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ATLANTA does not assume liability for any damage to the transmission or any resulting consequential damage, if these instructions are not observed.

Explanation of symbols:

Danger of personal injury

Risk of damage to gearbox or machine/system

Important information

Directions and instructions for the operation in areas with explosion hazard

General safety notes:

Improper working may lead to injuries and damage:

- **Flung about foreign matter can cause injuries. Do not leave any foreign matter or tools near the lifting unit when taking it into operation.**
- **Touching hot surfaces may cause burns. Wear protective gloves.**
- **Keep distance from rotating or straight traversing machine components. There is the risk that hair or parts of the body are squeezed or pulled in.**
- **Should you notice any damage or defect of the HS screw-jack gearbox, you must not take it into operation. Inform ATLANTA.**

General instructions:

When operated in areas with explosion hazard the instructions identified by the Ex symbol are to be observed. They have been prepared on the basis of the ignition danger rating KGA 130.

ATTENTION!
The observance of the operating and maintenance instructions is prerequisite for trouble-free operation of the system and the acceptance of possible warranty claims.
Therefore read these instructions before starting work with the screw-jack gearbox! Pay special attention to the safety instructions!
These operating and maintenance instructions are part of your product and contain important information regarding maintenance and service; therefore they should always be kept close to the screw-jack gearbox.

In addition, comply with any national or regional regulations regarding safety and prevention of accidents!

Residual risks to persons or property may arise from the screw-jack gearboxes. For this reason, any assembly, installation, start-up, and/or service work may be performed only by skilled or specially trained personnel being aware of possible risks.
The personnel must be qualified for the work to be done and be familiar with the assembly, installation, starting-up procedure and the operation of the product. Furthermore the complete operating and maintenance instructions must be carefully read, understood, and respected.
Only qualified personnel may perform the following work:
Transport and handling, storage, erection, installation, electric connection, start-up, maintenance, repair.

Within the meaning of the EC Machinery Directive 2006/42/EG the HS screw-jack gearbox is no machine but a component to be incorporated into machines. Within the scope of the EC Machinery Directive its operation is prohibited until it is ensured that the machine into which this screw-jack gearbox is installed is in compliance with the directions of the EC Machinery Directive.

Changes and modification of the HS screw-jack gearbox may be made only with express written permission of ATLANTA Antriebssysteme E.Seidenspinner GmbH & Co. KG .

ATLANTA Antriebssysteme E.Seidenspinner GmbH & Co. KG reserves the right to make technical changes to improve the product. .

Disclaimer:

The manufacturer shall not be liable for damage or injury arising from improper handling of the HS screw-jack gearbox.

Unprofessional handling or any other acts that are not in accordance with these instructions impair the properties of the product. This leads to the loss of any kind of warranty claims against the Company ATLANTA Antriebssysteme E.Seidenspinner GmbH & Co. KG.

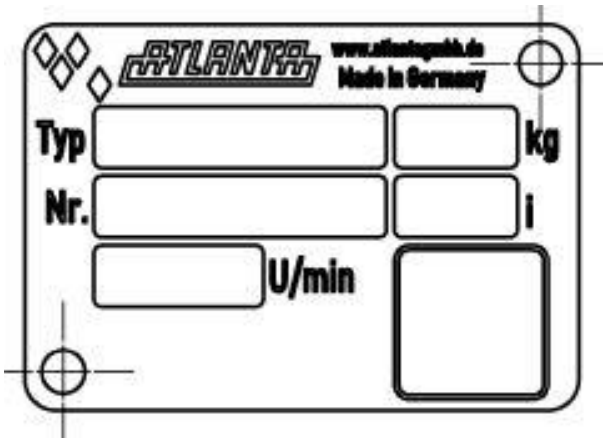
1. Short description

The ATLANTA high-performance screw-jack gearboxes (series60 5x xxx and 60 6x xxx) are used for the conversion of rotary motions into linear motions. They can be driven by either three-phase AC motors or servo-motors. Manual operation is also possible. On consultation with ATLANTA other motors may be permissible as special versions.
The gear units are available with non-rotating spindle or rotating spindle or as lifting-cylinder design. As standard version they are equipped with ball-screw spindle and nut. The light-metal housing ensures optimal heat dissipation.
They are provided with low-clearance gearing.
The ball-screw drives have been optimized for high loads and duty cycles.

The gear units are delivered test-run, tested for tightness, and consequently ready for operation.
The ball-screw drives are supplied greased ready for operation.

1.1. Marking

The HS screw-jack gearbox is provided with a nameplate containing the following information.
Example for nameplate:



Typ	Part number of the complete screw jack gear unit.
kg	Weight
Nr.	Serial number
i	Reduction
U/min	Max. speed with S3 operation

An oil nameplate contains the type of oil:

When used in potentially explosive areas the gear unit must show the corresponding marking on the name plate. Only then it may be used in this specific area.
Special attention should be paid to the category listed there.

Example of an ATEX nameplate:

Nameplate with stroke and end positions see chapter 7.1 and 7.2.

2. Proper use :

When operated in areas with explosion hazard the instructions identified by the Ex symbol are to be observed.

The ATLANTA screw-jack gearboxes may only be used for the conversion of rotary motions into linear motions in mechanical engineering applications under atmospheric pressure conditions.

The permissible input speed and output torque must not be exceeded. The layout instructions according to the ATLANTA catalogue have to be observed.

The gear unit may be operated only in rooms with normal ambient pressure. The gear unit must not be operated outdoors or at increased ambient pressure, and also not under water or other liquids.

The gear unit may be operated only at ambient temperatures between -10 °C and +40 °C.

Other temperatures and working conditions are possible with special designs and are subject to the approval by ATLANTA:

The gear unit is designed for intermittent operation (S3 acc. to DIN EN 60034-1). The duty cycles mentioned in the catalogue must not be exceeded.

Continuous operation (S1 acc. to DIN EN 60034-1) is not permissible without written approval by ATLANTA.

The gear unit must not be used in combination with combustion engines – danger of overheating, inadmissible shock loading!

The gear unit is designed for power input via the worm shaft. The efficiency rating stated refers to power input via the worm-shaft.

In combination with ball-screw spindles the gear unit is neither self-locking nor self-braking. The load must be braked and held by means of the motor brake.

When installed in vertical position, releasing the brake leads to uncontrolled lowering of the load.

The lifting unit may not be controlled by mechanical stops. The Lmin and Lmax measures on the nameplate must be observed. If the gear unit is run to the stops, components will be overloaded causing damage.
Deviation from this requirement is only permitted if a low speed is chosen and the motor is switched off before reaching 150% of the torque required for moving the load.

Gear units in lifting cylinder version can only transmit axial forces at the link rod head / piston tube. They are not able to transmit torques at this point. Torques have to be supported by guides in the customer design.

The surface temperature of the gearbox must not exceed 80°C during operation.

When used in areas with explosion hazard, it may be necessary to measure the surface temperature and to ensure warning or cut-off, if the temperature of 65°C is exceeded.

Differing working conditions require written approval by ATLANTA.

2.1. Improper use:

Any use where the permissible limit values of lifting capacity and input speed, the operating conditions and temperature ranges stated, and the other conditions mentioned under 2 are exceeded, shall be considered improper use and shall consequently be forbidden.

This applies equally, if the gear unit

- is not assembled properly
- is not installed properly
- is very dirty
- is not sufficiently lubricated
- if there is dirt or other fishes in the grease at the spindle

3. Transport

Transport and handling may be carried out only by qualified or specially trained personnel. Observe the safety regulations applying to transport and handling with lifting tackle.

The load should be handled and set down slowly and cautiously.

No special bores or threads are provided for transporting the gear unit. There are, however, many threaded fastening holes in the gearbox where eye-bolts can be screwed in, thus enabling safe transportation and handling.

It must be assured that no loads (particularly no bending stresses) act upon the spindle and the gear unit.

Lifting-cylinder type gearboxes must not be subject to any bending stress upon the cylinder jacket and tube.

The same applies to the protective tube in gear units with non-rotating spindle.

Improper transportation of the gear unit can cause damage to the output-shaft bearing or the spindle drive resulting in a considerably reduced service life of the gear unit and the spindle.

Gear units with rotating spindle:
Transport only at eye-bolts screwed in the housing.

Gear unit with non-rotating spindle:
Transport only in retracted position.
Don't apply bending stress on the protective tube.
Transport only at eye-bolts screwed in the housing.
Don't transport at the attaching part at the end of the spindle. The spindle can unscrew from the gearbox because of the missing self-locking quality.

Gear unit in lifting cylinder design:
Transport only in retracted position.
Don't apply bending stress on the piston tube or outside tube.
Transport preferably at eye-bolts screwed in the housing at with carrying handle at the outside tube.
The articulated joint at the piston tube is only allowed as additional suspension point.
Exclusive use of it results in an extracting piston tube because of the missing self-locking quality of the ball-screw drive.

The total weight of the screw jack gear unit is indicated on the name plate.

4. Preparing the installation

Installation work may be carried out only by qualified or specially trained personnel.

Inspect the gear unit for outside damage and soiling. A damaged or soiled gear unit must not be installed or operated.

Cleaning with high-pressure cleaners is not permissible. It leads to the destruction of the seals and penetration of water into the gearbox and consequently to premature failure of the gear unit.

Do not clean the gear unit, and in particular the area of the seals, with sharp-edged objects and liquid cleaning agents.

4.1. Check list for the installation and start-up

Before beginning the installation and start-up

What has to be checked?	Checked
Delivery: • Does the scope of delivery comply with the shipping documents? • Report any shipping damage immediately to the forwarder. • Report any visible damage/incompleteness immediately to ATLANTA Antriebssysteme E. Seidenspinner GmbH & Co. KG.	
Application in areas with explosion hazard: • Do the following specifications on the nameplate of the gearbox comply with the permissible *ex*-range conditions on site? – Explosion group – Category – Temperature class – Max. surface temperature • Are all components or attachments to be mounted suitable for use within the respective *ex*-protected application?	
Ambient temperature: • Will the ambient temperature range reliably lie between -10°C and + 40°C? – The maximum ambient temperature of 40°C must not be exceeded at any time during the operation. – The temperature must not fall below the minimum of -10°C at any time during the operation.	
Ventilation: • Is sufficient ventilation of the gear units provided to ensure adequate heat dissipation?	
Nameplate specifications: • Are the specifications stated on the nameplate of the gear unit not exceeded?	

During start-up

What has to be checked?	Checked
Environment: • It must be ensured that no explosive atmospheres, oils, acids, gases, vapors, or combustible dusts are present! • Exception: The gear unit is allowed for such environment and provided with a corresponding additional ATEX plate.	
Temperature measurement: A temperature measurement is **obligatory** after 3 hours of operation under maximum load permissible for the respective application! • The temperature measurements must be made in the area of the drive in places that are protected from the flow of cooling air. It is advisable to measure at different points to determine the maximum temperature. • An absolute temperature of 80°C on the surface of the housing must not be exceeded in order to keep the thermal stress on shaft seals and lubricant as low as possible; this has a positive effect upon their service life. • When used in areas with explosion hazard the surface temperature must not exceed 65°C.	

4.2. Check for true-running at the spindle of gear units with rotating spindle:

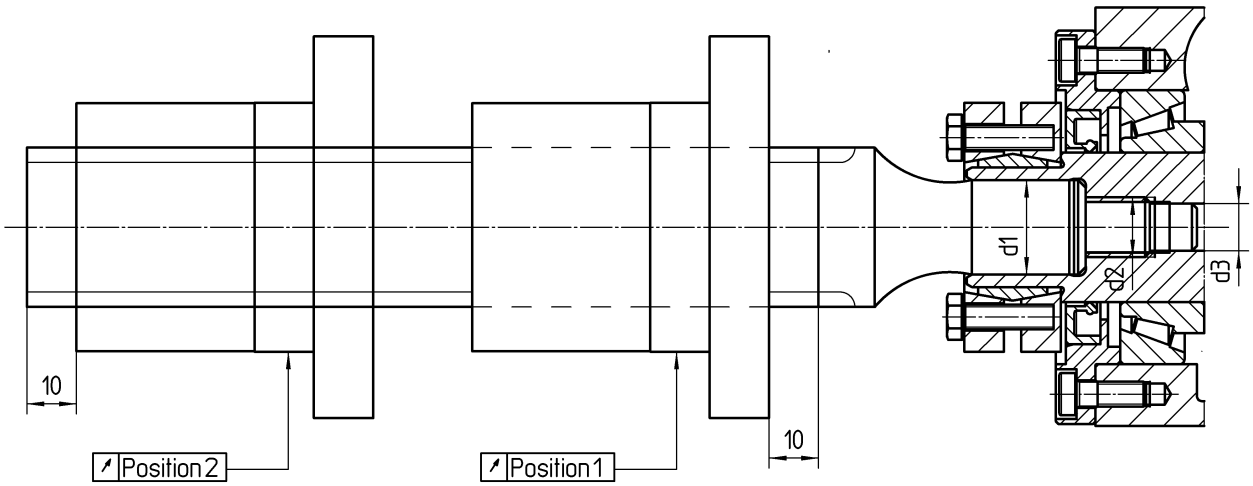
In order to make sure that there is no transport damage; check the spindle for true-running before installing the gear unit in the system!

Position and clamp the gear unit horizontally. Place the dial indicator on a level support on the workbench and put the measuring sensor on the nut. With motor disconnected, turn the input shaft by hand until at least one full revolution of the spindle is completed.

Measuring position 1:
Permissible radial divergence (=value indicated by dial indicator): 0.1 mm
Measuring position 2:
Permissible radial divergence (=value indicated by dial indicator) depending upon the spindle length measured from the front edge of the gear unit:

Spindle length	Radial divergence
Up to 500 mm	0.15 mm
501-1000 mm	0.4 mm
1001-1500 mm	0.8 mm
1501-2000 mm	1.2 mm

Please contact us, if the permissible radial divergence is exceeded.



5. Mounting

Mounting work may be carried out only by qualified or specially trained personnel.

Warning!

Rotating or straight moving parts may catch pieces of clothing, hair and members of the body and injure persons. The installation must ensure that persons cannot be endangered by any rotating or straight moving components.

Screw-jack gearboxes or any individual components must always be mounted free from tensions.

5.1. Mounting the limit-switch set for gear units with non-rotating spindle:

The mechanical limit switches can be used both as operation limit switches and as safety limit switches. They are provided with forced mechanical disconnection. Due to this they can be used as safety limit switches in accordance with the accident prevention rules of the German professional association.
The inductive limit switches can be used as operation limit switches. Whether their use as safety limit switches is permissible, has to be determined by the user.

The gearbox is supplied with the necessary bores inside the protective tube.

If the bores are executed on the site, mind the following points:

- Position the bores so that they are covered when the plate with screwed-in limit switch is fitted.
- Do not use long slotted holes because they would reduce the strength of the protective tube.
- After drilling, clean the tube from chips. Trim the bores inside and outside the tube.

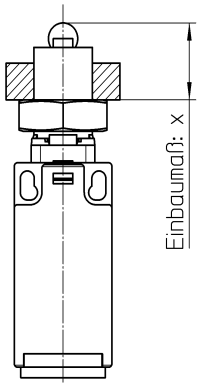
Screw the limit switches into limit switch plate to the dimension required. Proceed as shown in the following table and in the drawings 1 and 2. Tighten the nut on the limit switch only slightly.

Position the holder centrally over the hole or the slot and tighten the screws hand-tight. Do not forget the washers.

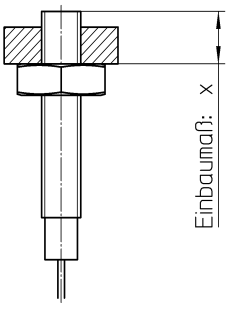
Now start the gear unit as described under point 7.

Gear unit	Installation dimension “x” [mm] with mechanical limit-switch set acc. to drawing 1	Installation dimension “x” [mm] with inductive limit-switch set acc. to drawing 2
HS 10	19.0 -0.5	11.0 -0.5
HS 25	21.6 -0.5	13.6 -0.5
HS 50	21.7 -0.5	13.7 -0.5
HS 100	22.0 -0.5	14.0 -0.5

drawing 1



drawing 2



Einbaumaß = installation dimension

After installing the gear unit in the system check if the limit switches function as desired. You can adjust the switching point by displacing the limit switch axially within the protective tube. .

Do not reduce or increase the screwing depth. The mechanical limit switch is provided with forced mechanical disconnection. The installation dimension is chosen to suit this switching point. If it is not possible to reach the switching point by axial displacement, please contact us.

When using a mechanical limit switch, make sure that the maximum switching path is not exceeded. When using an inductive limit switch, take care that it does not extend into the inside of the protective tube.

After determining the required switching positions tighten the screws at the limit switch plate with a torque wrench to 5.5 Nm and lock the nut of the limit switch.

When used in areas with explosion hazard, only limit switches meeting the ATEX requirements are permitted. The limit switches of the standard program range are not suitable for such applications.

When used in areas with explosion hazard, suitable corrosion protection (e.g. greasing, painting, zinc coating) must be provided, if there is a risk that mechanical sparking may occur.

Also corrosion protected screws have to be used.

5.2. Mounting the spherical plain bearing rod head / swivel head for gear units with non-rotating spindle:

If the spherical plain bearing head / swivel head is supplied non-assembled, proceed as described below:

Screw the spherical plain bearing head / swivel head onto the spindle end and adjust according to the mounting position. When mounted, there must not be any tensions between spherical plain bearing head / swivel head and twisting protection.

The spherical plain bearing head / swivel head must be connected to the spindle in such a way that the spindle torque can be reliably transmitted. The chosen type of connection must be verified by means of calculation.

