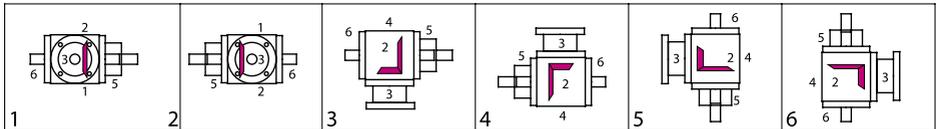
Installation positions

Type VS

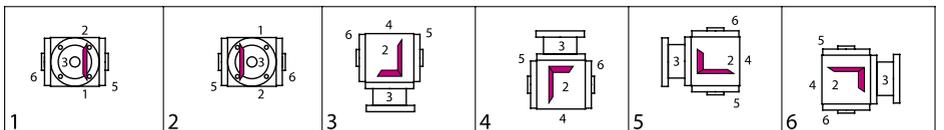


Type VL/VLM

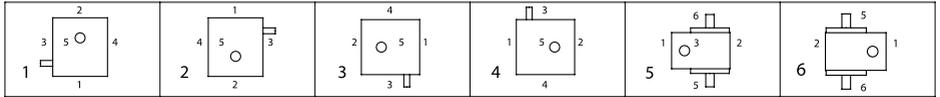
Installation positions Type A0 – D0



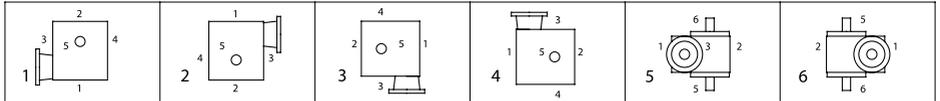
Installation positions Type E0- E0/HSD



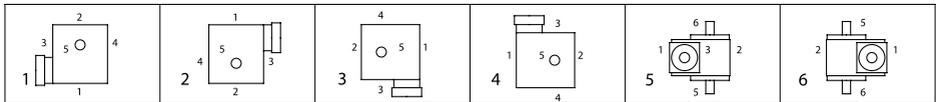
## Type S



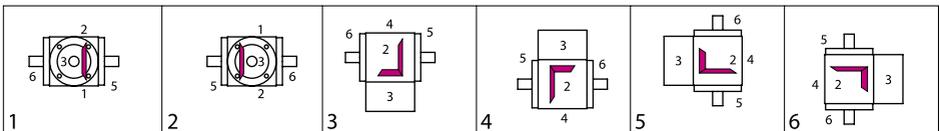
## Type SI / SLM



## Type SLC



## Type VC



## 5 Safety Precautions

The operations listed below may only be carried out by qualified and authorised technical personnel:

- Transport
- Storage
- Installation of the gearbox
- Installation of motors, couplings or other drive elements
- Commissioning
- Maintenance and repair
- Installation of safety devices on site



## 6 Transport

Before shipment, the drive was subjected to strict tests and was properly packed.

### **On receipt of the delivery:**

- Inspect packaging for obvious signs of damage
- Report damaged transport packaging immediately to the transport company and ATEK
- Have the damage and operability assessed by a qualified person; consult ATEK, if necessary

### **In-plant transport**

- Use admissible and adequately dimensioned transport aids such as ropes, ring bolts, hooks, etc.
- Compliance with the generally applicable standards and regulations



Damaged gearboxes must never be put into operation. Falling from a great height can cause damage to the gearbox and hence lead to a potential hazard.

## 7 Storage

### 7.1 Storage for up to 6 Months

Temporary storage of the gearbox (for up to 6 months) presupposes:

- Positioning according to the style of mounting
- A dry, dust-free storage location, no significant temperature fluctuations
- Storage well away from solvents and solvent vapours
- Screw in the vent filter (if necessary) only immediately before commissioning.
- Store this manual with the gearbox at all times, if possible.



### 7.2 Long-term Storage / Protection against Corrosion and Environmental Influences

The majority of the following storage demands result from the use of radial shaft seal rings. If a gearbox is stored for more than two years, we recommend that for reasons of efficiency the shaft seals should be replaced before commissioning, taking care not to damage the seal ring seat on the shaft. Instructions on replacing the shaft seals can be found under [www.attek.de](http://www.attek.de).





## 7.2.1 Storage Location

- Closed rooms that are vibration-free, cool, dry and moderately ventilated
- Do not wrap in films containing plasticisers
- Ensure adequate protection against attack by insects or rodents

## 7.2.2 Temperature

- The ideal storage temperature is +15 °C to +25 °C. Long term storage outside these limits will reduce the seal quality.
- Maximum allowable storage temperatures are -10 and +35 °C. Please note the comment relating to seal quality above.
- Temperatures must remain constant without sudden fluctuation.

## 7.2.3 Relative Humidity

- ideally < 50%

## 7.2.4 Oxygen and Ozone

- Exposure to ultraviolet/fluorescent light sources and mercury vapour lamps must be avoided, uncovered fluorescent tubes can pose a problem due to their ozone formation.
- Do not operate electric motors or other equipment that generates excessive sparks or other electric discharges in the immediate vicinity of the storage area
- Exhaust all combustible gases and other vapours that can result in the formation of ozone due to photochemical processes
- Avoid draughts
- Do not store solvents, fuels, lubricants, chemicals, acids, disinfectants or rubber solvents in the immediate vicinity



## 7.2.5 Heating

- Maintain a distance of at least one metre from radiators and other heaters
- The gearbox temperature must not exceed 25 °C for prolonged periods

## 7.2.6 Lighting

- Do not expose the gearboxes to direct sunlight
- Do not expose to artificial light with a high ultraviolet content

## 7.2.7 Shaft Seal Ring

- For long-term storage where the replacement of the seal ring cannot be assured, use AS seals, i.e. seals with a dust lip

## 7.2.8 Housing Surface

- For long-term storage, the housing should preferably be painted by ATEK, priming alone is not sufficient
- Before storage, inspect the gearboxes for chipped paint and repair, as necessary

## 7.2.9 Unpainted Gearbox Parts

- Coat shafts, flange mating surfaces and other bare metal parts with shaft protection lacquer

## 7.2.10 Oils

- Completely fill gearboxes with oil
- Avoid mixing oils of different specifications



## 8 Painting

If the painting cannot be carried out by ATEK, the radial shaft seal rings must be protected against the effects of solvents, hardeners and

paint. Painted radial shaft seal rings dry out and represent a considerable damage potential.

## 9 Lubrication

Please refer to the information given on the rating plate of the gearbox! Gearboxes with lifetime lubrication and filled with the necessary quantity of lubricant at the factory and are maintenance-free under normal operating conditions. Under extreme operating conditions or with increased service life demands, we recommend an oil change after approx. 15,000 operating hours. Subsequent lubrication is only

necessary if a substantial amount of lubricant has been lost due to leakage.