When used in areas with explosion hazard, suitable corrosion protection (e.g. greasing, painting, zinc coating) must be provided, if there is a risk that mechanical sparking may occur.

5.3. Mounting the spindle nut for gear units with rotating spindle:

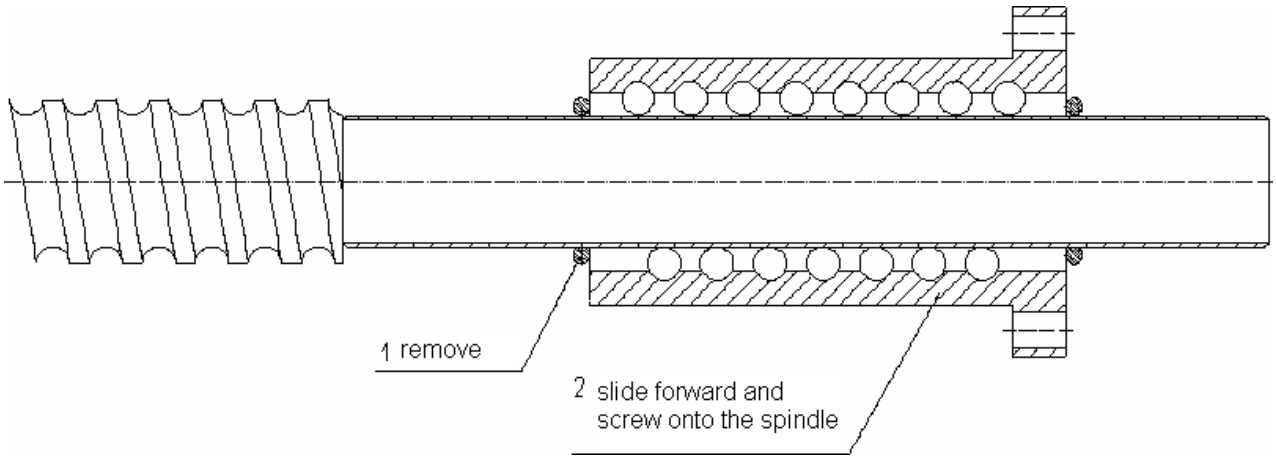
The unit is delivered with ball-screw nut mounted. Depending upon the design of the lifting device it may become necessary to remove the ball-screw nut from the spindle in order to install the gearbox. For this purpose we supply together with the gearbox a mounting sleeve which is necessary for the first installation and also for later maintenance work and should therefore be preserved. Proceed as shown on illustration 5.3.

Disassembling the nut from the spindle:

- Remove the o-ring from the mounting sleeve.
- Hold this side of the mounting sleeve against the spindle end.
- Turn the nut from the spindle onto the mounting sleeve. The mounting sleeve must be held carefully against the spindle end in order to prevent the balls from falling out.
- When the nut rests completely on the mounting sleeve, push it somewhat towards the centre and put the o-ring back in place.

Mounting the nut on the spindle:

- Remove one o-ring from the mounting sleeve. Be careful that the nut does not slip off the mounting sleeve.
- Hold this side of the mounting sleeve against the spindle end.
- Slide the nut on the sleeve right up to the spindle end.
- Screw the nut onto the spindle. The mounting sleeve should be held carefully against the spindle end to prevent the balls from falling out.
- When the nut is completely screwed onto the spindle, remove the mounting sleeve and put the o-ring back in place.
- Preserve the mounting sleeve for future maintenance work.
- If balls fall out, please contact us. Due to faulty re-filling the whole ball-screw drive can be blocked and damaged.



Drawing 5.3: Disassembling and mounting the ball-screw nut

5.4. Mounting the safety grip nut for gear units with rotating spindle:

Observe the special operating and maintenance instructions of BWL 108e for safety grip nuts.
You can find it on our homepage.

5.5. Mounting the mating bearing flange for gear units with rotating spindle:

Hold the mating bearing flange against the spindle end. Install the inner bearing ring with a sleeve by slightly tapping with a plastic hammer.
Rotate the bearing and check for easy running.
Screw it to the system. Tighten the screws as stated in the table below.

Choose the length of the screws in such a way that the available depth of the thread is used as completely as possible.

When used in areas with explosion hazard, suitable corrosion protection (e.g. greasing, painting, zinc coating) must be provided, if there is a risk that mechanical sparking may occur. Also corrosion protected screws have to be used.

Screw size	Strength class of the screws	Tightening *) torque
M 8	8.8	25 Nm
M 10	8.8	48 Nm
M 12	8.8	84 Nm
M 20	8.8	415 Nm

*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless. Secure screws against loosening (e.g. with Loctite 243).

5.6. Mounting the bellows:

When used in areas with explosion hazard, it must be ensured that the bellows does not come in touch with any attachments and does not brush against anything during operation, in order to avoid electrostatic charging.
Measure the electrostatic charge.

Gear unit with non-rotating spindle:
In the case of gear units with non-rotating spindle the bellows is mounted between nut protection and optional spindle mounting flange, spherical plain bearing rod head, swivel head or a customer-specific attachment.
Slide both cuffs of the bellows over the respective attachments. Fasten with hose clamps. Make sure that the bellows is not twisted.

Gear unit with rotating spindle:
In the case of gear units with rotating spindle one bellows is attached to the gear unit and the other one is enclosed loosely because the nut must be removed for the installation of the gear unit in the system. The bellows can be fixed only after the gear unit is installed in the system. See also Chapter 7.5.
When attaching the bellows, always make sure that it is not twisted.

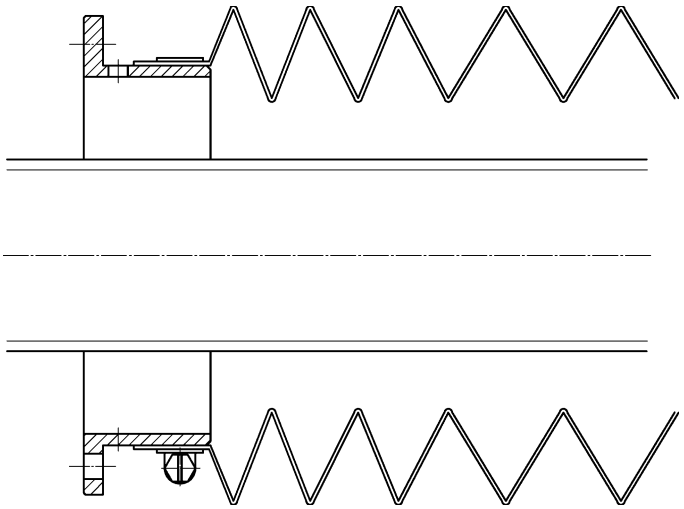
The bellows must be safely fixed so that the flanges or ends of the bellows cannot slip off from the attachments.

The space the bellows needs in compressed condition, must be considered in the design. The bellows must neither be compressed too much nor overstretched.

Depending upon the mounting situation, supporting rings are provided in the bellows in order to prevent the bellows from coming into contact with the spindle. They must not be removed!

The bellows must always be adequately ventilated. For this purpose our bellows adapters are provided with cross bores. Do not push the bellows fully up to the stop but only so far that the vents remain unobstructed. See drawing 5.6.

Vents are also provided in the bellows themselves. Make sure that these always remain unobstructed so that the air can freely pass or escape.



Drawing 5.6 Mounting the bellows

5.7. Mounting the gearbox swivel bearing:

Screw the swivel bearing and the gear unit together. Tightening torque acc. to table below. The flow of forces should, if possible, be chosen in such a way that the force passes over the supporting surface and not over the screws.

When used in areas with explosion hazard, suitable corrosion protection (e.g. greasing, painting, zinc coating) must be provided, if there is a risk that mechanical sparking may occur. Also corrosion protected screws have to be used.

Screw size	Strength class of the screws	Tightening*) torque
M 8	8.8	25 Nm
M 12	8.8	84 Nm
M 16	8.8	205 Nm

*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless. Secure screws against loosening (e.g. with Loctite 243).

5.8. Mounting the input flange:

We recommend to proceed as follows:

- Before attaching the input flange clean all contact surfaces.
- Insert the input flange into the gear centring piece and tighten the screws at first only slightly.
- Whenever possible, use washers for improved contact pressure.
- Because of their small contact surface, hexagonal screws should alaways be used together with washers
- Tighten screws alternately crosswise. Tightening torque acc. to table (reduced tightening torques on aluminum surfaces).
- Choose the length of the screws so as to make optimal use of the available depth of thread.

When used in areas with explosion hazard, the opening in the input flange (for tightening the fixing screw for the coupling) should be mounted so that it looks to the side or downward.
Improper installation can lead to unacceptably high temperatures.

When used in areas with explosion hazard, suitable corrosion protection (e.g. greasing, painting, zinc coating) must be provided, if there is a risk that mechanical sparking may occur.
Also corrosion protected screws have to be used.

Screw size	Depth of thread [mm]	Strength class of the screws	Tightening-torque *)
M 6	12	8.8	9 Nm
M 8	16	8.8	21 Nm
M 10	17	8.8	42 Nm
M 12	23	8.8	49 Nm

*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless. Secure screws against loosening (e.g. with Loctite 243).

5.9. Mounting the drive coupling:

If the drive coupling is supplied by ATLANTA, it will usually be enclosed separately.

Coupling for 3 phase AC motors:

Mount and fix the coupling as described in the enclosed operating and mounting instructions of the coupling manufacturer.

When used in areas with explosion hazard, only couplings meeting the ATEX requirements may be used.

Observe the Ex references in the operating conditions of the coupling!

Choosing unsuitable couplings or improper installation may increase the ignition risk.

Improper installation can lead to temperatures inadmissible for use in potentially explosive areas.

The maintenance intervals specified in the operating conditions must be strictly observed!

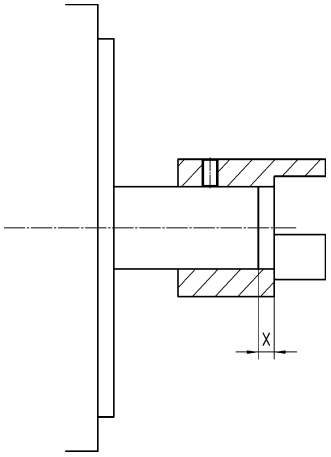
Check for true-running after 10 hours of operation under operating conditions.

- Torsionally flexible ROTEX claw coupling: at the large hub diameter
- BoWex fast flexible coupling: at the hub diameter.

Recommended mounting procedure (drawing 5.9.1) :

- Clean all contact surfaces and coat them with a thin oil film before mounting.
- Slide the corresponding coupling halfway onto the shafts of gear unit and motor.
- Tighten the threaded pins of the coupling half and secure against loosening (e.g. with Loctite 243) to ensure safe axial locking.
- In the case of standard motors and our drive flanges the shafts of gear unit and motor is set back by the dimension “X” compared with the coupling body. In the case of negative dimensions „X“, the motor-shaft projects in relation to the coupling body.
- Insert the star in the coupling half on the gear unit.

Gear unit	Part number	Motor shaft	Dim. „X at gear unit	Dim. „X“ at motor
HS 10	60 x4 0xx	11x23	10	10
		14x30	6	7
		19x40	3	0
HS 25	60 x5 0xx	19x40	6	6
		24x50	1	1
		28x60	1	1
HS 50	60 x6 0xx	24x50	4	4
		28x60	0	1
		38x80	0	1
HS 100	60 x7 0xx	28x60	-3	-2
		38x80	-3	-2
		42x110	-3	0



Drawing 5.9.1

ATLANTA coupling for servo-motors with toothed-shaft profile (Nos. 65 5x xxx and 65 4x xxx)

The coupling itself is supplied pre-assembled. For the installation on the motor shaft we recommend to proceed as follows (pictures 5.9.3 and 5.9.4):

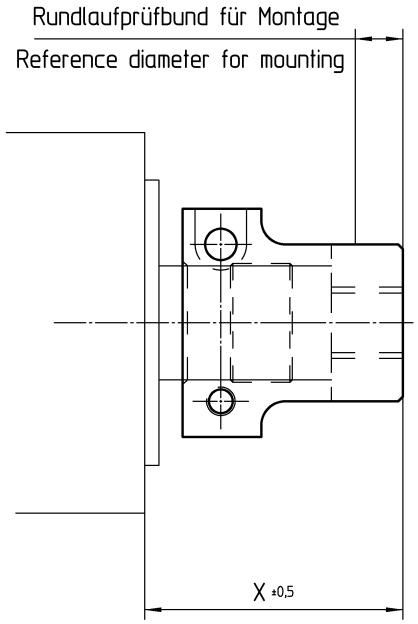
- Before mounting the coupling on the motor shaft clean all contact surfaces and coat them with a thin oil film (no grease). Remove any excess oil with a clean rag.
- Coat the surface of the DIN 5480 profile of the motor shaft with MoS2 powder or a special grease to reduce the danger of fretting corrosion (e.g. Klüberpaste 46 MR 401 from Klüber).
- Slide the coupling onto the motor shaft as far as the dimension indicated in table 5.9.2 or up to the stop (shoulder or retaining ring).
- Coupling 65 5x xxx:
  Tighten the clamping screws with an indicating torque wrench.
  Check the concentricity of the clutch at the reference diameter. (f_r < 0.04 mm).
- Coupling 65 4x xxx:
  Tighten the clamping screws slightly.
  Tighten the screws uniformly by turning them alternately crosswise.
  Check the concentricity of the clutch at the reference diameter. (f_r < 0.04 mm).
  Several passes are required until the screws are secured with the specified torque according to the table below.
  The width of the gap between clutch and pressure surface must remain equal.
- Check once more the concentricity at the reference diameter (f_r < 0.04 mm). See drawings 5.9.3 and 5.9.4.

When used in areas with explosion hazard, improper installation can lead to inadmissibly high temperatures. For this reason it is necessary to check the axial fixing and the tightening torque and also the concentricity again after 10 hours under operating conditions.

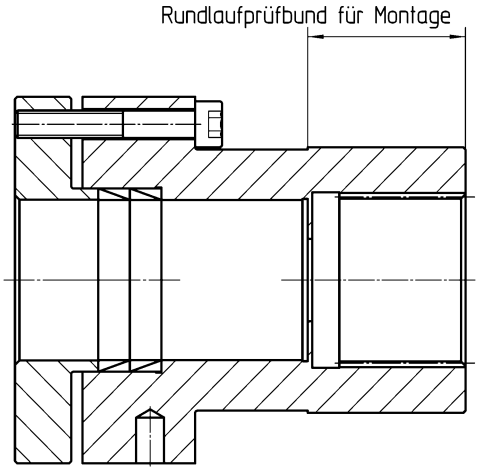
When used in areas with explosion hazard, use corrosion-protected screws when there is a risk of mechanical sparking.

Order code of coupling	Screw	Tightening torque *)	Order code of coupling	Tightening torque *)
65 51 xxx	M5	7 Nm	65 43 xxx	7 Nm
65 53 xxx	M5	7 Nm	65 44 xxx	10 Nm
	M8	25 Nm	65 46 xxx	10 Nm
65 54 xxx	M6	10 Nm		
	M8	25 Nm		
65 55 xxx	M8	25 Nm		

*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless. Secure screws against loosening (e.g. with Loctite 243).



Drawing 5.9.3 Coupling 65 5x xxx



Drawing 5.9.4 Coupling 65 4x xxx

If you do not find your servo motor in the following tables, please have a look at our page "ATLANTA Service".
https://atlanta-service.de/en

Table 5.9.2.

Gear unit HS 10 60 x4 1xx and 60 x4 2xx (a=32)

Motor dimensions						Coupling	Motor-flange	Intermediate flange	Dimension X
Shaft -ø	Shaft length	Centering-ø	Max. centering length	Bolt circle ø	Fixing thread				
8	25	30	2,5	46	M4	65 51 008	65 59 103	265 23 076	59
9	20	40	2,5	63	M5	65 51 009	65 59 101		49
9	24	40	2,5	63	M5	65 51 009	65 59 101		49
10	32	80	4	100	M6	65 51 010	65 59 104		56
11	23	60	3,5	75	M5	65 51 011	65 59 103		51
11	23	60	4	75	M5	65 43 111	65 59 103	15 mm width Customer production	*
11	23	60	5	90	M5	65 51 011	65 59 105		50
11	30	50	4	70	M5	65 51 011	65 59 102		56
11	30	80	3	100	M6	65 51 011	65 59 104		56
14	30	50	4	70	M5	65 51 014	65 59 102		56
14	30	50	5	95	M6	65 51 014	65 59 103	265 21 078	62
14	30	60	3,5	75	M5	65 51 014	65 59 103		52
14	30	60	5	90	M5	65 51 014	65 56 105		52
14	30	70	4	90	M5	65 51 014	65 59 102	265 21 098	64
14	30	80	5	100	M6	65 51 014	65 59 104		56
16	35	80	5	100	M6	65 51 016	65 59 104		56
16	40	70	5	90	M6	65 51 016	65 59 102	265 21 097	71
16	40	80	5	100	M6	65 51 016	65 59 104		56
19	40	80	5	100	M6	65 53 019	65 59 104		56
19	40	95	5	115	M8	65 53 019	65 59 103	265 21 096	67

* = coupling up to stop

Gear unit HS 25 60 x5 1xx and 60 x5 2xx (a=50)

Motor dimensions						Coupling	Motor-flange	Intermediate flange	Dimension X
Shaft -ø	Shaft length	Centering-ø	Max. centering length	Bolt circle ø	Fixing thread				
10	32	80	6	100	M6	65 51 010	65 59 303		56
11	23	60	7	75	M5	65 43 111	65 59 306		*
11	23	60	6	90	M5	65 43 111	65 59 301	265 23 085	*
11	23	95	6	115	M8	65 51 011	65 59 301		51
11	25	60	6	75	M5	65 43 111	65 59 306		68,5
11	30	50	6	70	M4	65 43 111	65 59 301	265 23 084	*
11	30	80	6	100	M6	65 51 011	65 59 303		56
14	30	50	6	70	M5	65 43 914	65 59 301	265 23 087	*
14	30	50	6	95	M6	65 51 014	65 59 302		56
14	30	60	7	75	M5	65 43 914	65 59 306		*
14	30	70	6	90	M5	65 43 914	65 59 301	265 23 086	*
14	30	80	6	100	M6	65 51 014	65 59 303		56
14	30	95	6	115	M8	65 51 014	65 59 301		56
16	35	80	6	100	M6	65 51 016	65 59 303		56
16	40	60	7	75;90	M5	65 51 016	65 59 306		68
16	40	70	7	90	M6	65 51 016	65 59 307		64
16	40	80	6	100	M6	65 51 016	65 59 303		56
16	40	110	7	145	M8	65 51 016	65 59 410		68
16	43	95	5	115	M8	65 51 016	65 59 301	265 23 099	66
19	35	70	7	90	M6	65 53 019	65 59 307		64
19	40	70	7	90	M6	65 53 019	65 59 307		64
19	40	80	6	100	M6	65 53 019	65 59 303		56
19	40	95	6	115	M8	65 53 019	65 59 301		56
19	40	95	6	130	M8	65 43 919	65 59 304		*
19	40	110	7	130	M8	65 53 019	65 59 402		72
19	40	110	7	145	M8	65 53 019	65 59 410		67
19	46	130	5	165	M10	65 53 019	65 59 301	265 23 097	72
19	50	110	6	145	M8	65 53 019	65 59 301	265 23 095	80
19	55	110	7	145	M8	65 53 019	65 59 411		78
19	58	110	7	145	M8	65 53 019	65 59 411		78
22	58	110	7	145	M8	65 53 022	65 59 411		78
22	55	114,3	7	200	M12	65 53 022	65 59 414		85
24	50	95	5	115	M8	65 53 024	65 59 305		72,5
24	50	110	7	130	M8	65 53 024	65 59 402		73
24	55	110	7	145	M8	65 53 024	65 59 411		78
28	55	110	7	145	M8	65 53 028	65 59 411		78
28	55	114,3	7	200	M12	65 53 028	65 59 414		85
28	60	130	7	165	M10	65 53 028	65 59 409		93
28	60	130	4	165	M10	65 53 028	65 59 301	265 23 079	83
32	58	130	7	165	M10	65 53 032	65 59 409		93
35	79	114,3	7	200	M12	65 53 035	65 59 412		98
35	80	114,3	7	200	M12	65 53 035	65 59 412		98

* = coupling up to stop

Gear unit HS 50 60 x6 1xx and 60 x6 2xx (a=63)

Motor dimensions						Coupling	Motor-flange	Intermediate flange	Dimension X
Shaft -ø	Shaft length	Centering-ø	Max. centering length	Bolt circle ø	Fixing thread				
11	23	95	7	115	M8	65 54 011	65 59 401		71
14	30	50	3	95	M6	65 44 114	65 59 404	265 24 080	70
14	30	60	4	75	M5	65 54 014	65 59 401	265 23 094	76
14	30	80	5	100	M8	65 54 014	65 59 403	265 24 089	80
14	30	95	3	115	M8	65 54 014	65 59 401		72
16	40	80	7	100	M6	65 54 016	65 59 403	265 24 089	87
16	43	95	7	115	M8	65 54 016	65 59 401		68
16	40	110	7	145	M8	65 54 016	65 59 410		70
19	35	70	7	90	M6	65 54 019	65 59 401	265 23 096	82
19	40	70	7	90	M6	65 54 019	65 59 401	265 23 096	82
19	40	95	7	115	M8	65 54 019	65 59 401		70
19	40	95	7	130	M8	65 54 019	65 59 403		70
19	40	110	7	130	M8	65 54 019	65 59 402		75
19	40	110	7	145	M8	65 54 019	65 59 410		70
19	40	130	7	165	M10	65 54 019	65 59 407		75
19	46	130	7	165	M10	65 54 019	65 59 407		75
19	55	95	7	115	M8	65 54 019	65 59 401	265 23 104	85
19	55	110	7	145	M8	65 54 019	65 59 411		81
19	58	110	7	145	M8	65 54 019	65 59 411		81
22	53,5	130	7	165	M10	65 54 022	65 59 409		95
22	55	110	7	145	M8	65 54 022	65 59 411		81
22	55	114,3	7	200	M12	65 54 022	65 59 414		88
22	58	110	7	145	M8	65 54 022	65 59 411		81
24	50	95	3,5	115	M8	65 54 024	65 59 401	265 24 091	77
24	50	110	3,5	130	M8	65 54 024	65 59 402		75
24	50	110	3,5	130	M8	65 44 024	65 59 402		*
24	55	110	7	145	M8	65 54 024	65 59 411		81
24	58	110	7	145	M8	65 54 024	65 59 415		86
28	60	130	7	165	M10	65 54 028	65 59 409		95
28	58	130	7	165	M10	65 54 028	65 59 409		95
28	55	114,3	7	200	M12	65 54 028	65 59 414		88
28	55	110	5	145	M8	65 54 028	65 59 411		78,2

* = coupling up to stop

Continuation of Gear unit HS 50 60 x6 1xx and 60 x6 2xx (a=63)

Motor dimensions						Coupling	Motor-flange	Intermediate flange	Dimension X
Shaft -ø	Shaft length	Centering-ø	Max. centering length	Bolt circle ø	Fixing thread				
32	50	130	7	165	M10	65 54 032	65 59 409		95
32	58	130	7	165	M10	65 54 032	65 59 409		95
32	58	130	4	215	M12	65 44 932	65 59 406	265 25 099	*
32	60	130	4	215	M12	65 44 932	65 59 406	265 25 099	*
32	60	155	7	190	M10	65 54 032	65 59 416		95
32	60	155	7	190	M10	65 54 032	65 59 404	265 24 122	95
32	60	155	7	190	M10	65 44 932	65 59 416		*
32	60	155	7	190	M10	65 44 932	65 59 404	265 24 122	*
35	79	114,3	7	200	M12	65 54 035	65 59 412		102
35	80	114,3	7	200	M12	65 54 035	65 59 412		102
38	80	180	5	215	M12	65 54 038	65 59 406	265 26 098	110
38	80	180	5	215	M12	263 52 021	65 59 406	265 26 097	*

* = coupling up to stop

Gear unit HS 100 60 x7 1xx and 60 x7 2xx (a=80)

Motor dimensions						Coupling	Motor-flange	Intermediate flange	Dimension X
Shaft -ø	Shaft length	Centering-ø	Max. centering length	Bolt circle ø	Fixing thread				
16	40	110	7	145	M8	65 55 016	65 59 508		80
19	40	80	4	100	M6	65 55 019	65 59 501	265 25 094	90
19	40	95	5	115	M8	581 20 002	65 59 501	265 25 092	*
19	40	95	5	130	M8	581 20 002	65 59 501	265 25 093	*
19	40	110	4	130	M8	65 55 019	65 59 501	265 25 090	89
19	40	110	7	145	M8	65 55 019	65 59 508		82
19	40	130	7	165	M10	65 55 019	65 59 507		85
19	40	130	7	165	M10	65 55 019	65 59 502		84
19	46	130	7	165	M10	581 20 002	65 59 507		95
19	55	80	7	100	M6	65 55 019	65 59 501	265 26 080	97,5
19	55	95	7	115	M8	65 55 019	65 59 501	265 25 092	80
19	55	110	7	145	M8	65 55 019	65 59 509		100
19	58	110	7	145	M8	65 55 019	65 59 509		100
22	53,5	130	4	165	M10	65 55 022	65 59 501	265 25 097	103,5
22	55	110	3	145	M8	502 27 047	65 59 505	265 25 081	117
22	55	110	7	145	M8	65 55 022	65 59 509		100
22	55	114,3	7	200	M12	65 55 022	65 59 512		97,5
22	58	110	7	145	M8	65 55 022	65 59 509		100
24	40	110	7	165	M10	65 55 024	65 59 501		77,5
24	50	110	4	130	M8	65 55024	65 59 501	265 25 090	95
24	58	110	7	145	M8	65 55 024	65 59 509		100
28	55	110	7	145	M8	65 55 028	65 59 509		82,5
28	55	114,3	7	200	M12	65 55 028	65 59 512		97,5
28	58	130	7	165	M10	65 55 028	65 59 507		104
28	58	180	7	215	M12	65 55 028	65 59 505		104
28	60	130	7	165	M10	65 55 028	65 59 507		104
28	60	180	7	215	M12	65 55 028	65 59 505		104
32	50	130	7	165	M10	65 46 932	65 59 507		*
32	58	130	7	165	M10	65 46 932	65 59 507		*
32	58	130	7	215	M12	65 55 032	65 59 506		104
32	58	180	7	215	M12	65 55 032	65 59 505		104
32	60	130	7	215	M12	65 55 032	65 59 506		104
32	60	180	7	215	M12	65 55 032	65 59 505		104
35	79-80	114,3	7	200	M12	65 55 035	65 59 510		118
38	80	180	6	215	M12	65 55 038	65 59 504		119
42	110	250	5	300	M16	505 33 019	65 59 503	265 57 025	*

* = coupling up to stop

5.10 Mounting the motor:

Mount and attach the motor as described in the enclosed operating and mounting instructions of the motor manufacturer.

When used in areas with explosion hazard, only motors meeting the ATEX requirements may be used.

Observe the Ex references in the operating instructions of the motor!

The choice of unsuitable motors or improper installation may increase the ignition risk.

When used in areas with explosion hazard, use corrosion-protected screws, if there is a risk that mechanical sparking may occur.

When used in areas with explosion hazard, check the threaded pins locking the coupling axially after 10 hours work under operating conditions.

We recommend to proceed as follows:

- Before attaching the motor clean all contact surfaces and coat them with a thin oil film. In order to reduce the danger of fretting corrosion it is also possible to use suitable special grease on the motor-shaft, (e.g. Klüberpaste 46MR401 from Klüber).
- Optimal centring of the motor is achieved with the motor-shaft arranged vertically downward.
- Slide the motor, fitted with the coupling, onto the input shaft of the screw-jack gearbox in such a way that the coupling nuts or the spline shaft profiles are aligned. (Observe the coupling operating instructions).
- The motor must slide on easily.
  There must not be any gap between the motor and the drive flange.
  There must not be any foreign matter on the drive flange.
- If necessary, rotate the motor around the motor axle until the fixing holes of motor and flange coincide.
- Screw motor and drive flange together. Tightening torque acc. to the table below (reduced tightening torque because of aluminium surface).
  Choose the length of the screws so that maximum use is made of the available thread depth.
  If possible, use washers for improved surface pressure.
  Always use washers together with hex screws because of their small contact area.
- Tighten the threaded pin of the coupling (not for servo couplings) through the opening in the drive flange and secure against loosening (e.g. Loctite 243) in order to ensure reliable axial locking.

Screw size	Strength class of screws	Tightening *) torque
M 5	8.8	5.6 Nm
M 6	8.8	9 Nm
M 8	8.8	21 Nm
M 10	8.8	42 Nm
M 12	8.8	49 Nm

*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless. Secure screws against loosening (e.g. with Loctite 243).

5.11. Mounting the hand wheel

The hand wheel is usually supplied non-mounted.

The hand wheel must either be firmly connected to the input shaft or removed for motor driven operation. The type of connection chosen has to be checked by calculation.

Ensure that no persons may be endangered by a rotating hand wheel.

When used in areas with explosion hazard, it must be ensured that no parts can fall onto or rub against a rotating hand-wheel, in order to avoid overheating, friction or sparking.

6. Electrical start-up:

Only qualified or specially trained personnel may carry out the connection of the electric components.
The operating and maintenance instructions of motor and brake must be strictly observed.

The power and brake connections for direct operation from the mains are shown on the enclosed circuit diagram (paragraph 12).
In order to avoid interference with the brake control the brake leads must not be laid in the same cable together with clock-pulse controlled power leads.
In order to avoid interference with motor protection devices (temperature sensor, coil thermostats) unshielded supply leads must not be laid in one cable with clock-pulse controlled power leads.

In the case of motors powered by frequency converters the operating and maintenance instructions and the relevant wiring instructions of the converter manufacturer are to be strictly observed.
When using linear speeds over 100 mm/s S-shaped ramps at the converter have to be used! We also recommend them with smaller linear speeds.

If servo-motors are used, it is very important to observe the operating and maintenance instructions as well as the respective wiring instructions of the motor manufacturer.
When using linear speeds over 100 mm/s S-shaped ramps at the converter have to be used! We also recommend them with smaller linear speeds.

It must be ensured that an overload protection device limits the motor torque to 150% of the motor torque required for raising the nominal load.
If the motor torque exceeds the torque required for moving the load, this is an indication for additional forces which have not been considered in the design. This reduces the service life of the spindle and the gearbox. In order to avoid this, it is necessary to find out and eliminate the cause of such forces.

Determination of the required motor torque from the spindle force:

$$T_M = \frac{F_{Sp} * p}{2 * \pi * \eta_{Sp} * i_G * \eta_G} + T_0$$

T_M = required motor torque in Nm
F_{Sp} = nominal load of spindle in customer application in kN
p = pitch of the spindle in mm
η_{Sp} = spindle efficiency = 0.9
i_G = gear ratio, either 3.0, 6.75 or 29 (see nameplate of gear unit)
η_G = efficiency of the gear unit at 1500 rpm: 0.85 at i_G =3.0 and 6.75
0.70 at i_G =29
T_0 = no-load torque of gear unit depending upon the gear size
HS 10 and HS25: 0.4 Nm
HS 50: 0.8 Nm
HS 100: 2.6 Nm

Example:
Gearbox HS 25 with i=6,75 and ball-screw spindle KG40x10
Nominal load of spindle in customer application: 13 kN

$$T_M = \frac{13\ kN * 10mm}{2 * \pi * 0.9 * 6.75 * 0.85} + 0{,}4\ Nm = 4{,}4\ Nm$$

The motor torque must not exceed 4.4 kN while moving the load. The overload device must limit the torque to 6.6 Nm.

The current consumption of the motor must remain constant over the entire stroke during start-up and operation.
Wear or overloading increase the current consumption.

We therefore recommend to measure the current consumption after start-up under rated load and to note this measured value as reference value:

Current consumption after start-up: _____ A

7. Mechanical start-up:

The start-up may only be carried out by qualified or specially trained personnel.

The forces and cycle times taken as the basis for the layout must not be exceeded, not even during start-up.

Before putting the unit into operation, check whether the layout and the actual loads correspond!

Lifting cylinders may only be installed in the position as agreed upon, when laying out the system. The lubrication is designed for this installation position. Other installation positions are not permissible without approval by ATLANTA. If in doubt, please consult us.

The piston tube with the articulated joint may only be installed in the delivered position. It's not allowed to turn it without approval by ATLANTA.

The maximum temperature of the housing must not exceed 80°C in order to keep the thermal stress on the shaft seals and the lubricant as low as possible.

Caution!
The surface of the gear unit, the spindle and the nut can reach temperatures of more than 65 °C during operation and can cause burns.
The person putting the gear unit into operation must ensure that nobody can be endangered by hot surfaces.

Warning!
Rotating or straight moving parts may catch pieces of clothing, hair and members of the body and injure persons. The person installing the gear unit must ensure that persons cannot be endangered by any rotating or straight moving components.

Monitoring and protective equipment must not be out of service.

When used in areas with explosion hazard, the person putting the screw-jack gearbox into operation must ensure that the surface temperature of 65°C is not exceeded on any of the components. If necessary, he must control the surface temperature.

He must furthermore ensure that no sparking can occur. Rotating or straight moving parts and those with which they may come into contact are to be protected against corrosion (e.g. by greasing, painting, zinc coating).

7.1. Lubricating instructions for screw-jack gearboxes:

The basic gear unit is delivered filled with oil and ready for operation.

For oil change instructions see point 9.5.

Between ball-screw spindle and ball-screw nut there exists rolling friction. They must be adequately lubricated. Without proper lubrication there will be increased wear leading to the destruction of the components.
The ball-screw drive is supplied with lubrication sufficient for approx.100 traversing kilometers.

The grease film on the spindle may not be contaminated. If it is, clean the spindle before the first operation and coat it with a new thin grease film.

For re-lubrication of the ball-screw drive in gear units with rotating and non-rotating spindle and for the yearly cleaning of the spindle see point 9.1.

The lifting-cylinder unit is provided with a key for supporting the torque. Depending upon the mounting position this key must receive a grease cushion. See point 7.6.
The grease cushion must be re-lubricated together with the ball-screw drive. See point 9.2.

Re-lubrication points in screw-jack gearboxes (see drawing 7.1.3.):
L_0 = length for re-lubrication of the ball-screw nut
L_1 and L_2 = lengths for re-lubrication of the key bar

The dimensions are noted on a nameplate on the gearbox.

Within the first few days and weeks of operation the grease supply should be checked at regular intervals and the emptying time adjusted to the respective application. The spindle surface should always be covered with a uniformly thin grease coating. Grease in the protective tube or under the bellows is an indication of excessive supply of lubricant. Screeching noises between spindle and nut indicate insufficient lubricant supply.

The non-observance of these lubricating instructions leads to the dismissal of possible warranty claims.

The electronically controlled lubricator should be taken in operation as described in the enclosed instructions BKI 102.
For start-up fill the hose by means of a grease gun before assembling. Proper lubrication is ensured only when the connecting hose is completely filled with grease right into the nut.
For the pressure build-up observe the times mentioned in the grease-cup instructions. Fastest pressure build-up: all switches in „ON“ position: Pressure build-up within 6-8 hours.