Information on the type and viscosity of the lubricant to be added must be obtained from the manufacturer, quoting the serial number of the gearbox. Gearboxes for oil change lubrication are delivered without lubricant and must be filled with an oil or grease according to our lubricant recommendation before commissioning.

## 10 Venting

Even under normal operating conditions, the gearbox temperature can be above 50 °C due to the small convection surface area. If the gearbox exceeds this temperature during operation, the vent filter supplied must be installed in order to prevent excessive pressure in the gearbox and hence gearbox leaks. With intermittent operation or other operating conditions that do not cause the gearbox temperature to exceed 50 °C, no vent bore is provided.

If venting of the gearbox is required, the plug (transport safety device) must be removed and replaced with the vent filter supplied. On vertical gearbox walls, the vent filter is screwed into the pipe elbow contained in the scope of supply.

With high operating loads and/or high ambient temperature, operation without a vent plug can result in an above-average load due to the internal pressure and hence to seal damage with a consequent impermissible oil loss. The operator must ensure that the gearbox vent is kept free of impermissible deposits and that an adequate air circulation can take place.

If the gearbox is painted later, the vent filter or vent valve must be protected against the ingress of paint. Double gearboxes have two oil chambers, each of which has to be vented with a valve or filter.



## 11 Surface Temperature

When the gearbox is at operating temperature, do not touch the gearbox housings with the bare hand in order to avoid burns. Check the surface temperature of the gearbox after commissioning.

Under maximum operating conditions, the gearbox temperature must not exceed 90 °C unless the value was previously agreed in writing with ATEK.



## 12 Temperature Measurement

The measuring instrument should cover the anticipated measuring range of 40 °C to 130 °C with a tolerance of +/- 4 K and be suitable for measuring housing and air temperatures.

1. Measuring the ambient temperature  
The ambient / cooling air temperature must meet the specifications on the rating plate.
2. Commissioning the gearbox
3. Determining the point with the highest temperature on the gearbox (on the stationary shafts near the shaft seal, near the bearing points in the neck flange and covers, near the oil sump or a side of the gearbox exposed to high external thermal loads).



4. Operate the gearbox at maximum load and speed until the final temperature is reached. The final temperature is reached when the gearbox temperature increases by less than 2 K/h.
5. Record the measured temperature values for the gearbox and the ambient temperature and store as reference values for later measurements.
6. If the gearbox has temperature stickers attached at the factory, these can be additionally used for determining the temperature.





## 13 Installation

### 13.1 Preparations for Installation

- Do not use sharp-edged tools, wire brushes or emery cloth for removing soiling.
- Do not clean gaskets and seals with solvents, trichloroethylene, carbon tetrachloride, hydrocarbons or other aggressive chemicals
- Carefully peel off shaft protection lacquer (if applied)
- If possible, inspect shaft seal rings using a magnifying glass (10x magnification) for cuts, hairline cracks, worn or porous spots and separated layers and inspect the surface for hard spots, soft spots, stickiness and discolouration
- Inspect the seal ring seats on the shafts for damage in the form of scratches, soiling or rust deposits
- Only after prolonged storage, drain the oil, rinse with solvent-free agents (petroleum, flushing oil) and fill with the oil volume according to the manufacturer's specifications for the respective installation position, speed and ambient temperature



### 13.2 Installation Position

- The installation positions are defined by the designation of the gearbox sides, whereby the underside is referred to as the installation position
- Mount gearboxes only with the ordered installation position on a suitable foundation free from distortion and strain
- When installation positions are limited, the correct position is marked as shown in Figure 1

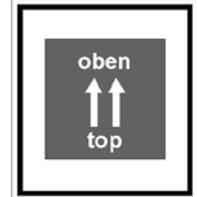


Figure 1

- The manufacturer must be notified of inclined installation positions or movements of the whole gearbox in the form of a sketch or drawing attached to the order.
- Changes to the installation position require the approval of ATEK and modification of the lubricant quantity and venting



### 13.3 Demands on the Installation Space

- Pay attention to adequate installation space with sufficient air circulation
- Avoid extreme contamination in the air (insofar as the seals have not been selected for these operating conditions)
- With direct exposure to the sun, the cooling air must be 10 K below the maximum admissible ambient temperature 10K
- Use the motor cooling also for gearbox cooling
- Do not install enclosures or housings around the gearbox without consulting ATEK
- Keep the area around the gearbox free from high-energy radiation
- The influence of abrasive or chemically aggressive substances on the seals must be avoided in the interests of the service life

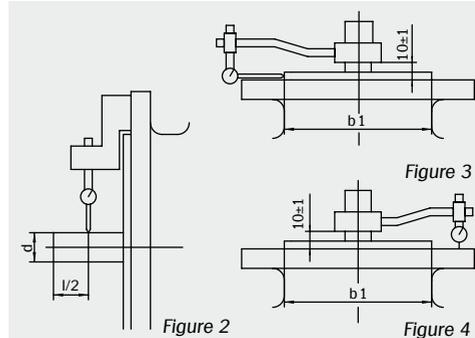


## 13.4 Installation of Attachments

- Attachments, flanges or mountings must not cause the gearbox to heat up to over 90 °C



- Align shaft and flange connections very carefully, observing if possible the reduced tolerance range from Table 1 and not exceeding the normal tolerance range; further details can be found in DIN 42955.



Shaft diameter	Radial runout tolerance at middle of shaft (Figure 2)		Centering circle diameter (Figure 3)	Coaxiality and axial runout tolerance over pitch circle (Figure 4)	
	normal	reduced		normal	reduced
up to 10	0.03	0.015	up to 22	0.05	0.025
above 10 to 18	0.035	0.018	above 22 to 40	0.06	0.03
above 18 to 30	0.04	0.021	above 40 to 100	0.08	0.04
above 30 to 50	0.05	0.025	above 100 to 230	0.1	0.05
above 50 to 80	0.06	0.03	above 230 to 450	0.125	0.063
above 80 to 120	0.07	0.035	above 450 to 800	0.16	0.08

Table 1: Form and position tolerances by analogy with DIN 42955

- Employ flexible couplings to compensate for minor inaccuracies in manufacturing or installation



- Pre-heat couplings, belt pulleys, chain sprockets, etc. to max. 100 °C for installation, or use a suitable separating paste or grease and a puller (Figure 5).

**Do not drive on with a hammer!**



- Bearings of the gearboxes operating at close to their static limits must be avoided or exactly aligned.