Type of lubricant: Microlube GB0 (Fa. Klüber)

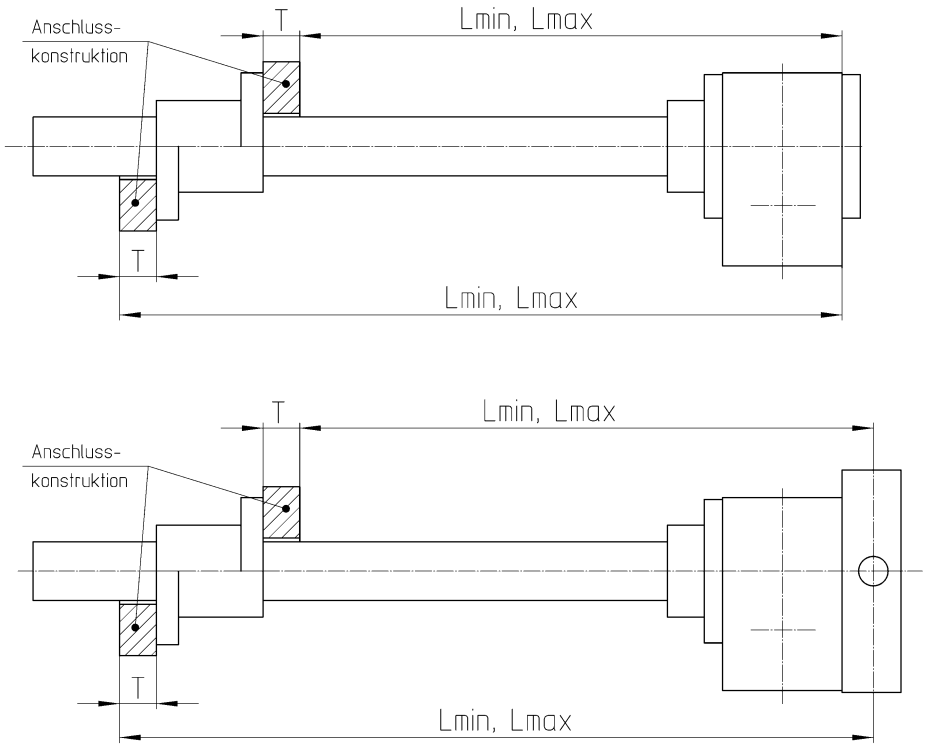
The lubricant level in the lubricator should be checked regularly. A permanent signal lamp powered by two commercially available 1.5 V batteries shows that the lubricator is ready for use. We recommend to include this check in a maintenance plan.

When the lubricator is completely empty it can be used again after refilling. Only the pressure chamber where the gas generation takes place and which is available as a spare part must be replaced.
Please ask for our relevant refilling instructions BKI 103e.
When refilling the lubricator carefully watch that no air bubbles are trapped in the lubricator. They lead to insufficient lubrication when they are transported through the hose to the lubricating spot.

Calculation of the emptying time:

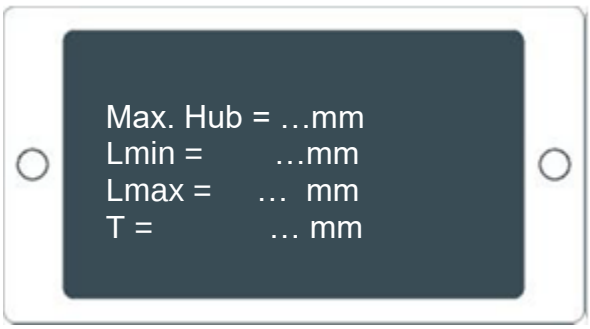
- Travelling distance of ball-screw drive in kilometers per year:
  2 * stroke * cycles/day * days/year
  Example: Stroke =1200 mm, 1200 cycles/day, 300 days/year
  is equal to 864 km travelling distance per year.
- Travelling distance per year in relation to travelling distance until re-lubrication:
  Example: KG 80x20 Lubricating interval 300-500 km
  S = 1.73 (864km/500km) or S = 2.88 (864km/300km)
- Amount of grease acc. to table 9.1:
  Example: KG 80x20: 50 g
  Required grease quantity for 1 year:
  50g * S = 86.5g or 144g
- Emptying time of grease cup:
  The grease cup contains 125 g of grease.
  Example: 125 g / 86.5 g = 1.44 years -> set emptying time to 18 months.
  125 g / 144 g = 0.87 years -> set emptying times to 12 months.

Drawing 7.1.1 End positions of gear units with rotating spindle:



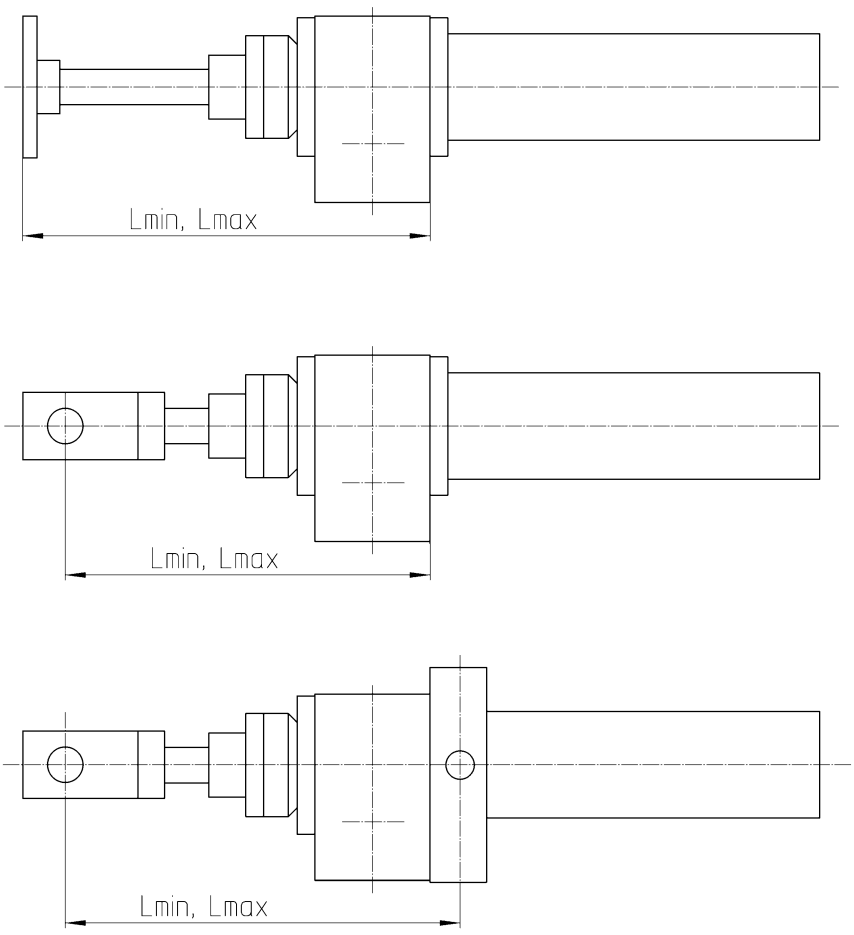
(Anschlusskonstruktion = customer plate)

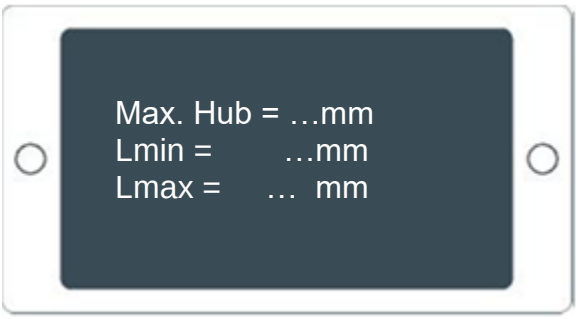
Fix the plate on a place near the gearbox, where it is well visible.



Max. Hub = maximum permissible stroke
L min = minimum length in retracted position; may not be less
L max = maximum length in extended position; may not be more
T = thickness of the customer plate (base of our design)

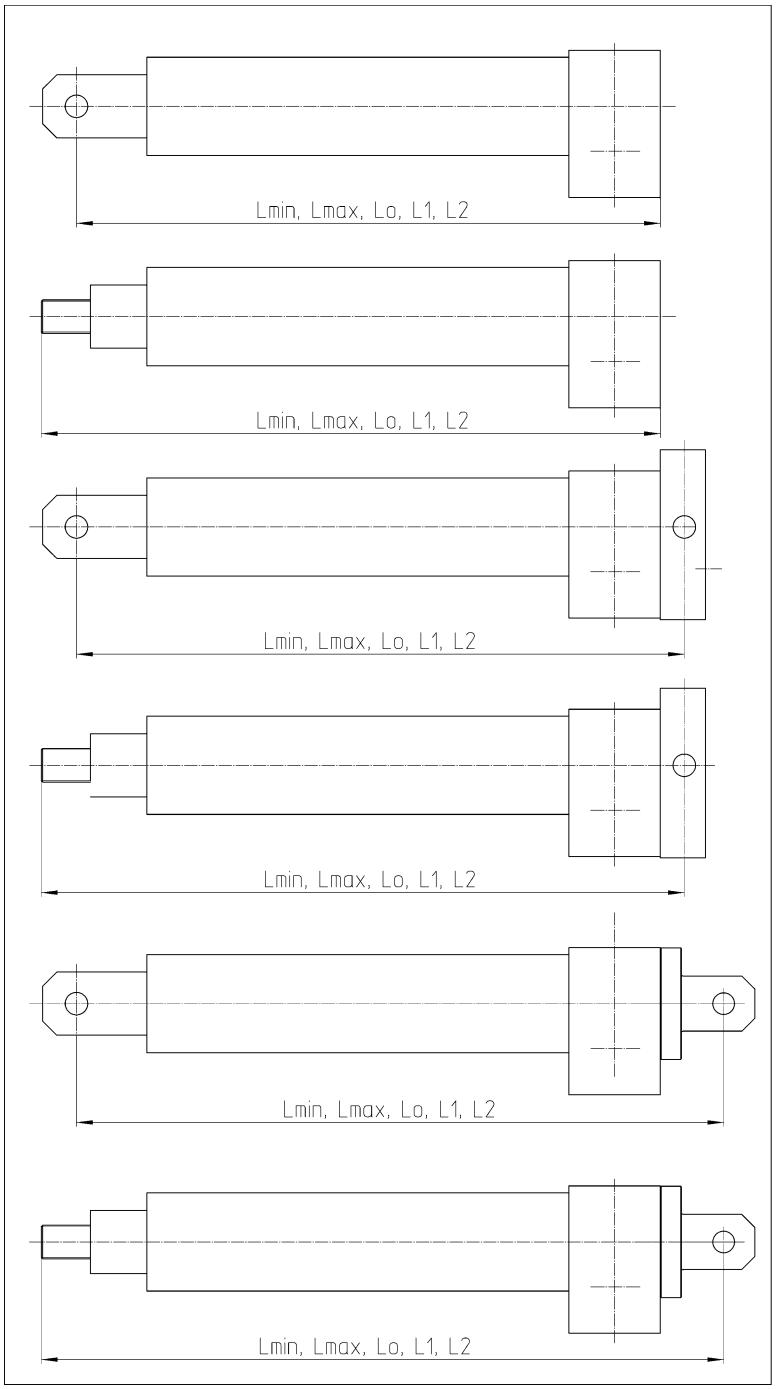
Drawing 7.1.2 End positions of gear units with non-rotating spindle:





Max. Hub = maximum permissible stroke
L min = minimum length in retracted position; may not be less
L max = maximum length in extended position; may not be more

Drawing 7.1.3 End and lubrication positions of gear units in lifting cylinder version:



Lmin = … Lmax = ..
L0 = …
L1 = L2 =
Max. Hub = …mm

L min = minimum length in retracted position; may not be less
L max = maximum length in extended position; may not be more
L0 = length for re-lubrication of the ball-screw nut
L1 and L2 = length for re-lubrication of the key bar
Depending on the design L2 can't be found
Max. Hub = maximum permissible stroke

7.1.4. Connection of a lifting cylinder to a lubricator or to central lubrication:

For this purpose, the lifting cylinder must be ordered accordingly and prepared internally.
A connection is only possible if the lifting cylinder is installed vertically. The internal preparation differs depending on whether the lifting cylinder is installed with the gear upwards or downwards. Lubrication is not guaranteed if the cylinder is installed the other way round.

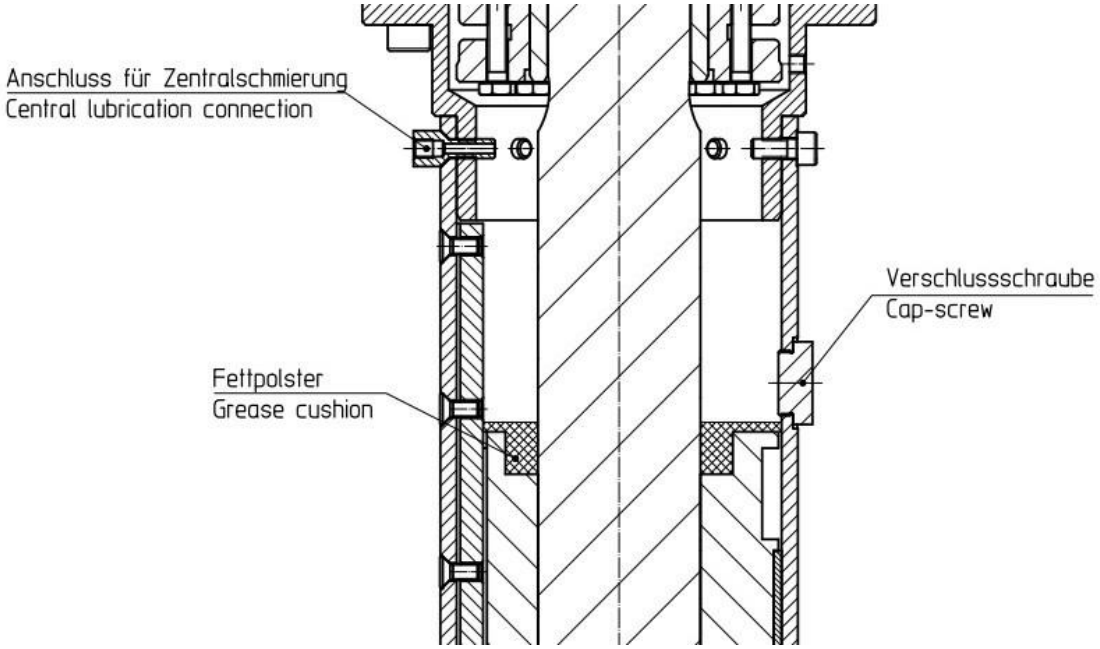
The grease quantity must be adjusted, so that the grease cushion in the cylinder has a constant height of 3 mm. On delivery, there is basic lubrication but no grease cushion.
Set the lubrication quantity at the beginning to the value in the table below.

Gear unit	Reference values for monthly lubrication quantity in grams
HS 10	1
HS 25	2
HS 50	3
HS 100	4

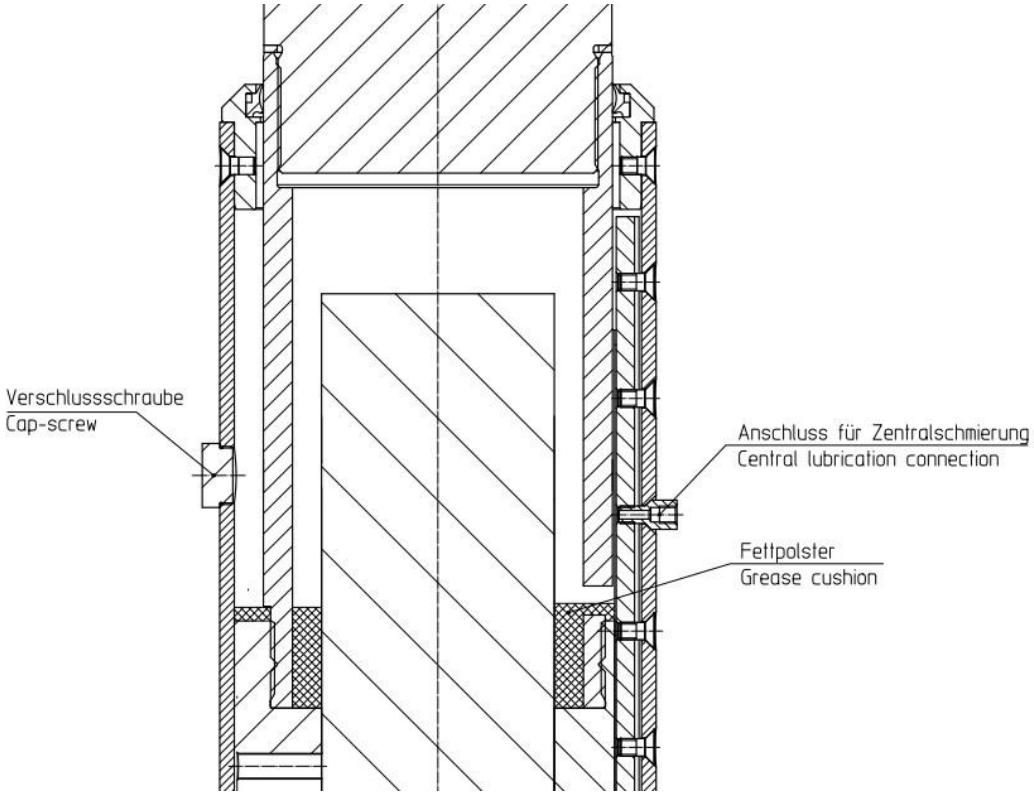
Check the height of the grease cushion quarterly until the height remains constant at 3 mm. If the height is lower, increase the amount of grease; if the height is higher, decrease the amount of grease.
To check the height of the grease cushion, please move the cylinder to the dimension L_1. The dimension is noted on the plate at the end of the tube.
Remove the cap-screw and measure the height of the grease cushion above the nut.

The ball screw nut can be relubricated manually at the central lubrication connection. To do this, move the lifting cylinder to the dimension L_0.

Situation with basic gear unit installed "on top", piston tube moves out downwards:



Situation with basic gear unit installed "below", piston tube moves out upwards:



7.2. Trial run of the screw-jack gearbox before installation:

Before making a trial-run the gearbox must be protected against twisting and the torque must be supported by suitable measures at the following points:

Gear units with non-rotating spindle:

At the mounting flange, at the fork link or the link rod head.

Gear units with rotating spindle:
At the running nut.

Lifting-cylinder type gear units:
They are internally secured against twisting of the piston tube.

Move the spindle, nut or the piston tube by hand into a medium stroke position.

Perform one complete stroke either by hand or motor. Switch off in time before reaching the end positions.

The maximum extended and minimum retracted end positions must not be exceeded.
The values L_{min} and L_{max} are noted on a nameplate on the gearbox. See above.

Any braking operation, even emergency stop, has to be finished within these end positions.

When starting the motor for the first time, the gear unit must not be in an end position because overshooting the end position would damage components, if the motor rotates in the wrong direction.

7.3. General mounting instructions and tolerances:

There are two machined mounting surfaces with sufficiently dimensioned fixing holes and threaded holes.
Choose the length of the screws so that maximum use is made of the thread depth.
Choose the installation, if possible, in such a way that the flow of forces passes over the supporting surface and not over the screws.
In swivelling drives and lifting cylinders the fixing bolts must be parallel in order to avoid adverse tensions.

Ensure tension-free mounting.
Use all threaded holes of the appropriate connecting surface.
Tighten the screws with the required tightening torque (see table below).

Spindle and nut must be perfectly aligned when installed. Lateral forces or bending stresses are unacceptable. They lead to increased wear and reduced service life.

The alignment between spindle and nut must be carefully checked in order to exclude overheating of the spindle drive. This check has to be repeated after 10 hours work under operating conditions.

Additional attachments or alterations at the gear unit require written permission by ATLANTA.

It must be ensured that no persons are endangered by the free rotating input-shaft end.
A fixed cover ensures reliable protection.

Before starting the operation, the usable part of the spindle must be carefully greased. Observe Paragraph 7.1 with the lubricating instructions.

The most favorable mounting position of the worm-shaft (input shaft) with a view to the lubrication of the worm-gear transmission inside the gearbox is laterally or at the bottom. If the input shaft is situated on top, the driving capacity is reduced by approx.10%.
Avoid the installation with motor hanging downward. Leakage oil could get into the motor in this position.

When used in areas with explosion hazard, it must be ensured that no parts can drop onto or rub against the free input-shaft end in order to avoid overheating, friction or sparking.
A fixed cover ensures reliable protection.

Vertical arrangement of the worm-shaft (vertical input) is only permissible in combination with an oil-level control switching off the gear unit in the case of a sudden loss of oil.

When used in areas with explosion hazard, suitable corrosion protection (e.g. greasing, painting, zinc coating) must be provided, if there is a risk that mechanical sparking may occur.
Also corrosion protected screws have to be used.

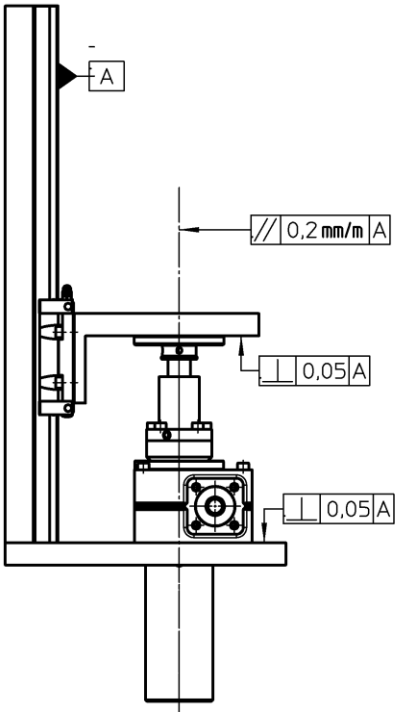
Gear unit	Screw size	Depth of thread [mm]	Strength class of the screws	Tightening *) torque
HS 10	M 8	20	8.8	25 Nm
HS 25	M 12	30	8.8	84 Nm
HS 50	M 12	30	8.8	84 Nm
HS 100	M 16	40	8.8	205 Nm

*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless. Secure screws against loosening (e.g. with Loctite 243).

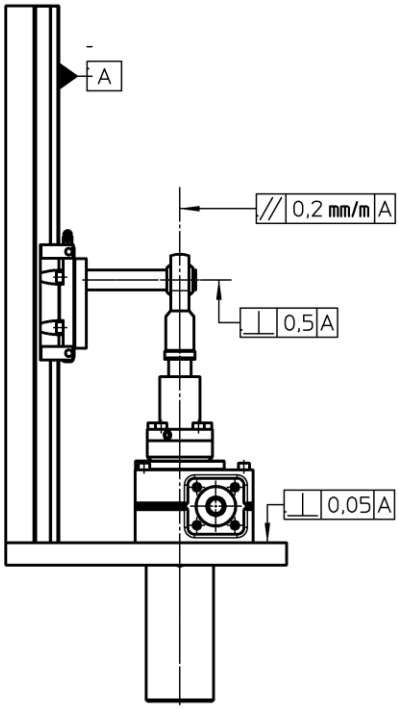
Material under the screw heads: Steel with boundary surface pressure > 500 N/mm^2

7.4. Installation of the screw-jack gearbox with non-rotating spindle in the system:

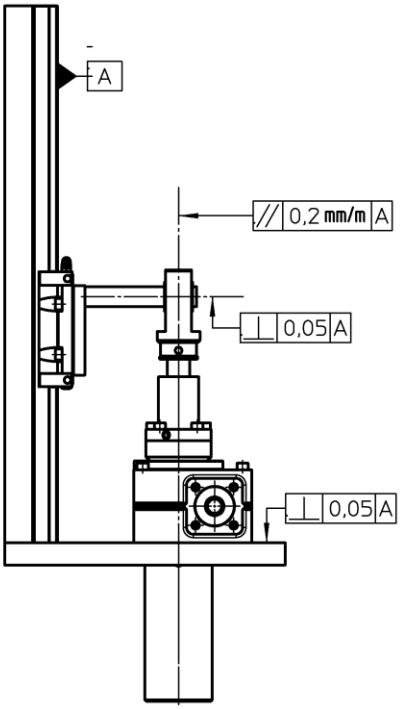
Mounting instructions and tolerances:



drawing 1



drawing 2



drawing 3

- Use the centering at the cover of the gearbox only if the mounting parts can be fixed after alignment without lateral forces.
- Fixing flange and swivel head require a precise mounting situation, but don't need necessarily a twisting protection (drawings 1 and 3).
- The spherical plain bearing rod head has a bigger mounting tolerance, but always needs a twisting protection (drawing 2).
- Fasten screws at gearbox and fixing flange after alignment in retracted end position (like drawing 1) without lateral forces.

Rotating or straight moving parts may catch pieces of clothing, hair and members of the body and injure persons. The installation must ensure that persons cannot be endangered by any rotating or straight moving components.

The screw-jack gearbox may only be installed in the position agreed upon, when laying out the system. The lubrication is designed for this installation position. Other installation positions are not permissible without approval by ATLANTA. If in doubt, please consult us.

If a twisting protection is provided, you should furthermore consider the following:

Horizontal installation:
The lifting drive must be installed so that the key bar (to be recognized by the row of fixing screws) lies at the bottom. The grease nipple for re-lubrication is then also at the bottom.

Vertical and oblique installation:
With vertical installation, any orientation of the grease nipple is possible.
With oblique installation, the key bar must come to lie at the bottom so that the grease cushion inside the protective tube lies mainly on the bar.

The loads, travelling speeds and duty cycles on which the layout is based must not be exceeded, not even during start-up operation
Exceeding the lifting force or the duty cycle even only once may already cause permanent damage!

Ball-screw spindles are not self-locking. When installed vertically, an uncontrolled lowering of the load will occur when the motor brake is released.

For systems comprising several screw jacks also observe paragraph 7.7!

The screw-jack gearbox may be subjected only to axial loads. Radial loads and bending moments must be avoided. It must be mounted free of tensions and transverse forces.

Lateral forces and bending stresses reduce the service life considerably.

Systems with guiding devices:

Attach the screw-jack gearbox as described in paragraph 7.3.
The spindle must be adjusted parallel to the guiding device.
In the case of swivel drives double-cardanic suspension must be provided.

Systems without guiding devices:

Attach the screw-jack gearbox as described in paragraph 7.3.
Ensure that no lateral forces and bending moments act upon the spindle.
In the case of swivel drives double-cardanic suspension must be provided.

Attach the spindle end with the mounting flange, spherical plain bearing rod head or swivel

head to the part to be moved. Insert the screws at the flange only loosely, do not tighten them.

When operating the unit for the first time, perform one full lifting stroke. In order to avoid damage we recommend to perform the first lifting stroke manually.

In the case of motor-driven displacement it is important to stop before reaching the end positions and to approach them in inching mode in order to avoid damage due to wrong adjustments. See paragraph 7.2 and drawing 7.1.2.

Check the limit switch for correct position and exact switching function.

Check the ventilation of the bellows while moving the unit under operating conditions.

After mounting check the bellows for proper attachment and functioning.
In retracted position it must not be compressed too firmly. It must not rub against any rotating components.

In extended position it must not be overstretched. The folds must not dent in.
Use all available supporting rings. Make sure that the bellows does not touch the spindle.

When all connection parameters are met, perform several lifting strokes without load.

Make sure that the spindle moves easily and that there are no tensions (uniform power drain).

Tighten the screws at the mounting flange with the required torque (see table below).

Then perform one or two lifting cycles under load. Check once more for easy and smooth motion and uniform power drain.

Increased noise, unwieldy transmission and consequently increased power drain are an indication for wear. We recommend to measure the power drain after start-up and to note this value in paragraph 6 as a reference value.

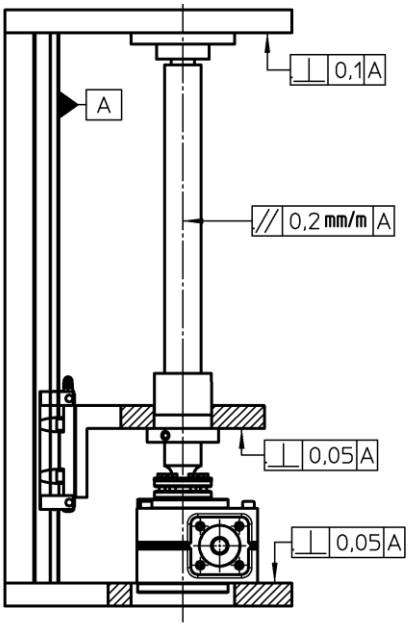
When used in areas with explosion hazard, suitable corrosion protection (e.g. greasing, painting, zinc coating) must be provided, if there is a risk that mechanical sparking may occur. Also corrosion protected screws have to be used.

Fixing flange	Screw size	Strength class of screws	Tightening *) torque
HS 10	M 10	8.8	48 Nm
HS 25	M 10	8.8	48 Nm
HS 50	M 12	8.8	84 Nm
HS 100	M 16	8.8	205 Nm

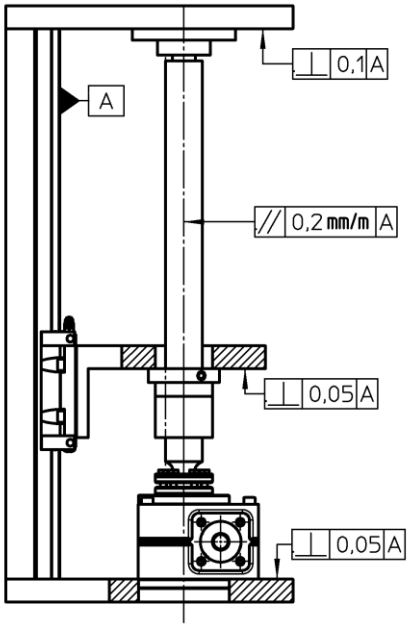
*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless. Secure screws against loosening (e.g. with Loctite 243).

7.5. Installation of the screw-jack gearbox with rotating spindle in the system:

Mounting instructions and tolerances:



drawing 1



drawing 2

- Use the centerings only if the mounting parts can be fixed after alignment without lateral forces. Use max. one centering.
  - Use of centering at the ball-screw nut:
    Alignment of gearbox has to be possible during mounting. (drawing 1)
  - Use of centering at cover of gearbox:
    Alignment of ball-screw nut has to be possible during mounting (drawing 2)
- Fasten screws at gearbox and ball-screw nut after alignment in end position close to the gearbox (like on drawing) without lateral forces.
- Move the nut to the end position opposite to the gearbox. Fasten screws at mating bearing flange without lateral forces.

Parts moving in linear directions may catch pieces of clothing, hair and members of the body. Take care during installation that persons cannot be endangered by parts moving in linear directions.

The loads, travelling speeds and duty cycles for which the unit is laid out must not be exceeded - not even during the installation.
Exceeding the lifting force or the duty cycle even only once may already cause permanent damage!

Ball-screw spindles are not self-locking. When installed in vertical position, releasing the motor brake will lead to uncontrolled lowering of the load.

For **systems comprising several screw jacks** also observe paragraph 7.7!

The screw-jack gearbox may only be subject to axial loads. Radial loads or bending moments are to be avoided. It must be mounted free of tensions and transverse forces.

Lateral forces and bending stresses reduce the service life considerably.

Systems with guiding devices:

Attach the screw-jack gearbox as described in paragraph 7.3.
The spindle must be adjusted parallel to the guiding device.
In the case of swivel drives double-cardanic suspension must be provided.

Systems without guiding devices:

To be used only with tensile loads. Compressive loads without guiding devices lead to increased wear and tear of the nut. Use gear units with screw-jack design.
Ensure that no lateral forces and bending moments act upon the spindle.
Use only screw-jack gearboxes with short spindles requiring no mating bearing flange.
Attach the screw-jack gearbox as described in paragraph 7.3.
In the case of swivel drives double-cardanic suspension must be provided.

Mounting the bellows (see paragraph 5.6):

Should it be necessary to disassemble the spindle nut, observe paragraph 5.3. After reassembly mount the nut without tension on the attachment

Fasten the bellows with a hose clamp on the spindle nut. Take care not to twist it.
Then fasten the second bellows in the same way between the attachment and the spindle end.

The bellows must always be attached to non-rotating parts.

After mounting check the bellows for proper functioning:
In retracted position it must not be compressed too firmly. It must not rub against any rotating components.
In extended position it must not be overstretched. The folds must not dent in.

Use all available supporting rings. Check that the bellows does not touch the spindle.

Check the ventilation of the bellows during the lifting operation under operation conditions.

When operating the unit for the first time, perform one full lifting stroke.

In order to avoid damage we recommend to perform the first lifting stroke manually.

In the case of motor-driven displacement it is important to stop before reaching the end positions and to move up to them in inching mode in order to avoid damage due to wrong adjustments. See paragraph 7.2 and drawing 7.1.1.

Operate the drive unit **without** load so that the spindle nut is moved to the end position close to the gearbox. Tighten the nut-fixing screws only slightly.

Move to the other end position. Check that the nut moves easily and smoothly on the spindle and that no tensions occur (uniform power drain). The spindle end must not beat during the traversing operation.

If provided, fix the mating bearing flange supporting the spindle end in the end position away from the gearbox. Tighten the screws only slightly.

Move back to the other end position and check for free motion.

In the end position close to the gearbox tighten the screws of the nut with the specified tightening torque (see table).

Move to the other end position. Check again for free and smooth motion.

Tighten the screws of the mating bearing flange with the specified tightening torque (see table).

Perform one or two cycles without load in order to exclude the existence of tensions.

Then perform one or two cycles with load. Check again for easy and smooth motion and uniform power drain.

Increased noise, unwieldy transmission and consequently increased current consumption are an indication for wear. We recommend to measure the current consumption after the start-up and to note this value as a reference value in paragraph 6.

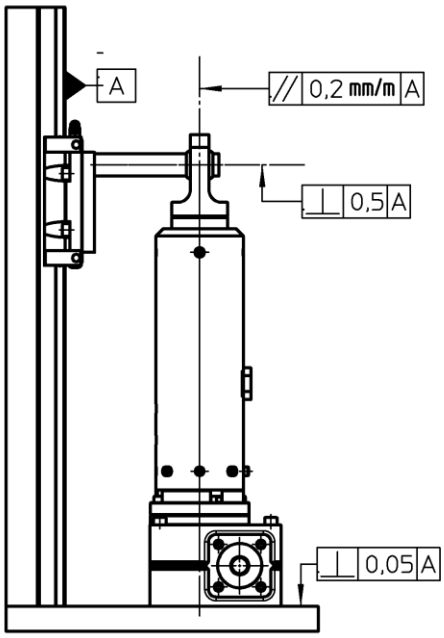
When used in areas with explosion hazard, suitable corrosion protection (e.g. greasing, painting, zinc coating) must be provided, if there is a risk that mechanical sparking may occur. Also corrosion protected screws have to be used.