- In order to avoid fretting corrosion, select tight-fitting shaft/hub connections (e.g. H7/k6) and coat with a suitable separating agent (such as Teflon spray, e.g. from OPN-Chemie 57290 Neukirchen). (CAUTION! Do not use under a shrink disc seat!)

- **Overloading of all bolted connections is to be avoided, also between housings, covers, housing extensions and flanges**

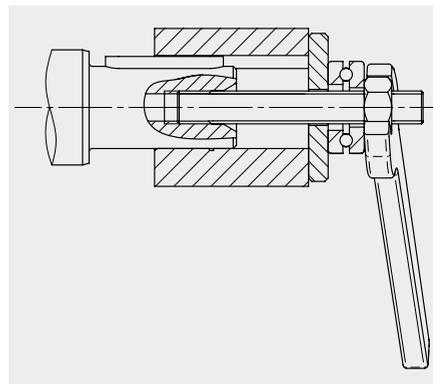


Figure 5: Installation of gear hubs



## 13.5 Shaft-mounted Gearbox

- To compensate for impacts and tolerances, mount the torque strut on a rubber buffer and always arrange on the machine side of the gearbox (to avoid additional bending torques)
- Proceed as shown in Figure 6 for installation.  
**Do not drive on with a hammer!**
- For hollow shaft bores > 35 mm, dismantling can be performed as shown in Figure 7.

## 13.6 Flange-mounted Gearboxes

- Position mounting surface exactly at right angle to the axis of the machine shaft to be driven on (observe DIN 42955)

## 13.7 Mounting Bores

- The mounting sides are defined by the designation of the gearbox sides (see point 2 'Gearbox designations')
- Check easy accessibility and remove any residues of subsequent painting

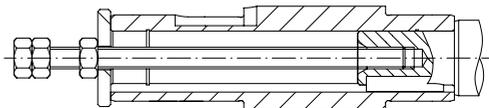


Figure 6: Installation of shaft-mounted gearbox

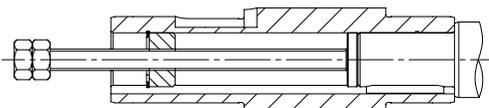


Figure 7: Removal of shaft-mounted gearbox

Dimensions	M5	M6	M8	M10	M12	M16	M20
Grade 8.8	6.5	11,0	27	54	93	230	464
Grade 10.9	9.5	16,5	40	79	137	338	661
Grade 12.9	11	19	47	93	160	395	773

Table 2: Bolt tightening torques in Nm

- Ensure a sufficient insertion depth of the threaded bores and avoid strains
- Tighten mounting bolts to the torques shown in Table 2



## 13.8 Shaft/Hub Connections with Shrink Discs

The locking assembly supplied by ATEK is a frictional locking, separable shaft/hub connection for cylindrical shafts and bores without parallel keys. The locking assembly is always supplied ready assembled.

### Installation

Soiled or used locking assemblies should only be dismantled for cleaning in exceptional cases. Grease the conical surfaces lightly.

Grease the contact surface of the bolt heads lightly (not with Molykote MoS2)

- Check the shaft seat for the prescribed tolerance (see Table 3)
- Clean and degrease the contact surfaces of the inside of the hollow shaft and the insertion shaft

- Clean the hub bore of the coupling and coat with low-viscosity oil (e.g. Castrol 4 in1 or Klüber Quietsch-Ex)



- **CAUTION!** Do not use Molykote, oil or grease with molybdenum disulphide (MoS<sub>2</sub>) or other high-pressure additives

- Loosen the clamping bolts only slightly but do not remove and tighten by hand only until the clearance between the outer rings and the inner ring has been eliminated.

- Push the locking assembly completely onto the hollow shaft

- Clean the solid shaft of the machine only in the area of the bronze; the bore of the hollow shaft must remain grease-free



- **Caution!** Install the shaft before tightening the clamping bolts

- The bronze bush must be in contact over its whole length

- Tighten the clamping bolts uniformly in turn

- Gradually increase the tightening torque until the tightening torque indicated in Table 4 is reached for all the clamping bolts

- The outer rings of the shrink disc must be plane-parallel and the gap between the rings must be uniform

- Mark the position of the solid shaft and hollow shaft relative to one another with a felt pen or scribe in order to be able to recognise any slipping under load during the trial run

Shaft dia. dw [mm]	18 - 30	31 - 50	51 - 80	81 - 500
Tolerance	H6/j6	H6/h6	H6/g6	H7/g6

Table 3: Shaft/hub fits

Bolt size M	M5	M6	M8	M10	M12	M16	M20
Tightening torque TA [Nm]	4	12	30	59	100	250	490

Table 4: Bolt tightening torques

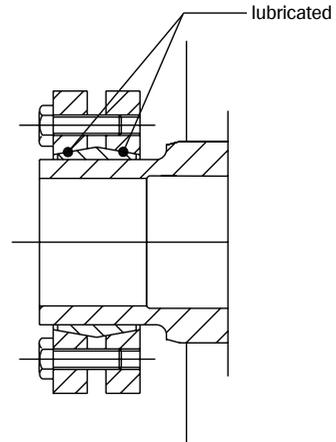


Figure 8: Shrink disc

### Dismantling

- Evenly loosen all clamping bolts one quarter of a turn at a time and continue in circular sequence until all bolts have been completely unscrewed.
- Do not unscrew the clamping bolts completely out of the screw thread
- The locking assemblies are not self-locking



- Remove the bolts alongside the puller thread and screw into the bores provided until they reach the bottom of the bore
- Release the locking assembly by uniformly tightening the puller bolts cross-wise
- Remove the shaft from the hollow shaft **(DO NOT DRIVE OFF WITH A HAMMER!)**
- Pull the locking assembly from the hollow shaft



**Caution! The rotating bolt heads can cause injury or damage to the equipment and must be protected against contact or from parts falling in.**

### 13.9 Shaft/Hub Connections with Jaw Coupling / Clamping Ring Hub

For the dimensioning of torques, allowing for superimposed strains/moments, the surface pressure of the clamping and locking ring hubs as well as comprehensive installation and operating instructions can be found under **www.ktr.com** Please consult us if couplings from other manufacturers are employed.

Coupling type	Gearbox
Rotex®	SL, SLM
Rotex GS®	VC, SC, SLC
Bowex®	SL, SLM
Clampex®	All types with HSD version

Table 5: Fields of application for couplings



The Rotex® and Rotex GS® couplings are available with ring gears of different Shore hardnesses and can “more or less” absorb shaft movements and exhibit torsional play, depending on the hardness. For the maximum admissible shaft movements, allowing for the operating conditions (e.g. impact loads,



temperature loads) and the anticipated ambient influences, such as foundation sinking and thermal shifts, please refer to the KTR catalogue or the installation / operating manual. The shift values indicated are maximum values and must not occur simultaneously. Tools for checking are: Dial gauge, straightedge, feeler gauge.