Screw size	Strength class of the screws	Tightening torque *)
M 6	8.8	9.5 Nm
M 8	8.8	23 Nm
M 10	8.8	46 Nm
M 12	8.8	80 Nm
M 20	8.8	380 Nm

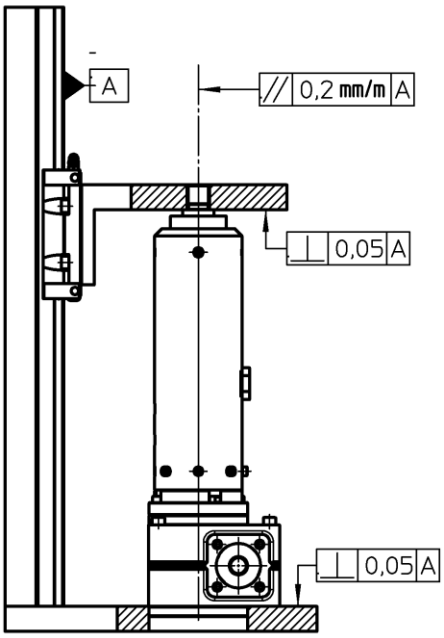
*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless. Secure screws against loosening (e.g. with Loctite 243).

7.6. Installing lifting-cylinder type screw-jack gearboxes in the plant:

Mounting instructions and tolerances:



drawing 1



drawing 2

- Use the centering at the cover of the gearbox only if the mounting parts can be fixed after alignment without lateral forces.
- Thread connection (drawing 2):
  Use preferably to connect own mounting parts.
  If screwed directly in a connecting part, it has to be possible to align the gearbox during mounting.
- Fasten screws at gearbox after alignment in retracted end position (like drawing) without lateral forces.

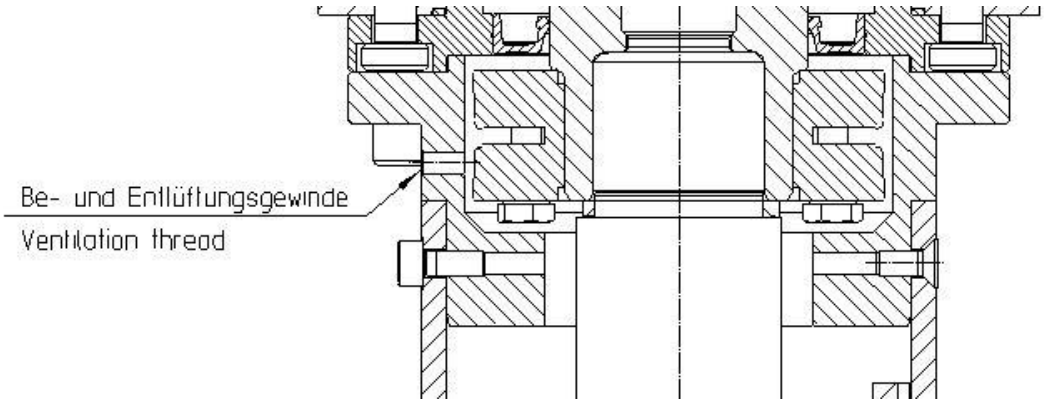
Parts moving in linear directions may catch pieces of clothing, hair and members of the body. Take care during installation that persons cannot be endangered by parts moving in linear directions.

The screw-jack gearbox may only be installed in the position as agreed upon, when laying out the system. The lubrication is designed for this installation position. Other installation positions are not permissible without approval by ATLANTA. If in doubt, please consult us.

Horizontal or oblique installation:
The lifting drive must be installed so that the key bar (to be recognized by the row of fixing screws) lies at the bottom.

The positions L_0, L_1 and L_2 to be approached are dependent upon the installation position.
The reference edges for the dimensions are shown in figure 7.1.3.
The dimensions are noted on a nameplate on the shell of the lifting cylinder.

In the flange between gearbox and outside tube are several threads for the ventilation of the air in and out of the cylinder. They have to be controlled regularly, that they don't clog with dirt.



The loads, travelling speeds and duty cycles for which the unit is laid out must not be exceeded - not even during the installation.
Exceeding the lifting force or the duty cycle even only once may already cause permanent damage!

Ball-screw spindles are not self-locking. When installed in vertical position, releasing the motor brake will lead to uncontrolled lowering of the load.

For **systems comprising several screw jacks** also observe paragraph 7.7!

The screw-jack gearbox may only be subject to axial loads. Radial loads or bending moments are to be avoided. It must be mounted free of tensions and transverse forces.

Lateral forces and bending stresses reduce the service life considerably.

Fix screw-jack gearboxes as described in paragraph 7.3.
The lifting cylinder must be aligned parallel to the guiding device.
Pay attention to double-cardanic suspension in the case of swivelling drives.

When operating the unit for the first time, cycle it over the complete lifting path.
In order to avoid damage, we recommend to perform the first lifting operation by hand.

When actuated by motor, stop before reaching the end positions and continue the approach in inching mode in order to avoid damage due to improper adjustment. See paragraph 7.2 and drawing 7.1.3.

While performing this test operation, check for easy motion and uniform power drain.

Increased noise development, hard-functioning drive and thus increased power drain, are an indication of wear. We recommend to measure the power drain after the start-up and to note this value as a reference value in paragraph 6.

When used in areas with explosion hazard, suitable corrosion protection (e.g. greasing, painting, zinc coating) must be provided, if there is a risk that mechanical sparking may occur.
Also corrosion protected screws have to be used.

7.7 Screw-jack lifting systems comprising several gearboxes:

When systems consist of several screw-jack gearboxes, the components where the connecting device is to be fastened must be carefully equalized in height so that the gearboxes will be uniformly loaded and no tensions occur.

Our universal shafts are torsionally rigid fail-proof, free of play and wear, at the same time being elastic and axially and angularly flexible. No maintenance required.
They dampen noise, torsional vibrations and shocks.

The center part can be without having to shift the gearboxes.
Just remove the screws item 5.

The plastic elements are oil-resistant.

The universal shafts are not permitted for areas with explosion hazard. .

According to the applicable accident prevention regulations the shaft must be provided with a cover. This cover must be made from solid steel parts. Adequate ventilation of the universal shaft must be ensured.

The cover is not included in the scope of delivery.

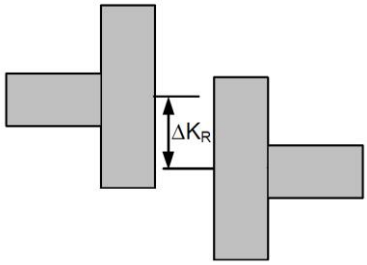
Aligning the universal shaft:

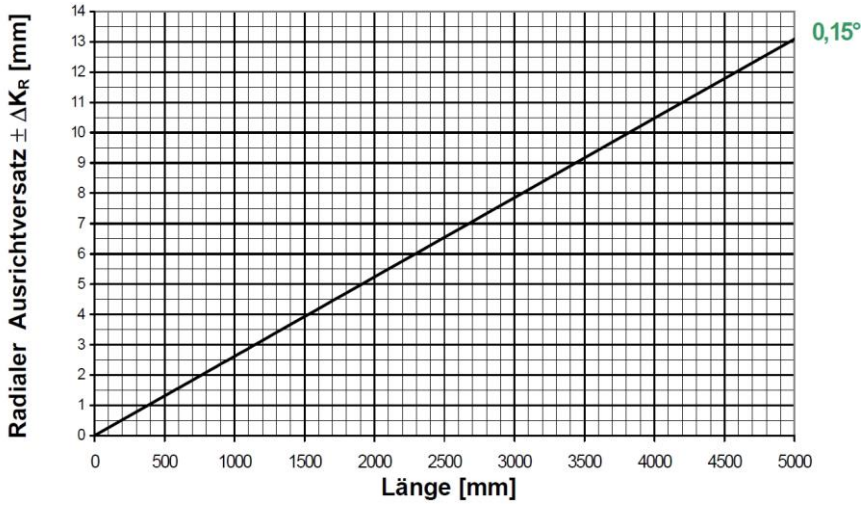
In order to achieve a long service life, the gearboxes should be installed and aligned as carefully as possible. This applies especially in the case of high speeds.

The total displacement is a combination of radial and angular misalignment.

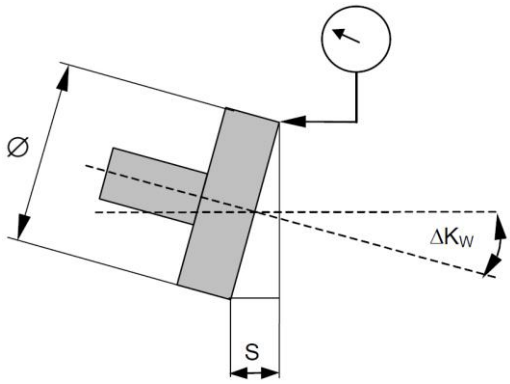
Permissible radial displacement:

The permissible radial displacement is equal to an angle of 0.15°.





Permissible angular displacement:



The angular displacement must be checked at each flange. The deviation S must not exceed the following value:

S < = 0.0026 * ø

Linkage shaft	Flange diameter ø	Max. angular displacement S
60 83 30x	56	0.146
60 83 40x	85	0.221
60 83 45x	100	0.260
60 83 60x	120	0.312

7.7.1 Mounting the universal shaft with key connection (60 83 x0x):

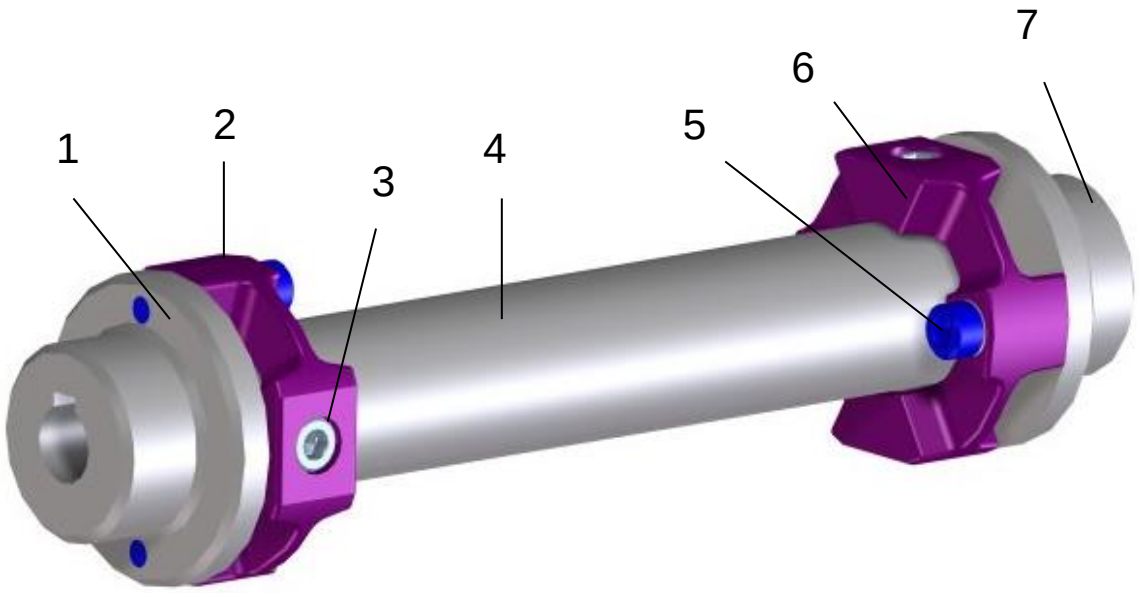
This universal shaft has a bore with keyway on both flanges

The relative positions of the keyways can be varied by the screws items 3 / 5.

In the case of gearboxes with i=29 it is thus possible to realize a max. difference in height between attachments of 0.2 mm.

For smaller gear ratios the deviations are larger. In such cases we recommend the use of universal shafts (60 83 x1x) for clamped connection.

In the case of gearboxes with rotating spindle and gearboxes with non-rotating spindle and connecting flange precise alignment can also be achieved by not cutting the fixing threads in advance but only after the alignment.



Instructions for installing the screws:

Put some grease under the screw heads so that the screw head slides on the aluminum bushing and the bushing does not twist inside the plastic elements item 2/item 6.

If necessary, prevent the elastic element from twisting/skewing while tightening the screws by applying counterpressure with a suitable tool. This is particularly important at the screws item 3, so that the annular area between the elastic element item 2 and the tube item 4 is in full contact and does not support only at 2 edges. This might cause the screw to come loose and that the coupling is destroyed.

Use only the screws supplied with colored adhesive compound in the thread (e.g. blue)! This micro-capsulated adhesive makes the screw stick inside the thread thus securing it reliably against coming loose. The curing time of the adhesive after screwing is about 4-5 hours at 20°C. The coupling must not be operated before. Higher temperatures accelerate the curing process. At a temperature of 70°C (e.g. heating with warm-air blower) it lasts only approx.15 minutes. The adhesive is resistant to temperatures between -80° and +90°C.

The adhesive is cured completely after 24 hours. Only then, you should subject the universal shaft to the full torque.

Adhesive, possibly stripped off from the thread while screwing in, may stick between hub and

the aluminum bushings thus increasing the frictional application pressure between these parts.

Anaerobic adhesives (such as Loctite, Omnifit etc.) undo the adhesion of the rubber on the metal thus leading to the destruction of the coupling. We therefore advise you against their use. Rubber parts damaged or destroyed by unsuitable adhesives do not justify a claim for damages

Linkage shaft	Screw size radial / item 3	Screw size axial / item 5	Tightening-*) torque
60 83 30x	M 6x10	M 6x25	10 Nm
60 83 40x	M 8x20	M 8x20	25 Nm
60 83 45x	M 8x25	M 8x25	25 Nm
60 83 60x	M 10x30	M 10x30	50 Nm

*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless.

Mounting the universal shaft:
Slide the hubs items 1 and 7 onto the gear shafts.
Check the angular displacement.
Check the radial displacement between the two hubs. Align the gearbox.

If pillow- block bearings are used they should be mounted now according to paragraph 7.7.3. Arrange the pillow-block bearing in the middle. In the case of several pillow-block bearings, distribute them evenly spaced on the tube length.

Slide the elastic elements item 2 and item 6 on the tube item 4 and fix them with screws item 3. Observe the instructions above.
Screw the hub item 1 together with the elastic element item 2 using the screws item 5.

Gear units with non-rotating spindle:

Align mounting flanges to same height.

Gear units with rotating spindle:

Align flange nuts to same height.

Screw the elastic element item 6 with the nearest thread in item 7. This results in a height difference of the connecting part.
If the difference is too big for your application, align the connecting parts once more to the same height and cut the threads for the mounting flange or the flange nut in the connecting device in this position.
Rotate the universal shaft by hand and align the pillow-block bearings so that the universal shaft is not subject to tensional stress.

Slightly tighten the screws on the gearboxes and pillow-block bearings. Then rotate the universal shaft once more by hand. If it rotates smoothly, tighten the screws completely.

For tightening torques for fastening the gearboxes see paragraph 7.3.

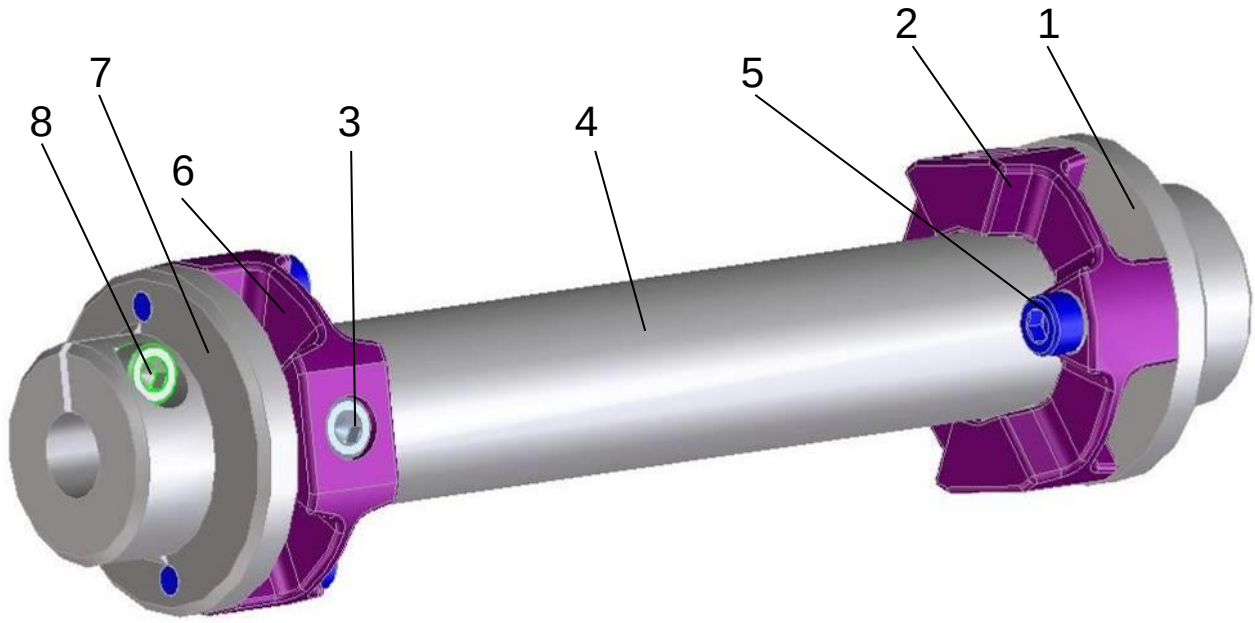
Position the universal shaft axially in the middle between the gearboxes. Tighten the threaded pin in the hub in order to fix the universal shaft axially.

7.7.2 Mounting the universal shaft with clamped connection (60 83 x1x):

One flange of this universal shaft has a bore with keyway and the other one has a smooth bore with clamping hub and screw.

It can therefore be mounted when the attachments are aligned to the same height without risking a deviation.

It is suitable for all gearboxes and attachments.



Instructions for installing the screws:

Put some grease under the screw heads so that the screw head slides on the aluminum bushing and the bushing does not twist inside the plastic elements item 2/ item 6.

If necessary, prevent the elastic element from twisting/skewing while tightening the screws by applying counterpressure with a suitable tool. This is particularly important at the screws item 3, so that the annular area between the elastic element item 2 and the tube item 4 is in full contact and does not support only at 2 edges. This might cause the screw to come loose and the coupling to be destroyed.

Use only the screws supplied with colored adhesive compound in the thread (e.g. blue)! This micro-capsulated adhesive makes the screw stick inside the thread thus securing it reliably against coming loose. The curing time of the adhesive after screwing is about 4-5 hours at 20°C. The coupling must not be operated before. Higher temperatures accelerate the curing process. At a temperature of 70°C (e.g. heating with warm-air blower) it lasts only approx.15 minutes. The adhesive is resistant to temperatures between -80° and +90°C.

The adhesive is cured completely after 24 hours. Only then, you should subject the universal shaft to full torque.

Adhesive, possibly stripped off from the thread while screwing in, may stick between hub and the aluminum bushings thus increasing the frictional application pressure between these parts.

Anaerobic adhesives (such as Loctite, Omnifit etc.) undo the adhesion of the rubber on the metal thus leading to the destruction of the coupling. We therefore advise you against their use. Rubber parts damaged or destroyed by unsuitable adhesives do not justify a claim for damages

Linkage shaft	Screw size radial / item 3	Screw size axial / item 5	Tightening-*) torque
60 83 30x	M 6x10	M 6x25	10 Nm
60 83 40x	M 8x20	M 8x20	25 Nm
60 83 45x	M 8x25	M 8x25	25 Nm
60 83 60x	M 10x30	M 10x30	50 Nm

*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless.

Mounting the universal shaft:
Slide the hubs item 1 and item 7 onto the shafts of the gear units. Tighten the clamping screw item 8 in order to achieve proper centering.
Check the angular displacement.
Check the radial displacement between both hubs. Align the gear unit.

If pillow- block bearings are used they should be mounted now according to paragraph 7.7.3. Arrange the pillow-block bearing in the middle. In the case of several pillow-block bearings, distribute them evenly spaced on the pipe length.

Slide the elastic elements item 2 and item 6 onto the tube item 4 and fix with screws item 3. Observe the instructions above.
Screw the hub item 1 together with the elastic element item 2 using the screws item 5.
Loosen the clamping screw item 8 again.
Screw the elastic element item 6 together with the hub item 7.

Gear units with non-rotating spindle:

Align link rod heads, pivot bearing heads, or fixing flanges to same height.

Gear units with rotating spindle:

Align flange nuts to same height.

Gear units in lifting-cylinder design:

Align pivot eye or customer-specific attachment at the threaded connection to the same height.

Position the universal shaft axially in the middle between the gearboxes.
Tighten the clamping screw item 8 hand-tight.
Rotate the universal shaft by hand and align the pillow-block bearings so that the universal shaft is not subject to tensional stress.

Slightly tighten the screws on the gearboxes and pillow-block bearings. Then rotate the universal shaft once more by hand. If it rotates smoothly, tighten the screws completely.

Tightening torques of the clamping screws item 8 are the same as for the screws item 3. See table above.

For tightening torques for fixing the gearbox see paragraph 7.3.

Tighten the threaded pin in hub item 1 in order to fix the universal shaft axially.

7.7.3 Mounting the pillow blocks:

Use only pillow blocks with bearings on clamping sleeves. Only this type of fastening will avoid the eccentric fixing of the universal shaft.

Preparation:
Bolting surfaces: Clean before mounting. Roughness <= 12.5 µm. Smoothness within IT7.
Check tube for dimensional and shape accuracy. Diameter tolerance: h10

Mounting:
Position the housing in the correct place along the universal shaft and fix it with screws on the bolting surface. Tighten the screws only hand-tight. .
Insert rubber cords in the grooves of the bottom part of the housing.
Place one half each of the aluminum split ring, with felt seal fitted, on the rubber cords.

Slide the bearing with the clamping sleeve onto the tube. The nut must be in the housing on the side where there is **no** grease nipple so that the bearing can be re-lubricated during operation.
Fill the bearing completely with the appropriate grease. The rest of the recommended amount of grease is to be filled laterally into the lower housing portion.

Pillow block	Amount of grease for first filling	Connecting screws 8.8 for both pillow block halfs and tightening torque *)		Fixing screws 8.8 and tightening torque *)	
60 85 300	50 g	M10x50	48 Nm	M12	84 Nm
60 85 400	65 g	M10x50	48 Nm	M12	84 Nm
60 85 450	75 g	M10x55	48 Nm	M12	84 Nm
60 85 600	180 g	M12x65	84 Nm	M16	205 Nm

*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless. Secure screws against loosening (e.g. with Loctite 243).

Install the universal shaft with the bearing in the bottom part of the housing.
Align the universal shaft and the pillow block housing carefully in relation to the gearboxes. The notches in the ends of the housing feet may be helpful. Then tighten the fixing screws slightly.
Insert the rubber cords in the grooves on the upper part of the housing.
Fit the seal halfs on the cords.
Fit the upper part of the housing. Pay attention that the markings on the upper and the lower part match as the parts are not interchangeable.
Tighten the connecting screws with the tightening torque mentioned above.

Upon final alignment of the universal shaft according to paragraphs 7.7.1. or 7.7.2. tighten the fixing screws with the tightening torque listed above. .

8. Operation

Forces, cycle times, torque or any other relevant working conditions on which the layout is based, must not be exceeded during the practical operation – not even for a short time.

Exceeding the limits even only once can already cause permanent damage.

It must be assured that the layout and the actual loads are in conformity with each other!

If the gearboxes are lubricated with the standard lubricants, the ambient temperature must lie between -10°C and +40°C.
Deviating temperatures require special lubricants. Please consult us.
It must be ensured that adequate dissipation of the generated heat is provided for.

An absolute temperature of 80° C on the surface of the housing must not be exceeded in order to keep the thermal stress on shaft seals and lubricant as low as possible, which has a positive effect upon their service life .

When used in areas with explosion hazard, the operator must take care that the surface temperature of 65°C is not exceeded on any of the components.
If necessary, he must control the surface temperature.
In order to find out which of the components heats up most, the temperature should be measured under operating conditions.
The operator must furthermore assure that no sparking can occur. Rotating or straight moving parts and parts which could come into contact with these, must be protected against corrosion (e.g. by greasing, painting, zinc coating).

Caution!
The surface of the gear unit, the spindle and the nut can reach temperatures of more than 65 °C during operation and can cause burns.
The person putting the gear unit into operation must ensure that nobody can be endangered by hot surfaces.

Warning!
Rotating or straight moving parts may catch pieces of clothing, hair and members of the body and injure persons. The person operating the gear unit must ensure that persons cannot be endangered by any rotating or straight moving components.

Monitoring and protective equipment must not be put out of operation.

The ventilation threads at the flange of lifting cylinders have to be controlled regularly, that they don't clog with dirt. See also chapter 7.6.

9. Maintenance

Maintenance work may only be carried out by qualified or specially trained personnel!

Monitoring and protective equipment must not be put out of operation.

Before starting any maintenance work on screw-jack gearboxes the following points must be ensured:

- **The machine/system, in which the gearbox is installed, must be at a standstill.**
- **The machine/system must be secured against inadvertent starting.**
- **The machine/system must be sufficiently cooled off so that there is no danger of burns.**
- **The motor must be cut off from the mains.**

The operator must ensure that, also after carrying out maintenance work, there is no risk of sparking. Any rotating or straight moving parts and any such parts which may get into contact with them should be protected against corrosion after completing the maintenance work (e.g. by greasing, painting, zinc coating).

Maintenance intervals

Interval	What should be done?
Every 2000 machine hours, - at least every six months	• Listen to running noises of the basic gear to detect possible damage to bearings. • Visual inspection for leakage at the motor flange and the seals. If there is a leakage, please contact us. Unnoticed loss of lubricant leads to wear, increased temperatures and sparking when running dry.
After 150 to 500 km traveling distance, at least ever 12 months	• Re-lubricate the ball-screw spindle drive and key bar if available (see 9.1 and 9.2)
Depending upon operating conditions; possibly after 2 years.	• Change the gear oil (see 9.5)
Depending upon operating conditions	• Clean basic gear (see 9.3)
At least once a year	• Measure the wear of the motor brake (see 9.6)
After 5000…8000 hours, at the latest after 3 years	• Replace shaft seal (see 9.4)

9.1. Regular lubrication of spindle:

In the case of prolonged exposure, synthetic oils and grease can lead to irritations of the skin. Clean your hands thoroughly after contact with lubricants.

The ball-screw drive must be lubricated at regular intervals.
We recommend to include this process in a maintenance plan.
The scrapers at the ball-screw nut hold the grease inside the nut for a long time.
The following values are to be regarded as approximate values. The lower values are to be taken for higher loads and speeds. This also helps to determine the emptying time of the grease cup. When using rotating spindles without bellows we recommend to shorten the lubrication intervals as well.

Is the calculated period for re-lubrication longer than one year, the ball-screw nut and the key have to be greased together at least once a year with the amount of grease mentioned below.

Determining the re-lubrication time:

- Performance of the ball-screw drive in kilometer per year:

  2 * stroke * cycles/day * days/year

  Example: Stroke =700 mm, 850 cycles/day, 300 days/year
  means 357 km travelling distance per year
-

Read the permissible performance (travelling distance) until re-lubrication is required from the table 9.1.:
Example: KG 63x20 Lubrication interval: 300-500 km
Result: The ball-screw drive should be greased at least once a year.

Table 9.1: Reference values for re-lubrication quantities and intervals for ball-screw nuts:

Ball-screw drive	Lubrication quantity in grams	Lubrication interval in km
KG 20x10	8	150 – 250
KG 20x20	8	300 - 500
KG 25x10	10	150 – 250
KG 25x20	10	300 – 500
KG 32x10	15	150 – 250
KG 32x20	15	300 – 500
KG 40x10	20	150 – 250
KG 40x20	20	300 – 500
KG 50x10	25	150 – 250
KG 50x20	25	300 – 500
KG 63x10	30	150 – 250
KG 63x20	30	300 – 500
KG 80x20	50	300 – 500

For re-lubrication of ball-screw drives of lifting-cylinder units see also point 9.2.

The filling in the lubricator must be checked regularly. We recommend to include this work in a maintenance plan.
When the lubricator is completely empty, it can be refilled for further use. Only the pressure chamber, where the gas generation takes place and which is supplied by us as a spare part, has to be replaced. A permanent signal lamp, powered by two standard 1.5 V batteries, signals that the lubricator is ready for operation.
Our instructions BKI 103 are available on our homepage.
When refilling the lubricator care should be taken that no air bubbles develop inside the lubricator due to the consistency of the grease. They cause an interruption of the lubricant supply when they are carried through the hose to the lubricating point.

9.1.1 Re-lubricating the rotating-spindle gear unit:

The ball-screw nut is provided with an M6 or (depending on size) M8x1 lubricating connection on its flange containing a ball grease nipple. Re-lubricate the nut there at intervals as determined above.
As the nut stands still, it is possible to connect a lubricator in the case of ball-thread drives from KG50 on. For this purpose the grease nipple must be removed at first.

Clean the spindle completely from old grease once a year or at the end of the emptying time of the lubricator. Then the full useful length should be greased again.
Depending upon the ambient conditions (dust, moisture, etc.) thorough cleaning may be required at shorter intervals, in order to ensure adequate lubrication of spindle and nut. Insufficient lubrication results in increased wear.

We advise to use high-quality ball-bearing grease of class K2K-20 acc. to DIN 51825 in consistency class NLGI 1 to 2. We recommend a high ability to absorb pressure.

Recommended grease qualities:

Klüber:	Klüberlub BE 41-542 or Stabutherm GH 461
BP:	Energrease LS 2 or Energrease LS EP 2
Castrol:	Spheerol AP 2
Esso:	Beacon EP 2
Mobil:	Mobilux 2 or Mobilux EP 2
Total/Fina:	Marson L 2 or Marso EPL 2

In case of use of the lubricator of ATLANTA: Klüber Microlube GB-0
ATLANTA order code for 1 kg of Klüber Microlube GB-0: 65 90 002

9.1.2 Re-lubricating the non-rotating spindle gear unit:

The ball-thread nut is provided with an M6 or (depending on size) M8x1 lubricating connection on its flange containing a funnel-shaped nipple.
The nut rotates while the spindle is moving. Re-lubrication at intervals as determined above must therefore be made by hand while the unit is at a standstill.

Models with bellows have a bore in the nut protection. Operate the drive by inching until the grease nipple comes in sight in the hole. Now you can re-lubricate.

Clean the spindle in the extracted position completely from old grease once a year or at the end of the emptying time of the grease cup. Then the full useful length should be greased again.
Depending upon the ambient conditions (dust, moisture, etc.) thorough cleaning may be required at shorter intervals, in order to ensure adequate lubrication of spindle and nut. Insufficient lubrication results in increased wear.

If the gear unit is provided with an internal twisting protection, the key must also be re-lubricated.
For this purpose the protective tube is provided with a ball grease nipple.

The following mounting situations are to be considered:

- Protective tube in vertical position upwards:
  Re-lubricate when the spindle is extended to position L_{max}.
- Protective tube in vertical position downwards:
  Re-lubricate when the spindle is retracted to position L_{min}.
- Protective tube in horizontal position:
  Re-lubricate when the spindle is extended to position L_{max}..
  Then retract spindle to position L_{min}. and lubricate once more.

Re-lubricate at the intervals determined above using the following quantities:

Gearbox	Amount of grease with vertical protective tube	Amount of grease with horizontal protective tube
HS 10	4 ml	2x each1.5 ml / 100 mm stroke
HS 25	8 ml	2x each 2 ml / 100 mm stroke
HS 50	9 ml	2x each 2.5 ml / 100 mm stroke
HS 100	25 ml	2x each 3 ml / 100 mm stroke

Example for horizontal installation:
HS 100 with 500 mm stroke:
Amount of grease = 3 ml / 100 mm stroke x 500 mm stroke = 15 ml
Re-lubricate in position L_{max}. with 15 ml.
Retract spindle to position L_{min}. and re-lubricate once more with 15 ml.

We advise to use high-quality ball-bearing grease of class K2K-20 acc. to DIN 51825 in consistency class NLGI 1 to 2. We recommend a high ability to absorb pressure.

Recommended grease qualities:

Klüber:	Klüberlub BE 41-542 or Stabutherm GH 461
BP:	Energrease LS 2 or Energrease LS EP 2
Castrol:	Spheerol AP 2
Esso:	Beacon EP 2
Mobil:	Mobilux 2 or Mobilux EP 2
Total/Fina:	Marson L 2 or Marso EPL 2

In case of use of the lubricator of ATLANTA: Klüber Microlube GB-0
ATLANTA order code for 1 kg of Klüber Microlube GB-0: 65 90 002

As lubricant for the key we also advise to use high-quality ball-bearing grease of class K2K-20 acc. to DIN 51825 in consistency class NLGI 2. More liquid greases are not suitable. We recommend a high ability to absorb pressure.

Recommended grease qualities:
Klüber: Klüberlub BE 41-542 or Stabutherm GH 461
Other manufacturers see above.

9.2. Re-lubricating the lifting-cylinder unit:

The positions for re-lubrication of the ball-screw nut and the key depend upon the mounting situation. See drawing 7.1.3.

L_0 = Length for re-lubricating the ball-screw nut
L_1 and L_2 = Lengths for re-lubricating the key bar
The dimensions are noted on a nameplate at the gearbox.

Re-lubricate ball-screw nut and key bar always together.

For lubricating the ball-screw nut, advance to the dimension L_0.
Remove the cap-screw (item 1). Lubricate the ball-screw drive at the lubricating nipple (item 3). Amount of grease see table 9.1. Screw the cap-screw on again.

For lubricating the key bar use the re-lubricating set of 9.2.1.

Fill the syringe with grease. Put the hose on the syringe. Fill the hose with grease. Start re-lubrication only if hose is completely filled with grease.

Advance the lifting cylinder to the dimension L_1. Slide the hose through the thread of the cap-screw until it knocks against the key bar at the opposite side of the tube. Pull it back a little bit. Re-lubricate approx. 4ml of grease. Repeat the procedure at the other side of the key bar.

If there is a dimension L_2 on the name plate, advance the lifting cylinder to this dimension and repeat the whole procedure.
Then tighten the cap-screw again.

Check the ventilation threads at the flange, that they don't clog with dirt. Clean, if necessary. See also chapter 7.6.

As lubricant for ball screw and the key we advise to use high-quality ball-bearing grease of class K2K-20 acc. to DIN 51825 in consistency class NLGI 1 to 2. We recommend a high ability to absorb pressure.

Recommended grease qualities:

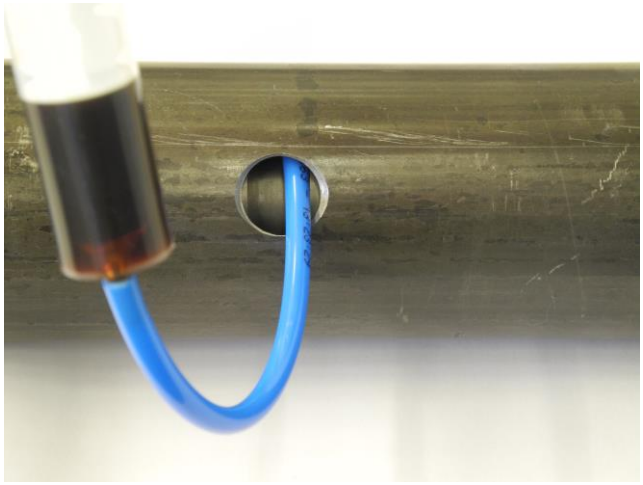
Klüber:	Stabutherm GH 461 or Klüberlub BE 41-542
BP:	Energrease LS 2 or Energrease LS EP 2
Castrol:	Spheerol AP 2
Esso:	Beacon EP 2
Mobil:	Mobilux 2 or Mobilux EP 2
Total/Fina:	Marson L 2 or Marso EPL 2

ATLANTA order code for 1 kg of Klüber Microlube GB-0: 65 90 002

9.2.1 Re-lubricating set for lifting cylinders

Preparation:

- Put the hose on the syringe.
- Fill the hose with grease.
- Press the syringe until grease leaves it.