Standard ring gear hardness [Shore]	Designation [Colour]
80 Sh A – GS	blue
92 Sh A – GS	yellow
95/98 Sh A – GS	red
64 Sh D – GS	green size 7-38; pale green size 42 -75

Table 6: Ring gears

#### Installation

- Check the shaft seat for the prescribed tolerance (see Table 2)
- Clean and degrease the coupling and motor shaft and coat with low-viscosity oil (e.g. Castrol 4 in 1 or Klüber Quietsch-Ex)
- **CAUTION!** Do not use Molykote, oil or grease with molybdenum disulphide (MoS2) or other high-pressure additives
- Loosen the clamping bolt only slightly
- Push the coupling half onto the motor shaft and tighten the clamping bolt. For locking bolt tightening torques and the installation dimensions in order to maintain the axial clearance for the ring gear, please refer to the sections on motor installation.
- In the case of couplings without a parallel key, mark the position of the motor shaft and coupling relative to each other with a felt pen or scriber in order to be able to recognise any slipping under load.



## 13.10 Motor Attachment



- First ensure that the drive train and motor are load-free and disconnected from an electrical supply during installation.

- Clean and degrease hub bore and motor shaft

- Before installation, check the motor tolerances in Table 1

- Warping or damage on the motor shaft, flanges or parallel keys will necessitate re-machining.

- Position the motor or gearbox vertically, using a hoist if necessary.



- Tilting or impact of either of the two drive elements is not permitted and will result in premature gearbox failure.

- For larger drives, release the motor brake

- Before tightening the bolts of the flange connection, check using a feeler gauge whether the two flange surfaces are in contact around their whole circumference.

- Then finally tighten the connecting bolts crosswise.

### 13.10.1 Special Points of Note for Attachment of Motors of VL Series

- Measure the installation height and width of the parallel keys of the motor and compare with the dimensions of the hollow bored drive shaft.

- In order to avoid fretting corrosion, select tight-fitting shaft/hub connections (e.g. k6/H7) and coat with a suitable separating agent (e.g. Teflon spray from e.g. OPN-Chemie 57290 Neukirchen) (CAUTION! Do not use under a shrink disc seat!)
- Adjust the position of the parallel key / parallel keyway so that the bores of the mounting flanges are more or less aligned.
- It should be possible to fit the parallel key into the parallel keyway without any significant resistance.

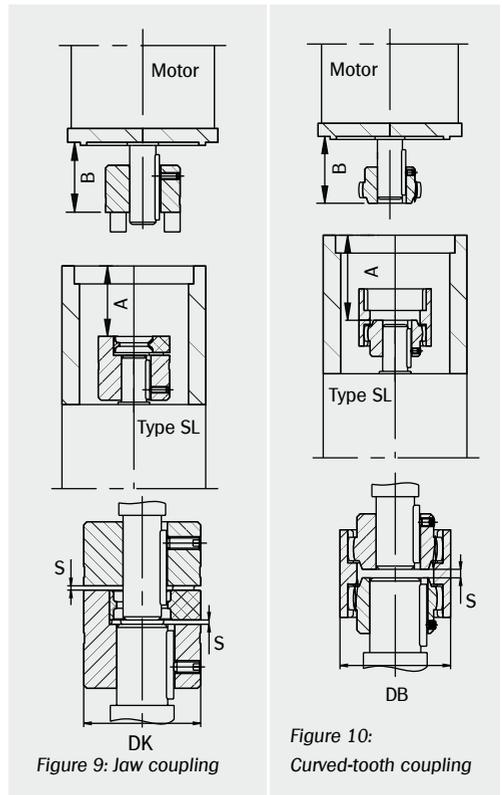


Figure 9: Jaw coupling

Figure 10: Curved-tooth coupling

## 13.10.2 Special Points of Note for Attachment of SL Series Motors



The axial shaft-mounted coupling for SL gearboxes is ideally suited for normal applications without extreme reversing mode.

### Two versions:

Jaw coupling with elastomer spider (Figure 9)  
Curved-tooth coupling with polyamide sleeve (Figure 10)

### Configuration:

- Gearbox-side coupling hub with parallel keyway and set screw is already mounted on the drive shaft
- Involute gear of plastic (jaw coupling) / polyamide sleeve with internal curved teeth (curved-tooth coupling)
- Customer-side coupling hub with parallel keyway and set screw

The power transmission between shaft and coupling hub is effected by a non-slipping parallel key connection. Pay particular attention to proper tightening of the locking bolt and to the condition of the contact surfaces.



### Installation procedure

- Push hub onto motor shaft
- Measure distance A on the gearbox
- Adjust distance B (Table 7 or 8)
- With curved-tooth couplings, also pay attention that the distance S is also maintained between the motor shaft and the gearbox shaft
- Refer to Table 7 / 8 for tightening torques for the locking bolts

Locking bolt	14	19/24	24/28	28/38	38/45
Coupling diameter DK [mm]	30	40	55	65	80
Distance S [mm]	1,5	2	2	2	3
Distance B= (A-S) [mm]	A-1.5	A-2	A-2	A-2	A-3
Tightening torques for locking bolt $T_A$ [Nm]	1,5	2	4,8	10	17
Tightening torques for locking bolt $T_A$ [Nm]	1,34	10,5	10,5	25	25

Table 7: Jaw coupling

Coupling size	M-38	M-42	M-48	M-65	I-80
Coupling diameter DB [mm]	83	92	95	132	175
Distance S [mm]	4	4	4	4	6
Distance B= (A-S) [mm]	A-4	A-4	A-4	A-4	A-6
Tightening torques for locking bolts $T_A$ [Nm]	10	10	10	17	17

Table 8: Curved-tooth coupling

## 13.10.3 Special Points of Note for Attachment of VC, SC and SLC Series Motors

The axial shaft-mounted coupling is suitable for dynamic and low-play applications.

**Configuration:**

- Conical hub, with integral frictional shaft/hub connection is already installed in the drive shaft with VC gearboxes. On the SC and SLC gearboxes, a non-slipping shaft/hub connection is installed.
- Involute gear of plastic
- Clamping hub Type KN or KNN (Figure 11) or clamping ring hub Type SN (2-piece, Figure 12)

The power is transmitted via frictional connection. On Type KNN, an additional non-slipping connection is provided by a parallel key. Pay particular attention to controlled tightening of the clamping bolts and to the condition of the contact surfaces.

Select fit pair motor shaft – hub k6/H7. With other shaft tolerances, the torques indicated in the catalogue can change – please consult ATEK (Engineering).

**Installation of clamping hubs on the motor shaft**

- Clean and degrease hub bore and motor shaft
- Loosen the clamping bolt slightly
- Push hub onto shaft
- Measure distance A on the gearbox
- Set distance B according to Figure 13 with the values in Table 9.
- Tighten clamping bolt to the torque indicated in Table 9

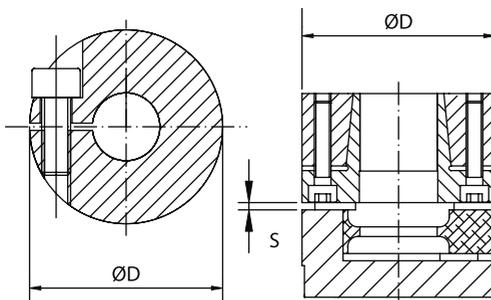


Figure 11: Clamping hub

Figure 12: Clamping ring hub

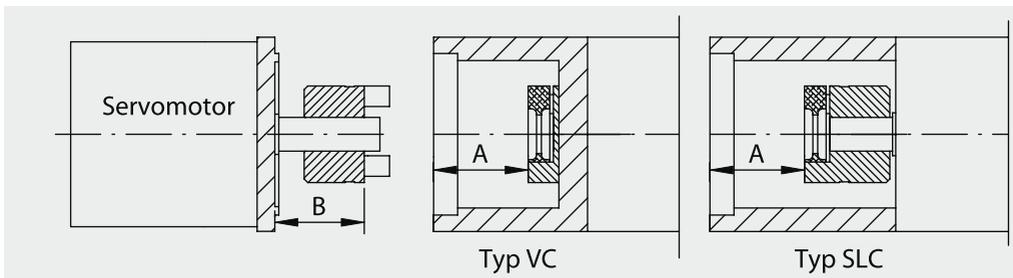


Figure 13: Installation of AdServo

Coupling size	14	19/24	24/28	28/38	38/45
Coupling diameter D [mm]	30	40	55	65	80
Clamping bolt DIN 912	M3	M6	M6	M6	M8
Distance S	1,5	2	2	2,5	3
Distance B = (A - S)	A - 1,5	A - 2	A - 2	A-2,5	A - 3
Tightening torque TA [Nm]	1,34	10,5	10,5	25	25

Table 9: Clamping hub

### Installation of clamping ring hubs on the motor shaft

Clean the hub bore and shaft and subsequently lubricate with low-viscosity oil (e.g. Castrol 4 in 1).

**Caution: Oils and greases with molybdenum disulphide or high-pressure additives, as well as lubricant grease pastes must not be used.**



Loosen the clamping bolts slightly and pull the clamping ring slightly from the hub so that the clamping ring lies loose – push the hub onto the motor shaft – measure distance A at the gearbox – set distance B (from Table 10). Tighten the clamping bolts uniformly and crosswise to the torque indicated in Table 10. Repeat the procedure as often as necessary until the tightening torque is achieved for all the bolts.

Coupling size	14	19/24	24/28	28/38	38/45
Coupling diameter D [mm]	30	40	55	65	80
Clamping bolts	4xM3	6xM4	4xM5	8xM5	8xM6
Distance S	1,5	2	2	2,5	3
Distance B = (A - S)	A - 1,5	A - 2	A - 2	A-2,5	A - 3
Tightening torque TA [Nm]	1,34	2,9	6	6	10

Table 10: Clamping ring hub

## 13.10.4 Special Points of Note for Attachment of VLM and SLM Series Motors



Installation in potentially explosive atmospheres is not permitted unless the motors have the necessary approval.

- Compare the type of protection and heat class supplied with the conditions of the installation location.
- Where large temperature fluctuations or high humidity prevail, employ a standstill heater

- The distance between the air intake surface and the nearest wall should correspond to at least half the motor diameter.



- With vertical installation and top-mounted fan, we recommend protective fan covers.



- Before commissioning, check the insulation resistance of the motor windings / at 25 °C higher than 5 Ω



- Ensure an adequate supply of fresh air and free cooling ribs as well as free air intake and discharge openings for the fan.

- The electrical connection may only be made by qualified personnel in accordance with the applicable safety regulations
- Power / current data must correspond to the data of the mains power supply
- Voltage and frequency fluctuations are subject to DIN EN 60034-1



- 50 Hz motors can be connected to 60 Hz networks as long as the change in power, voltage, torque and speed are observed
- Check whether all connecting leads have the necessary cross-section (DIN VDE 0298)
- The earthing connection is in the vicinity of or directly in the terminal box
- Cable entries must be fitted with glands to DIN 46320 / Part 1



- For checking the direction of rotation, the drive should first be operated in its installation position without connected machine parts
- For "clockwise" rotation of the machine, the phase sequence L1, L2, L3 must correspond to the terminals U1, V1 and W1. A change in direction of rotation can be effected by reversing any two phase conductors.



## Motor protection devices

To protect the drive against short circuit, overload or single-phase operation, a protection switch or thermal overcurrent trip must be installed in accordance with the relevant installation regulations. PTC thermistors must be connected to a suitable tripping device. Thermostats are pre-wired for self-tripping.

## Start of squirrel-cage motors

If direct starting is selected as the starting method for the drive, the connected mains supply network and the connecting leads must be able to withstand the starting current. If the connected driven machine does not require an increased starting torque (the resistance moment of the driven machine is lower than the rated torque of the drive), star-delta starting should be preferred. This avoids extreme jerking on starting and prolongs the service life of the drive with frequent starts. The starting current and starting torque are approx. 1/3 of the corresponding values for direct starting.

Switching from the star to delta connection should take place close to the motor rated speed, as otherwise the changeover current is almost as high as for direct starting. The motor can also be started using electronic soft starters. The soft starter ensures jerk-free starting of the machine with a greatly reduced starting current.

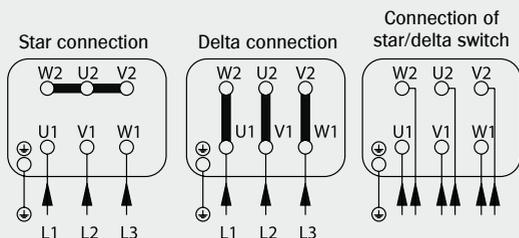


Figure 14: Motor terminal strip



# Double gearbox

## 14 Double Gearboxes / Gearbox Combinations

These gearboxes have at least two oil chambers, each of which has to be vented via a valve

or filter and its oil level checked.

## 15 Commissioning

- Bring the gearbox to room temperature if it has not been stored at room temperature
- If a vent filter / vent valve has been supplied for the gearbox, this must be screwed in before commissioning.

- If an incorrect direction of rotation can cause damage to the driven machine, check the gearbox (when disengaged) for the correct installation position and direction of rotation



- In the disengaged condition, check whether the drive shaft can be rotated smoothly in both directions without excessive friction points also paying attention to any unusual noise



- If a trial run is possible, ensure that there is sufficient protection against rotating parts and that the parallel keys are secured (e.g. using adhesive tape)



- If any unusual noise or vibration occurs or if the temperature exceeds 90 °C, stop the drive and notify ATEK.

## 16 Trial Run

If a trial run is possible, pay attention at maximum load and speed and under the least favourable conditions to the following points when the maximum gearbox temperature is reached:

1. Unusual noise development (grinding, knocking, scraping)
2. Unusual vibrations
3. Unusual odours, steam or smoke
4. Oil leaks at the shaft seals, housing joints, vent filter / valve (where installed)



### Inspect the cool gearbox for:

1. Leaks, traces of oil
2. Secure mounting of all parts and attachments
3. Clamped connections such as e.g. couplings, shrink discs (remove cover), etc. for slipping
4. Install all covers again after the inspection

## 17 Maintenance

All ATEK drives require a minimum of maintenance. For gearboxes with lifetime lubrication, maintenance is limited to the regular check for lubricant losses due to leaks, visual inspection of the conditions of the gaskets and possibly temperature measurements.

### Opening the gearbox

When opening the gearbox, pay attention that no dirt particles or parts fall into the gearbox, that the position of all components (in particular of the shafts) is marked and that confusion in particular of the Laminium discs and shims is ruled out. O-rings / gaskets must be replaced with parts of the same quality / dimensions. Grease the O-rings before installation.

During assembly, use new bolts with the same strength class and tighten to the torque indicated in point 13.7, Table 2. Inspect the O-ring for damage before installation and replace, if necessary. Coat with grease before installation. The bolts must be inserted grease-free.



**Please note that opening the gearbox will void any warranty claims. For this reason, the gearbox should only be opened at ATEK or with the approval of ATEK during this period.**

### Oil levels

The bevel gearboxes are normally half filled with oil (Figure 15-17). Please refer to Figure 21 for the filling levels of the worm gearboxes.



### Check oil level

The gearbox is at standstill, secured to prevent unintentional starting and protected against any load-side reverse torques; depending on the load condition, disconnect from the drive/output shaft.

The gearbox has cooled down, is in its installation position and the oil fillings have settled.



**Caution!**  
Risk of burns from hot gearboxes!

### Variants for oil level checks:

Please consult ATEK concerning oil level checks via the gearbox cover and for smaller S, SL or SLM series worm gearboxes, size 040 to 100, as well as VC, SLC and SC series AdServo gearboxes.

- a) Oil level check via M6 oil level check plug**  
Carefully unscrew the plug together with the copper washer. The oil must now drain out of the gearbox.
- b) Oil level check via the lateral screw plug**  
Carefully unscrew the plug and measure the oil level using check wire as shown in Figure 15.
- c) Oil level check via the top screw plug**  
After unscrewing the plug, measure the oil level using a clean check rod or wire and record on the side of the gearbox housing. The oil level should be at half the housing height (Figure 16).

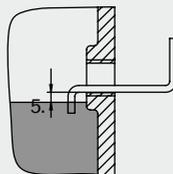


Figure 15:  
Lateral screw plug

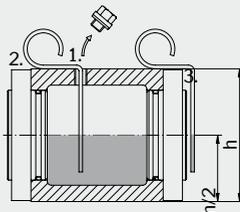


Figure 16:  
Top screw plug

- d) **Carefully unscrew the dipstick,** wipe clean with a lint-free cloth, screw in again then remove and read off the oil level (Figure 17).

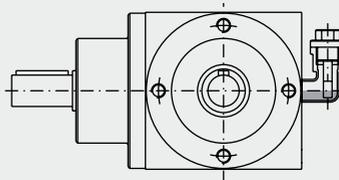


Figure 17: Pipe elbow

- e) **Oil level check via sight glass**  
The oil level should be up to the middle of the sight glass (Figure 18 and 19).

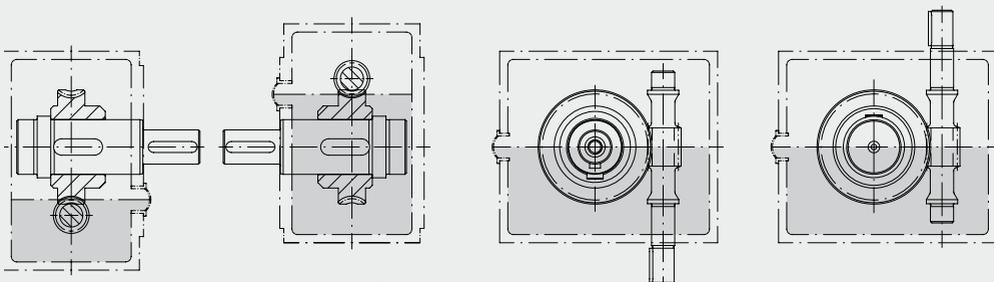


Figure 18: Oil level in worm gearbox

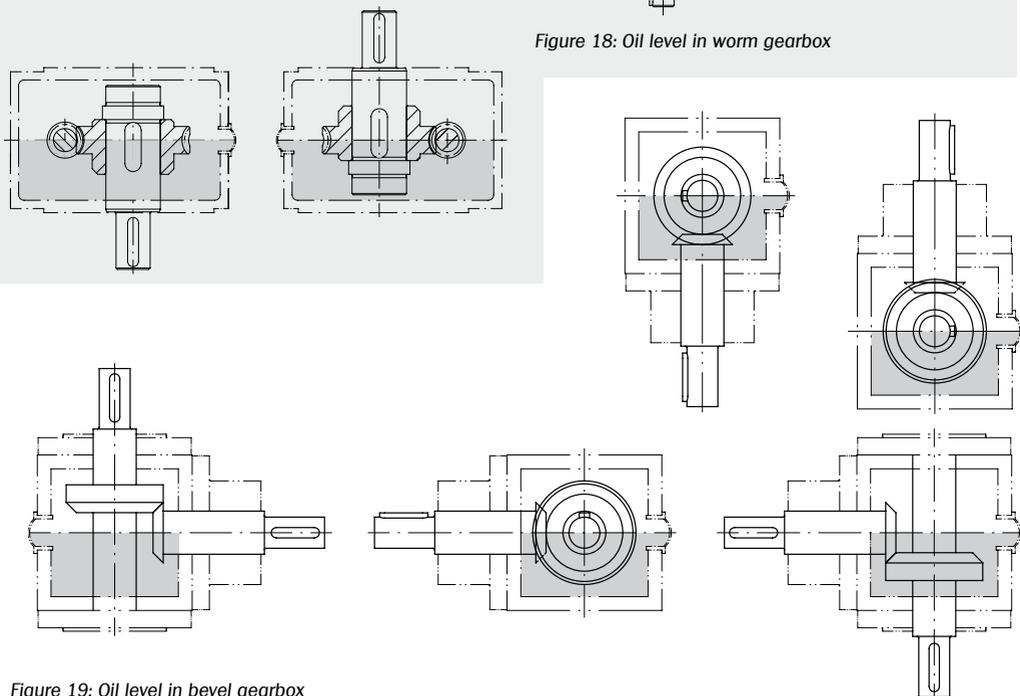


Figure 19: Oil level in bevel gearbox

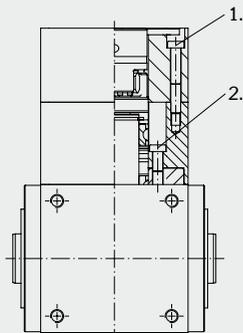


Figure 20: Extension removal, step 1

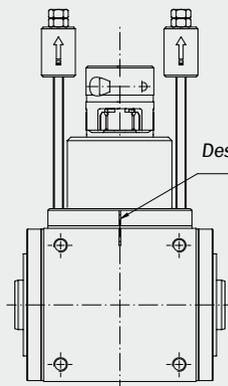


Figure 21: Step 2

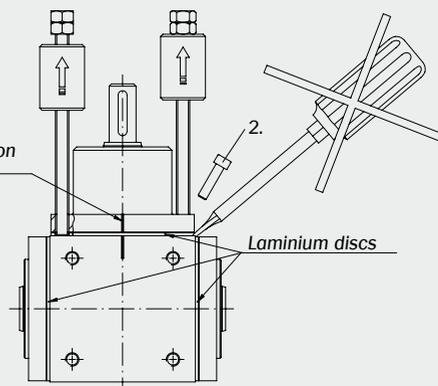


Figure 22

**f) Oil level check via disconnected gearbox housing extension / motor flange** (Figure 20-22, not for ATEX gearboxes). This measurement method should only be used in exceptional cases, e.g. in the event of major leaks, on bevel gearboxes (Series V, VS, VL, VLM, VC). These gearboxes have a lifetime lubrication that should not require replacing until the first change of the radial shaft seals. If you are unsure about the design of the gearboxes, a sectional view of your gearbox can be viewed, downloaded or printed on the Internet under Service/Spare Parts.

On bevel gearboxes, the gearbox housing extension / motor flange should preferably be removed as no damage to the delicate radial shaft seals is to be expected here.

the shafts must not be turned so that the relative tooth positions are not changed after reassembly.

Should removal of a gearbox cover be necessary, please consult ATEK.

If a gearbox cover has to be removed, the cover on side 6 should preferably be removed. For side 5 (side on which the gear wheel lies), please contact ATEK. Proceed here as for the removal of the gearbox housing extension. In this case, however, the gasket is removed together with the cover. For this reason the seal ring seat on the shaft must be clean and rust-free. The gasket should not be removed from the cover and must not be damaged. Therefore pull the cover off the shaft as straight as possible.

**Topping up with oil:**

If the oil level is not correct, information on the oil grade and oil quantity can be obtained from ATEK, quoting the serial number of the gearbox. For ATEX gearboxes, the information on the oil grade can be found on the rating plate. If only one of the admissible oil alternatives is available, a complete oil change must be carried



First mark the positions of the shafts relative to each other and of the gearbox housing extension / motor flange relative to the housing with a felt pen or scribe. Then loosen the mounting bolts (1 to 2) and remove the gearbox housing extension using two threaded rods with rafter as shown in Figure 21/22. The use of levers can result in damage to the Laminium disc under the cover. During the whole operation,

out. If the gearbox has no oil filler plug, the oil can be poured in via the bore of the vent filter, the oil level inspection bore or the gearbox housing extension. Close the bore securely after filling. If the thread or gasket of the plug is damaged, these must be replaced.

**Changing oil:**

- Place a collecting vessel under the drain plug
- Carefully unscrew the drain plug
-  Caution! Risk of scalding if the gearbox has not cooled down completely.
- Position the gearbox so that the oil can drain out completely
- When using alternative oil grades, take care not to mix the oils
- Inspect the plug and gasket for damage and replace, if necessary. Screw in the plug again using a medium-strength locking compound.
- Pour in the oil quantity according to the ATEK information / rating plate and check the oil level after 15 minutes at the inspection bore.
- Close the inspection bore.

**i**

**Note**

Oil losses generally indicate a defect in the sealing system. This is not always visible from the outside as on the types VL, VLM and VC the oil can also run out into the space between motor and gearbox (motor flange). ATEK gearboxes have a sealed inspection plug on the underside of the motor flange. A minimal oil loss can also occur via the vent filter when the gearbox reaches its maximum temperature for the first time. Check the oil level after every oil loss.

**Replacement of bearings**

The bearing service life corresponds to the relevant guidelines for industrial gearboxes. Replacement of the bearings is only necessary in the event of bearing damage (excessive temperature, noise, bearing play, etc.). If in doubt, please consult ATEK.

**i**

**Inspection of couplings**

Jaw couplings (ROTEX®) have an elastomer spider that is subject to wear in the event of extreme shaft movements or torque loading. If the spider width shown in Figure 23 falls below the tolerances in Table 11 or exhibits other damage or discolouration, the spider must be replaced with a new spider of the same grade.

If the application does not permit an increase in play, wear of the coupling must also be ruled out. In this case the coupling wear must be checked for the first time after 1000 operating hours or after 3 months at the latest.

Type	Wear limit					
	14	19/24	24/28	28/38	38/45	42/55
b normal	10	7	8,5	11	13	16
b min	7,5	5,2	6,5	8,2	9,6	12

Table 11: Wear limits of the elastomer spiders

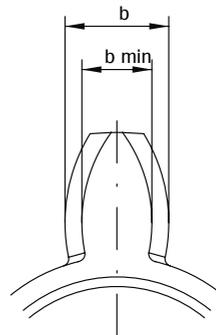


Figure 23: Ring gear jaw coupling

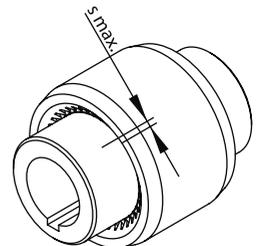


Figure 24: Curved-tooth coupling

As shown in Figure 23, curved-tooth couplings have a max. admissible torsional play  $s$  (see Table 5).

Bowex Size	Torsional play $s$ per hub [mm]
38	1.7
42	1.7
48	1.8
65	2.5
80	2.7

Table 5: Coupling wear of tooth couplings

### Replacement of the radial shaft seals

Depending on the load imposed by environmental influences and the temperature load (heavily dependent on speed), replacement of the radial shaft seals should only be carried out

by qualified persons or by the manufacturer. Damage to the shaft seats must be avoided at all costs. Instructions for removal and installation can be found under [www.atek.de](http://www.atek.de).

New shaft seals must not be installed on the same running track or damage shaft seal seats. Remachining of the shaft seal seats by the customer is only expedient if the necessary technical know-how is available.

### Corrosion protection

Depending on the environmental influences, the corrosion protection coating must be renewed and the paint coating repaired.

The interval for checking the air circulation of the vent filters / valves (removal of dust deposits) and the replacement of the vent filters / valves

Fault	Possible cause	Remedy
Noticeable uniform running noise	Defective bearing	Bearing replacement necessary, should be carried out by manufacturer
Radial or axial movement of gearbox shafts	Defective bearing	Bearing replacement necessary, should be carried out by manufacturer
Noticeable uniform running noise depending on the tooth meshing position	Defective gear set	80% repair: Replace gear set, bearings, seal rings and possibly shafts
	Defective coupling	Replace the coupling
Gearbox noise with vibrations	Defective bearing	Bearing replacement necessary, should be carried out by manufacturer
	Foreign matter in oil	Consult the manufacturer
Non-uniform running noise	Defective coupling	Replacement of the jaw coupling spider
	Defective shaft seal ring	Replace the seal
Oil loss at seal ring	Defective shaft seal	Replace the seal
Oil loss at housing	Defective housing seal	Replace the housing seal
Oil loss at vent filter / valve	Unfavourable combination of speed, direction of rotation, temperature, oil level, installation position	Consult the manufacturer
Temperature increase	Various causes	Consult the manufacturer
Gearbox seized	Defective gear set or bearings	Replace the defective parts
Shafts do not rotate or do not rotate uniformly	Shaft/hub connection in or on gearbox interrupted	Consult the manufacturer
Torque is not transmitted	Defective gear set, broken shaft, loose gear wheel	Consult the manufacturer

Table 12: Troubleshooting Chart

# Disposal

can only be determined by an authorised person from the plant operator's company or from the equipment supplier. During the equipment maintenance, inspect the shaft seals and in the

event of excessive shaft loads, check the radial or axial bearing play at the shaft ends. Spare parts drawings for repair work can be found in the catalogue or on the Internet.

---

## 18 Troubleshooting Chart

If you require technical information or other assistance, please have the serial number of the gearbox available. Furthermore, you should be able to provide information on the type of

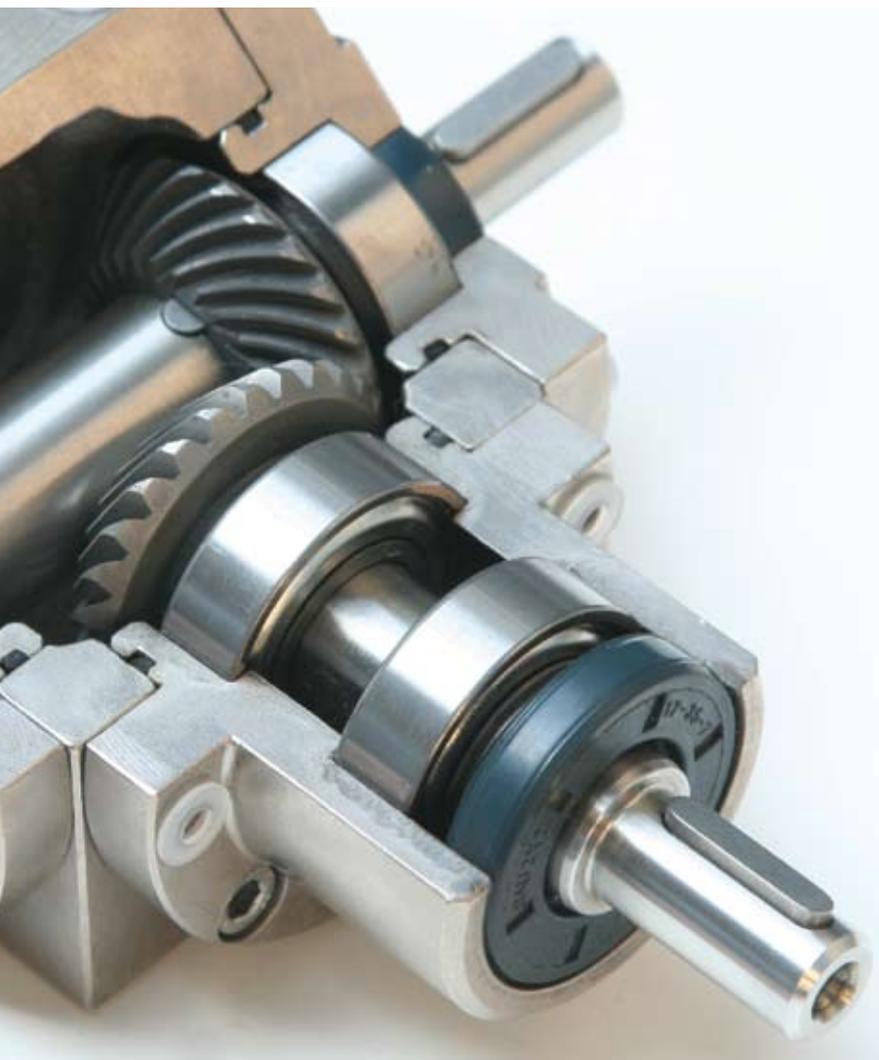
fault, the gearbox application, the ancillary circumstances and the temporal development of the fault.

---

## 19 Disposal

During disposal of the gearbox, ensure that the gearbox oil is delivered to an authorised used oil collection point for proper disposal. Housing parts can be disposed of as casting scrap, and shafts, roller bearings, gear wheels (except bronze gears) and bolts as steel scrap.





4 / 2009

[www.atek.de](http://www.atek.de)

ATEK Antriebstechnik Willi Glapiak GmbH  
Siemensstrasse 47 · D-25462 Rellingen  
Tel.: + 49 - (0)4101/79 53-0  
Fax: + 49 - (0)4101/79 53-21 (Verkauf)  
Email: [atek@atek.de](mailto:atek@atek.de) · [www.atek.de](http://www.atek.de)

**ATEK**  
ANTRIEBSTECHNIK