Re-lubrication:

- Advance the lifting cylinder to dimension L_1.
- Slide the hose through the thread of the cap-screw until it knocks against the key bar at the opposite side of the tube.
- Pull it back a little bit.
- Re-lubricate approx. 4ml of grease.

- Slide the hose inside the groove in the other direction until it knocks against the key bar.
- Pull it back a little bit.
- Re-lubricate approx. 4ml of grease.
- If there is a dimension L_2 on the name plate, advance the lifting cylinder to this dimension and repeat the whole procedure.

- Store the re-lubricating set for the next time.

9.3. Cleaning the basic gear unit:

Dust on the gearbox in excess of 5mm thickness is not acceptable because, due to the dust layer, the surface temperature is excessively increased so that the dust may ignite. Keep the surface clean.

Cleaning with high-pressure cleaners is not permissible. It leads to the destruction of the seals and penetration of water into the gearbox and the ball-screw nut and consequently to premature failure of these components.

Do not clean the gear unit, and in particular the area of the seals, with sharp-edged objects. Cleaning with solvents or cleaning agents is only permissible if these are released in writing by ATLANTA E.Seidenspinner GmbH & Co. KG.

After cleaning the basic gear unit it is necessary to grease the spindle and the nut again. Attachments of steel are to be protected again against corrosion, if necessary.

9.4. Radial shaft seal rings

Shaft sealing rings seal the gap between the housing and the rotating shafts. The shaft seals are wearing parts which have to be replaced when reaching the wear limit.
The service life of shaft seals is affected by a variety of parameters;
these are among other things:

- peripheral speed at the an sealing lip
- temperature
- internal pressure in the gearbox
- viscosity of the lubricant
- chemical composition of the lubricants and the additives
- mounting situation (lubricant supply to the sealing lip)
- particles and/or metallic rubbings in the lubricant
- material of shaft sealing ring
- external contamination
- damage during exchange

This large variety of parameters makes it practically impossible to make a precise service life prognosis without experiments considering the conditions of the individual application. As the service life of the shaft seals is subject to fluctuations as described before it is very important to check them regularly. This is the only way to avoid an unnoticed loss of lubricant inside the gearbox.

When replacing the shaft sealing ring you should also check the condition of the contact surface of the sealing lip on the shaft. When there are seizing marks, the shaft must be repaired or replaced. As an alternative, it is also possible to mount the shaft seal in a slightly axially displaced position so that the sealing lip runs at a different location without traces of wear.

9.5. Changing the gearbox lubricant:

Before changing the lubricant the gearbox must be cooled off until it is not more than lukewarm.

In the case of prolonged exposure, synthetic oils and grease can lead to irritations of the skin. Clean your hands thoroughly after contact with lubricants.

Lubricants (oils and fats) are hazardous substances that may pollute soil and water.
Collect the drained lubricant in suitable containers and dispose of the lubricant in accordance with the applicable national regulations.

Prevent the lubricant from entering into drains, sewerage and waters.

ATLANTA HS-high-performance screw-jack gearboxes are supplied filled with the synthetic polyglycol oil Klüber Synth GH6 – 220 (Fa. Klüber) with viscosity class ISO VG 220. See oil nameplate.

Gear unit	Oil quantity in liters
HS 10	0.1
HS 25	0.3
HS 50	0.7
HS 100	1.0

Recommended synthetic oils:

Klüber:	Klüber Synth GH6-220
Aral	Degol GS 220
BP	Energol SG-XP 220
DEA	Polydea PGL P 220
Fuchs	Renolin PG 220
Optimol	Optiflex A 220
Shell	Tivela S 220
Tribol	800 / 220

ATLANTA order code for 1 liter of Klüber Synth GH6-220: 65 90 010

Synthetic oils must not be mixed with mineral oils.
Mineral oils reduce the transmissible power and must not be used without consulting ATLANTA.
Exchange the complete lubricant filling (including rinsing), if you want to use another lubricant. The non-observance of this instruction can lead to damage to the gear unit and complete failure!

Under the following conditions the lubrication of the gear unit with synthetic oil is a lifetime lubrication:

- The layout of the gear unit was made strictly according to the guidelines contained in the ATLANTA catalogue.
- The gear unit is operated exclusively within the permissible rated values and limit values.
- The operator checks the gear unit regularly (every 2 weeks) for oil leakage.
- The surface temperature reaches max. 80°C.

In the case of operation under differing operating conditions and/or operation at mostly low input speeds (peripheral speed of the worm v < 0.5 m/s) we recommend to change the oil every two years.
For this purpose empty, rinse and then refill the gearbox with new oil.

Gear unit	Ratio	Input speed for v=0,5 m/s [in min^{-1}]
HS 10	3	455
HS 10	6,75	600
HS 10	29	565
HS 25	3	320
HS 25	6,75	360
HS 25	29	360
HS 50	3	245
HS 50	6,75	285
HS 50	29	285
HS 100	3	185
HS 100	6,75	240
HS 100	29	240

9.6. Measuring the wear of the motor brake:

Before releasing the motor brake make sure that the load cannot start moving.

The brake linings of the motor brake are subject to wear. They must be inspected at least once a year and the air gap should be adjusted, if necessary.

Carefully read and observe the operating and maintenance instructions for the motor and the brake.

When the wear limit mentioned in these instructions is reached, the brake linings must be replaced.

In the case of high switching frequencies, this inspection should be made more frequently, we recommend quarterly.

9.7. Replacing the spindle:

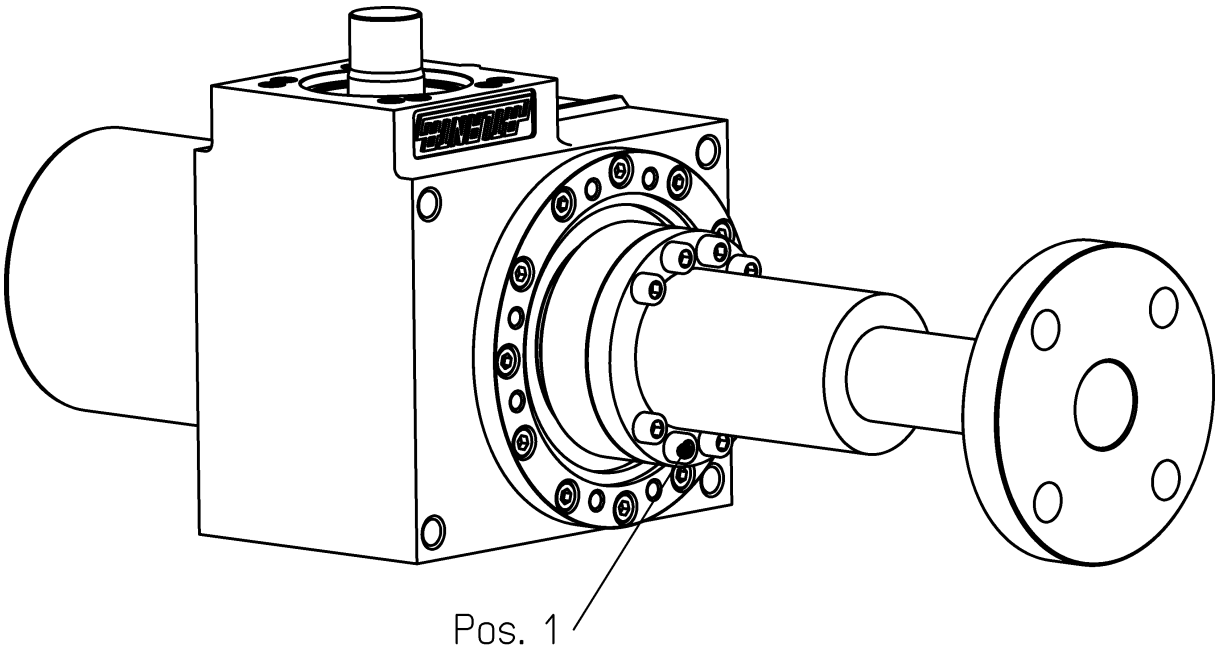
The ball-screw spindle is a safety-relevant component. Both the axial force and the torque are transmitted by the spindle onto the gear unit.

In gear units with non-rotating spindle they are transmitted via the screws at the nut fixing device and in the case of rotating spindle and lifting cylinder via the shrink-disc.

In order to ensure the safety of operation, the assembly and/or disassembly of the spindle may be performed only by specially trained personnel. We recommend to have this work done in our factory.

Before the spindle is replaced it must be assured that the load is securely supported and cannot start moving. It is recommended to dismount the gearbox before replacing the spindle.

9.7.1 Replacement of spindle and nut for gear units with non-rotating spindle:



Drawing 9.7.1 Replacement of spindle and nut for non-rotating gear units

Version with twisting protection:

The spindle must be exchanged at our factory.

Version without twisting protection:

1. Dismounting the existing spindle and nut:

- Loosen the screws (item 1) on the nut and remove them.
- Pull the nut with the spindle out of the gear unit.
- Do not screw the spindle out of the nut because the balls would fall out!

2. Connecting devices at the front end of the spindle:

- **It is recommended to order the new spindle together with a new adapter.**
- The available adapter may be used again after checking it for fitness for further use. Then:
  a) Remove the adapter.
  ATTENTION: The adapter may be pinned or secured with Loctite!
  If secured with Loctite, heat before disassembly.
  b) Be careful not to damage the thread in the adapter during disassembly!
  c) Mount the adapter on the new spindle.
  Secure with Loctite in the area of the thread.
  d) **If the old adapter was pinned, fasten it again by pinning.**
  In the case of gear units with twisting protection mind the correct position between adapter and twisting protection inside the protective tube!

ATTENTION: The pin transmits the torque. This work may only be done by specially qualified personnel!
We recommend to order the replacement spindle with the adapter fitted by us.

3. Installation of the new spindle and nut:

- Remove the grease from the screwing surfaces of nut and gear unit.
- Slide spindle and nut through the gear unit and fit the nut in the centering piece.
- Use new screws (pos. 1 in drawing 9.7.1.) for fixing the nut and tighten them as stated in Table 9.7.1.1.
- **If the spindle is not properly fixed and locked, the screws may loosen so that the spindle may be pulled out of the gearbox causing the assembly to collapse.**

4. Lubricate the spindle on the useful length.

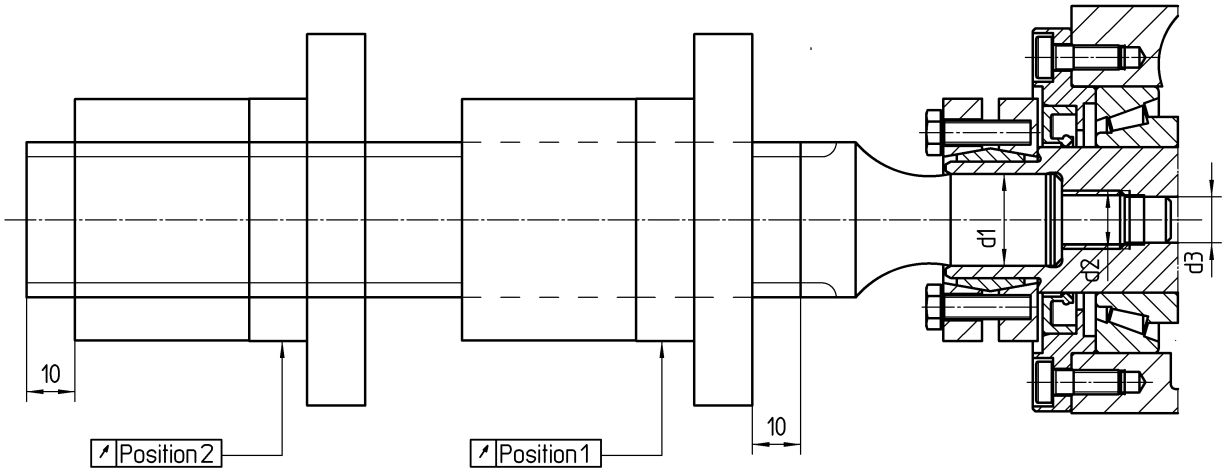
5. When starting up the gear unit again, proceed as described in paragraph 7.

Table 9.7.1.1:

Gear unit	Screw size	Strength class of the screws	Tightening torque *)
HS 10	M 6	12.9	16 Nm
HS 25	M 8	12.9	40 Nm
HS 50	M 8	12.9	40 Nm
HS 100	M 10	12.9	78 Nm

*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too high, the screws will be overstrained and become useless. Secure screws against loosening (e.g. with Loctite 243).

9.7.2. Replacement of spindle and nut for gear units with rotating spindle:



Drawing 9.7.2 Spindle exchange and concentricity check

1. Removing the existing spindle and nut:

- Remove the ball-screw spindle nut and any attachments. See point 5.3.
- Clamp gear unit on the workbench.
- Loosen the screws at the shrink-plate until the plate can be shifted on the output shaft. Do not disassemble.
- Screw spindle counter-clockwise out of the gear unit.

2. Preparation of the spindle to be installed:

- Clean diameters d1 and d3 as well as the thread d2 of the spindle.
- **Coat diameter d1 with a thin oil film. Never use grease or MoS_2- oil paste in this area.**
- Coat diameter d3 and thread d2 with special grease to protect it against fretting corrosion.
  ATLANTA-recommendation: Klüberpaste 46 MR 401 from Klüber
  Order code for 750 g can: 990 04 015

3. Preparation of the output bushing:

- Clean inside diameters d1 and d3 as well as the thread d2 of the output bushing. At the same time check the bores for damage and fretting corrosion: If necessary, polish. If there are any questions or doubts, please contact us or return the gear unit to us.
- **Coat the diameter d1 with a thin oil film. Never use grease or MoS_2- oil paste in this area.**
- Coat diameter d3 and thread d2 with special grease to protect it against fretting corrosion.
  ATLANTA-recommendation: Klüberpaste 46 MR 401 Fa. Klüber

4. Insert the spindle into the gear unit and then screw it into the gear unit by hand right up to the stop.

5. Put the shrink-disc back again and slide it right up to the stop in the direction of the gear unit.

6. Creating the transverse pressure fit:

- Tighten the clamping screws one after the other (not crosswise!). Pay attention to the parallelism of the two disks.
- Several passes are necessary to reach the tightening torque listed below.
- Use an indicating torque wrench. Tightening without using an indicating torque wrench is not permissible. Over-stretching the shrink-plate even only once may already make it unusable.

Gear unit	Tightening torque
HS 10	5 Nm
HS 25, HS 50	12 Nm
HS 100	30 Nm

*) Use only calibrated torque wrenches! If the tightening torque is too low, the required torque will not be transmitted. If the tightening torque is too big, the screws will be over-strained and become unusable.

- **If the spindle is not properly fixed and secured, there is a risk that the clamping screws come loose so that the spindle can be pulled out of the gear unit and the plant collapses.**

7. Grease the new spindle on the useful length.

8. Check the concentricity at the spindle according to point 4.2.

9. For starting up again proceed as described in paragraph 7.

9.7.3. Replacement of spindle and nut for gear units in lifting cylinder design

The spindle must be replaced in our factory.

10. Storing

If the gear unit is not installed immediately after delivery, the following precautions have to be taken:

- The ideal way of storing is in vertically suspended position with the spindle hanging freely.
- Alternatively: Store the gear unit with horizontal spindle and input shaft (worm-shaft) lying horizontally on top. Support the nut in such a way that the spindle comes to lie horizontally. In the case of long spindles the spindle must be supported additionally. Care should be taken that there is no other contact to any other objects.
- The spindle is greased. It must be carefully protected from dust. Before being mounted the spindle must be cleaned from old grease and then greased again.
- Protect the gear unit against environmental influences (ozone, UV radiation, electric welding, dust, dirt, moisture, temperature fluctuations, shocks, etc.).
- Attachments e.g. motor or coupling are to be stored separately.
- Protect all steel components against corrosion.
- Occasional rotating of the input shaft of the gear unit will facilitate the start-up.

The max. storing time under these conditions is 2 years.

Before installing the gear unit after storage, all parts have to be inspected for possible rust stains. If there are any, they have to be removed. Then protect the parts once more against rust, e.g. by greasing, painting, zinc coating.

11. Disposal

Observe the applicable national regulations!

Dispose of the various parts separately in accordance with their nature and composition and the applicable country-specific regulations!

For example (this list is not exhaustive):

- Steel scrap:
  Spindles and nuts
  Gearbox swivel bearing
  Coupling for servo-motor
  Nut protection, bellows adapter
  Link rod head, pivot bearing head, fixing flange
  Mating bearing flange
  Protective tube and flange
  Twisting protection and strip
  Outer tube and piston tube and rod end of the lifting cylinder
- Aluminum scrap:
  Gear housing
  Gear cover
  Motor flanges
  Couplings for three-phase motors
- Bronze scrap:
  Worm gear (separated from hollow shaft)
- Collect used oil and dispose of it correctly in accordance with the applicable regulations

12. Motor connecting diagram for three-phase AC motor with brake: