Operating and Maintenance Instructions

for

ATLANTA High-Performance & Standard Screw-Jack Gearboxes 60 & 61-Series

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

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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.

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

1. Short description

The ATLANTA high-performance (series 60) and standard (series 61) screw-jack gearboxes are used for the conversion of rotary motions into linear motions. They are mostly driven by three-phase motors. Manual operation is also possible. On consultation with ATLANTA other motors, e.g. servo motors, may be permissible as special versions.
The gear units are available with rotating or non-rotating spindles. As standard version they are equipped with trapezoidal-thread spindle and nut. Ball-screw drive is possible as special version.
The light-metal housing ensures optimal heat dissipation.
The gear units are delivered test-run, tested for tightness and consequently ready for operation. The spindles are provided with an initial grease-lubrication sufficient for approx. 10 strokes.

2. Proper application

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.

The gear unit is designed for intermittent operation. 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 trapezoidal-thread spindles the gear unit is statically self-locking, but not self braking. The self-locking capacity can be weakened or neutralised by vibrations, unfavourable lubricating conditions and smoothing of the surfaces after some time of operation.

In combination with ball-screw spindles the gear unit is neither self-locking nor self-braking.

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 is exceeded.

Differing working conditions require written approval by ATLANTA.

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 must 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.

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.

Weights in kilograms:

Nominal force of gear unit	High-performance gear unit	Standard gear unit		Spindle per meter	Protective tube per meter
	Basic gear unit	Basic gear unit non-rotating	Basic gear unit rotating		
2	-	0.95	0.65	0.8	1.2
5	1.7	1.3	1.0	1.6	2.1
10	3.4	2.1	1.7	2.0	2.9
25	5.7	5.6	5.0	4.5	3.7
50	13.2	15.6	14.0	8.0	5.2
100	32.5	29.2	26.5	17.5	8.8

Nominal force of gear unit	High-performance running nut	Drive flange	Biggest possible drive motor
2	0.5	0.8	4.8
5	0.55	1.1	11.0
10	0.75	1.6	26.0
25	1.6	1.9	26.0
50	3.1	2.4	35.0
100	6.7	2.9	50.0

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 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!

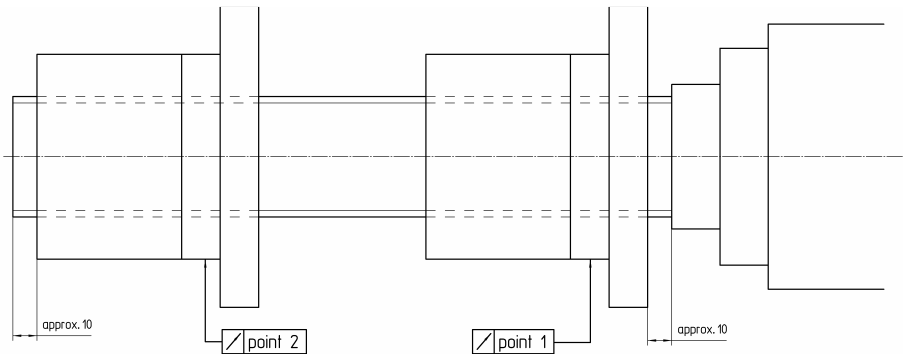
Position and clamp the gear unit horizontally. Place the dial indicator on a level support on the workbench and put the measuring sensor on the nut. With motor disconnected, turn the input shaft by hand until at least one full revolution of the spindle is completed.

Measuring point 1:
Permissible radial divergence (=value indicated by dial indicator): 0.1 mm

Measuring point 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	0.25 mm
500-1000 mm	0.5 mm
1000-1500 mm	0.8 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 set of limit-switches for gear units with rotating spindle:

The limit switches are suitable both as operating limit switches and as safety limit switches. The mechanic limit switches are equipped with forced mechanical disconnection. This feature permits their utilisation as safety limit switches in accordance with the accident-prevention regulations of the German professional association.

The protective tube is delivered with the necessary bores.

If additional holes are to be drilled after delivery, the following points are to be observed:

- Arrange the bores so that after the assembly they will be covered by the plate in which the limit switch is screwed in.
- Do not use any extended slotted holes, because they could cause an unacceptable reduction of the strength of the protective tube.
- Clean the tube from chips after drilling and remove any burrs on the inside and the outside of the holes.
- The protective tube of the 100kN gear unit has a welding seam on its inside. This must be fitted into the recesses on the protective-tube flange and the twisting protection.
- Always use the same screw length and insert the spring washer when mounting the protective tube again. If screws are too long, they will block the spindle and if they are too short, their retaining strength is insufficient.

Screw the limit switches into the plate as specified. Proceed according to the table below and as shown on the drawings 1 and 2. Tighten the nut at the limit switch only slightly.

Fasten the plate with the clamp on the protective tube. The limit switch must sit in the middle of the bore. Tighten the screws only slightly.

Then start up the gear unit as described under step 7.

After installing the gear unit in the system check whether the limit switches function as required. The switching point can be changed by moving the limit switch in the bore of the protective tube in axial direction.

Do not reduce the screwing depth! The mechanic limit switch is provided with mechanical forced disconnection. The installation dimension is co-ordinated with this switching point.

The limit switch can be screwed in slightly further, if the required switching point cannot be reached by axial displacement.
When using a mechanic limit switch, be careful not to exceed the maximum switching range. In the case of an inductive limit switch, make sure that it does not project into the protective tube.

After determining the switching positions, tighten the screws at the clamp with an indicating torque wrench to 3.5 Nm and lock the nut of the limit switch .

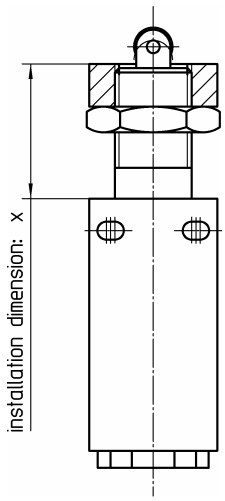
When used in areas with explosion hazard, only limit switches meeting the ATEX requirements may be used. The limit switches of the standard program are not suitable there.

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

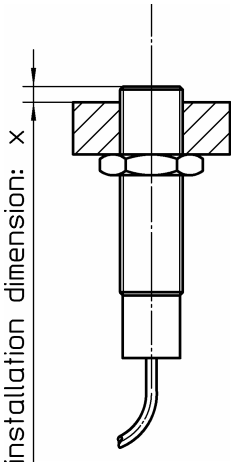
When used in areas with explosion hazard, use corrosion-protected screws, if there is a risk that mechanical sparking may occur.

Gear unit	Installation dimension for set of mechanic limit-switches [mm] acc. to drawing 1	Installation dimension for set of inductive limit-switches [mm] acc. to drawing 2
61 12 xxx	Not available	1
60 13 xxx / 61 13 xxx	Not available	1.5
60 14 xxx / 61 14 xxx	33	1.5
60 15 xxx / 61 15 xxx	33	1.5
60 16 xxx / 61 16 xxx	31.5	3
60 17 xxx / 61 17 xxx	31.5	3

Drawing 1



Drawing 2



5.2. Mounting the fork link/link-rod head for gear units with non-rotating spindle:

The fork link / link-rod head are usually supplied unassembled.

Screw the fork link / link-rod head onto the spindle end and adjust according to the mounting position. After the installation there must not be any tension between fork link / fork-rod head and the turning-out protection.

The fork link / link-rod head must be connected with the spindle in such a way that the spindle torque is reliably transmitted. The kind of connection chosen should be checked by calculation.

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

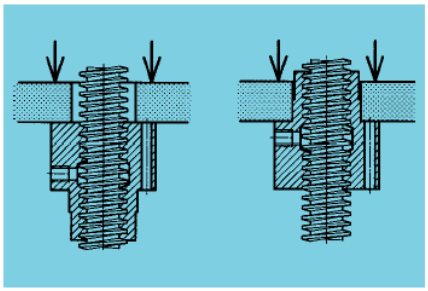
5.3. Mounting the spindle nut for gear units with rotating spindle:

Spindle and nut must be exactly aligned. Lateral forces and bending moments are not permissible. They are responsible for increased wear and tear.

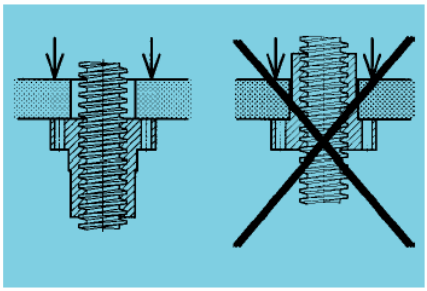
The proper alignment of spindle and nut must be carefully checked in order to exclude any risk of overheating the spindle drive. This check must be repeated after 10 hours of operation under operating conditions.

The installation of the nut under the load support must be carried as shown on the following sketches.

Hochleistungs-Laufmutter
Heavy-duty running nut

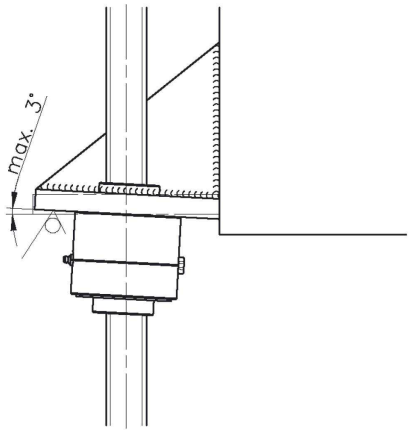


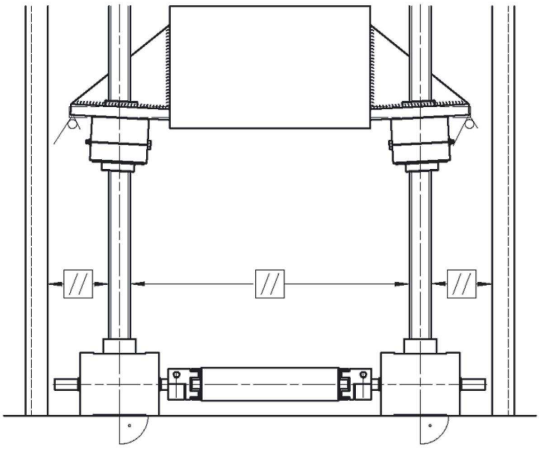
Flansch-Laufmutter
Flanged running nut



Self-aligning running nuts can counterbalance an existing angle error of max. 3° between spindle axis and nut screwing face. This can reduce the wear of the nut if the screwing face of the nut is a welded construction.

Self-aligning running nuts can neither make up for an existing parallelism error between spindles nor for deviations from right angles between fixing surfaces of gearboxes and guiding devices.





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

In the case of gear units with non-rotating spindle the safety grip nut is optional equipment. Please request our special documentation.
In the case of gear units with rotating spindle the safety grip nut is already mounted at delivery.

In most cases the running nut must be removed for the installation of the screw-jack gearbox in the system. When mounting it again it is necessary to readjust the distance between running nut and safety grip nut correctly. The distance “X” originally set is stamped upon a nameplate on the gear unit.

5.5. Mounting the flanged-nut swivel bearing / the support for gear units with rotating spindle:

Screw the flanged-nut swivel bearing / the support in the proper position to the flanged nut. Tightening torque as indicated on the chart below.
Choose the flow of forces, if possible, 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) must be provided, if there is a risk that mechanical sparking may occur.

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

Screw size	Strength class of the screws	Tightening*) torque
M 5	8.8	3.5 Nm
M 6	8.8	8.9 Nm
M 8	8.8	18.8 Nm
M 12	8.8	45 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 mating bearing flange for gear units with rotating spindle:

Hold the mating bearing flange against the spindle end and mount it by tapping slightly with the 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) must be provided, if there is a risk that mechanical sparking may occur.

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

Screw size	Strength class of the screws	Tightening *) torque
M 8	8.8	23 Nm
M 10	8.8	46 Nm
M 12	8.8	80 Nm
M 20	8.8	385 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).

5.7. 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 units with non-rotating spindle:
The bellows is attached at the gear unit and at the spindle mounting flange. It must still be fixed, however, to the fork link or the link-rod head after they are mounted.
Mounting with fork link:
Slide the Delrin sleeve over the fork link and push the flange of the bellows over it. Fix with a hose clamp. Make sure that the bellows is not twisted.
Mounting with link-rod head:
Slide the split Delrin sleeve with the O-ring over the link-rod head and push the flange of the bellows over it. Fix with a hose clamp. Make sure that the bellows is not twisted.

Gear units 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.

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

5.8. Mounting the gearbox swivel bearing:

Drive the bolt with light blows with the hammer in the required swivelling direction into 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) must be provided, if there is a risk that mechanical sparking may occur.

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

Screw size	Strength class of the screws	Tightening *) torque
M6	8.8	9.5 Nm
M 8	8.8	23 Nm
M 12	8.8	80 Nm
M 16	8.8	195 Nm
M 20	8.8	385 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 mounting strips:

Fasten the mounting strips by screwing them to the gear unit. Tightening torque as shown in the 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) must be provided, if there is a risk that mechanical sparking may occur.

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

Screw size	Strength class of the screws	Tightening *) torque
M6	8.8	9.5 Nm
M 8	8.8	23 Nm
M 12	8.8	80 Nm
M 16	8.8	195 Nm
M 20	8.8	385 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).

5.10. Mounting the input flange:

The input flange is usually already mounted when the unit is delivered.

After a removal we recommend to proceed as follows for reassembling:

- 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.

Then tighten the screws uniformly by turning them alternately crosswise. Tightening torque as shown in the table below.

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, suitable corrosion protection (e.g. greasing) must be provided, if there is a risk that mechanical sparking may occur

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.

When used in areas with explosion hazard, improper installation can lead to unacceptably high temperatures.

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

Screw size	Depth of thread [mm] series 60	Depth of thread [mm] series 61	Strength class of the screws	Tightening *) torque
M 5	10	8	8.8	3.5 Nm
M 6	10	11 (61 x4 xxx) 13 (61 x5 xxx)	8.8	9 Nm
M 10	15	22	8.8	40 Nm
M 12	18	25	8.8	45 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 drive coupling:

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

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.

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

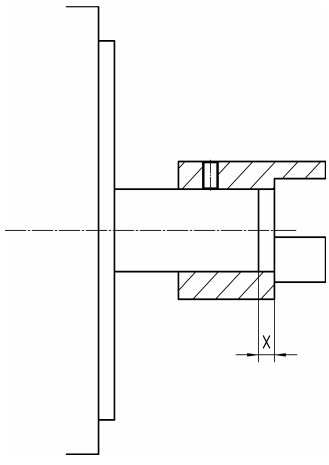
Check for true-running after 10 hrs of operation under operating conditions.

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

Recommended mounting procedure:

- Clean all contact surfaces and coat them with a thin oil film before mounting.
- Slide the coupling halfway onto the motor-shaft.
- Tighten the threaded pin of the coupling 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 motor-shaft 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. See also drawing 2.
- Insert the star and the second coupling half.

Gear unit	Length of motor-shaft	Dimension „X“	Length of motor-shaft	Dimension „X“
60 x3 xxx	23	3.75	30	-0.25
60 x4 xxx	30	5.25	40	0.25
60 x5 xxx	40	5.75	50	0.75
60 x6 xxx	50	6.25	60	1.25
60 x7 xxx	60	-0.75	80	-0.75
61 x2 xxx	20	2	23	0.5
61 x3 xxx	23	3.5	30	-0.5
61 x4 xxx	30	5	40	0
61 x5 xxx	40	6.5	50	1.5
61 x6 xxx	50	6.5	60	1.5
61 x7 xxx	60	-0.5	80	-0.5



Drawing 2

5.12. 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.

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 a suitable special grease on the motor-shaft, e.g. Klüberpaste 46MR401
- 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 nut and the key of the screw-jack gearbox 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. Choose the length of the screws so that maximum use is made of the available thread depth.
- Tighten the threaded pin of the coupling through the opening in the drive flange and secure against loosening (e.g. Loctite 243) in order to ensure reliable axial locking.

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

Screw size	Strength class of screws	Tightening *) torque
M 5	8.8	2.8 Nm
M 6	8.8	7 Nm
M 8	8.8	14 Nm
M 10	8.8	40 Nm
M 12	8.8	47 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).

5.13. Mounting the handwheel

The handwheel is usually supplied unmounted.

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

Ensure that no persons may be endangered by a rotating handwheel.

When used in areas with explosion hazard, it must be ensured that no parts can fall onto or rub against a rotating handwheel, 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.

It must be ensured that an overload protection device limits the motor torque to 200% of the motor torque required for raising the nominal load.

The power and brake connections for direct operation from the mains are shown on the enclosed circuit diagram (paragraphs 12 and 13).
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.
We strongly recommend to provide for S-shaped ramps at the converter!

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!

Caution!
The surface of the gear unit, the spindle and the nut can reach temperatures of more than 65 ℃ 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.

When used in areas with explosion hazard, the person putting the screw-jack gearbox into operation must ensure that the surface temperature of 80℃ 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).

7.1. Test-run of the screw-jack gearbox before the installation:

Before making a test-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, the link fork or the link-rod head.

Gear units with rotating spindle:
At the running nut.

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

Operated by the motor, perform one complete stroke. Switch off before reaching the 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.

7.2. Installation of the screw-jack gearbox in the equipment:

There are two machined mounting surfaces available 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 flow of forces, if possible, so that the force passes over the supporting surface and not over the screws.

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

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 guarantees reliable protection.

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

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 guarantees reliable protection.

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

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

Gear unit	Screw size	Depth of thread [mm]	Strength class of the screws	Tightening *) torque
60 x3 xxx 60 x4 xxx	M 6	13	8.8	9.5 Nm
60 x5 xxx	M 8	12	8.8	23 Nm
60 x6 xxx	M 12	18	8.8	80 Nm
60 x7 xxx	M 16	22	8.8	195 Nm
61 x2 xxx	M 6	12	8.8	9.5 Nm
61 x3 xxx	M 6	15	8.8	9.5 Nm
61 x4 xxx	M 8	15	8.8	23 Nm
61 x5 xxx	M 12	18	8.8	80 Nm
61 x6 xxx	M 16	24	8.8	195 Nm
61 x7 xxx	M 20	30	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).
Material under the screw heads: Steel with boundary surface pressure > 500 N/mm^2

Before starting the operation, the usable part of the spindle must be carefully greased. Observe Paragraph 7.3 of the lubricating instructions.

The most favourable 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.

7.3. Lubricating instructions for screw-jack gearboxes:

Because of the sliding friction between trapezoidal-thread spindle and nut it is absolutely important to provide sufficient lubrication there. Insufficient lubrication leads to increased wear and tear and to the destruction of the nut.

The unit is supplied with an initial lubrication of the trapezoidal-thread spindle sufficient for approx. 10 lifts.

Optimal lubrication is achieved with our electronically controlled lubricator due to the continuous feed of lubricant. If the unit is operated only rather seldom, it may be sufficient to relubricate it by hand. In the case of long intervals, however, manual lubrication may lead to increased wear at the spindle. We recommend to use a high-grade adhesive lubricant which, if lubricated manually, should be applied with a brush.

Recommended grease:

Klüber:	Microlube GB-0
Texaco:	Molytex EP 2
Mobil:	Mobilgrease HP
Esso:	Beacon EP 2
Shell:	Alvania Grease R2

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

The electronically controlled lubricator must be put into operation as described in the enclosed instructions BKI 102.
For the start-up fill the hose by means of a grease gun before mounting. Correct 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 specified in the lubricator instructions.
Fastest pressure build-up: all switches „ON“: Pressure build-up in 6-8 hours.
Type of lubricant: Microlube GB0 (Fa. Klüber)
As a result of our experiments we recommend to set an emptying time of 6 months after start-up and pressure build-up. Within the first few days and weeks the grease supply should be checked at regular intervals and the emptying time should be adjusted to the individual applications. The surface of the spindle must always be coated with a uniformly thin grease film. If there is grease in the protective tube or under the bellows, this indicates that the lubricant supply is too high. Screeching noises between spindle and nut are an indication for insufficient lubrication.

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.
Please request our instructions BKI 103.

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.

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

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

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.

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!

In **systems comprising several screw-jack gearboxes** the spindle mounting flanges, fork links or link-rod heads must be carefully adjusted to the same height in order to ensure that the gearboxes are loaded uniformly and that no stresses occur.
We recommend to cut the fixing threads for the flanges only after this adjustment.

The screw-jack gearbox may only be subjected to axial loads. Radial loads and bending moments must be avoided. It must be mounted free from 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 7.2.
The spindle must be adjusted parallel to the guiding device.
In the case of swivel drives double-cardanic suspension must be ensured.

Systems without guiding devices:

Attach the screw-jack gearbox as described in Paragraph 7.2.
Make sure that no lateral forces or bending moments act upon the spindle.
In the case of swivel drives double-cardanic suspension must be ensured

Attach the spindle end with the mounting flange, the fork link or the link-rod head to the moving part. Insert screws 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 make the first lifting stroke by turning manually.

In the case of motor-driven displacement it is important to stop before reaching the end positions and to move up to them by hand in order to avoid damage due to wrong adjustments.

Check the limit switches for correct position and proper switching.

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

After mounting, check the bellows for secure seating and proper functioning.
In retracted condition it must not be compressed too much. It must not rub against any rotating attachments.
In extended condition it must not be overstretched. The folds must not buckle in.
Use all available supporting rings. Make sure that the bellows does not touch the spindle.

If all connecting parameters are complied with, perform several cycles without load.

The spindle must move freely and easily and there must not be any tensions (uniform current drain).

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

Then perform one or two cycles with load. Check once more for easy and free motion and uniform current drain.

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

Current drain after the start-up: _____ A

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

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

Mounting flange	Screw size	Strength class of the screws	Tightening *) torque
60 12 500	M 6	8.8	9.5 Nm
60 13 500	M 8	8.8	23 Nm
60 14 500 60 15 500	M 10	8.8	46 Nm
60 16 500	M 12	8.8	80 Nm
60 17 500	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).

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

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 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!

In **systems comprising several screw-jack gearboxes** the spindle nuts must be carefully adjusted to the same height in order to ensure that the gearboxes are loaded uniformly and that no stresses occur.
We recommend to cut the fixing threads for the nuts only after this adjustment..

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 7.2.
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:

Use only screw-jack gearboxes with short spindles requiring no mating bearing flange.

Use only with tensile loads. Compressive loads without guiding devices lead to increased wear and tear of the nut.
Attach the screw-jack gearbox as described in Paragraph 7.2.
Ensure that no lateral forces and bending moments act upon the spindle.
In the case of swivel drives double-cardanic suspension must be provided.

Mounting the bellows:

Mount the spindle nut observing paragraph 5.4. Mount the nut without tensions to 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 condition it must not be compressed too firmly. It must not rub against any rotating components.
In extended condition it must not be overstretched. The folds must not buckle in.
Use all available supporting rings. Check that the bellows cannot 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 make the first lifting stroke by turning manually.

In the case of motor-driven displacement it is important to stop before reaching the end positions and to move up to them by hand in order to avoid damage due to wrong adjustments.

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 current drain). The spindle end must not beat during the 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 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 current drain.

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

Current drain after the start-up: _____ A

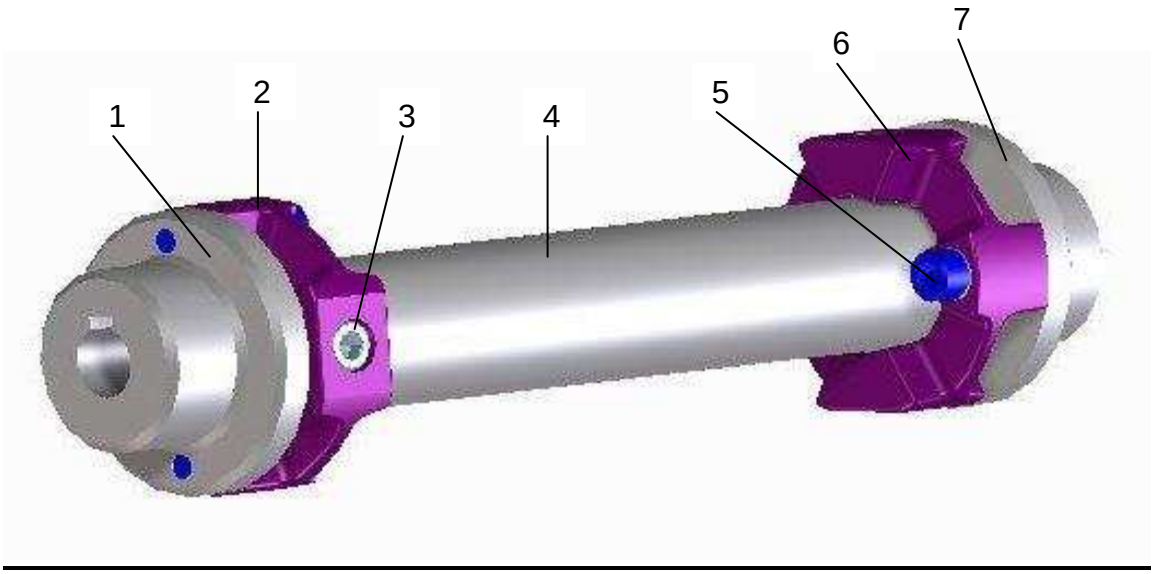
When used in areas with explosion hazard, suitable corrosion protection (e.g. greasing) must be provided, if there is a risk that mechanical sparking may occur

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

Trapezoidal-thread nut	Screw size	Strength class of screws	Tightening *) torque
87 14 002 + 600 87 18 003 + 600	M 5	8.8	3.5 Nm
87 20 004 + 600 87 30 015	M 6	8.8	8.9 Nm
87 30 600 87 40 006	M 8	8.8	18.8 Nm
87 40 600	M 10	8.8	40 Nm
87 60 007 + 600	M 12	8.8	45 Nm
Mating bearing flange	Screw size	Strength class of screws	Tightening *) torque
60 22 500 60 23 500	M 8	8.8	23 Nm
60 24 500 60 25 500	M 10	8.8	46 Nm
60 26 500	M 12	8.8	80 Nm
60 27 500	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. Mounting the linkage shafts, torsionally stiff (60 83 xxx):



Put a little bit of grease under the heads of the screws so that the screw head slides on the aluminium bushing and the bushing will not rotate inside the rubber pieces (items 2 / 6).

If necessary use a suitable tool to apply some counter-pressure preventing the rubber piece from rotating/slanting when tightening the screws. Pay special attention to the screws (item 4) to ensure that the annular surface between rubber piece (item 2) and tube (item 4) is loaded over the full surface and not only at two points, because otherwise the screw may work loose and the clutch may be destroyed.

Use only the screws supplied with coloured adhesive paste (e.g. blue) within the thread! This micro-capsulated adhesive holds the screw in the thread thus reliably preventing it from working loose. The curing time of the adhesive after fitting the screws is approx. 4-5 hours at 20° C. The clutch must not be operated earlier. Higher temperatures will shorten the curing process. At 70°C (e.g. heating with hot-air blower) t he curing time is only approx. 15 minutes. The adhesive resists heat between –80°and +90°C. The screws must not be re-used more than three times. Adhesive brushed off from the thread when fitting the screws will stick between the hub (items 1 / 7) and the aluminium bushings increasing the frictional contact pressure between these parts.

Anaerobic adhesives (such as Loctite, Omnifit, etc.) destroy the adherence of the rubber on the metal thus leading to the destruction of the clutch. We therefore strongly recommend not to use any of these adhesives. Claims concerning rubber parts deteriorated due to adhesives will not be accepted.

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. Secure screws against loosening.

Fit hub (item 1) on gearbox shaft and screw to rubber piece (item 2) using the screws (item 5). Screw rubber piece (item 2) on the tube (item 4) using the screws (item 3). The rubber piece is thus contracted radially and receives an initial pressure stress increasing the performance.
If pillow-block bearings are required, slide them onto the tube now.
If several pillow-block bearings are provided, they should be distributed equally over the length of the tube.
Slide the hub (item 7) onto the gearbox shaft and connect with the rubber piece (item 6) with the screws (item 5).
Slide the rubber piece (item 6) onto the tube (item 4) but do not yet screw them together.
Mount the gearbox in the desired position but tighten the screws only slightly.

Gear units with non-rotating spindle:

Align the fixing flanges, fork links or link-rod heads on the same level.

Gear units with rotating spindle:

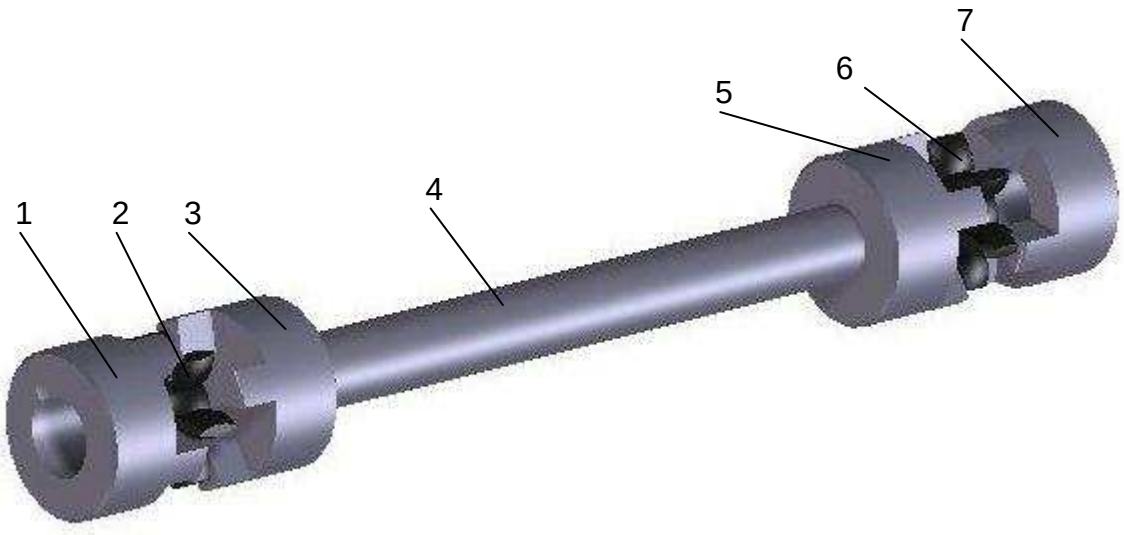
Align the flange nuts on the same level.

Screw the rubber piece (item 6) into the nearest thread in the tube (item 4). This will lead to a difference in height with regard to the connecting piece. In order to avoid this, adjust the fixing elements once more so that they are on the same level after screwing and connect them in this position to the system.
Rotate the linkage shaft by hand. Adjust the pillow-block bearings in such a way that the linkage shaft is not tensioned.

Tighten the screws at the gearboxes and the pillow-block bearings slightly. Then rotate the linkage shaft once more by hand. When it turns easily, tighten the screws firmly.

For correct tightening torque values for mounting the gear unit see chapter 7.2.

7.7. Mounting of the linkage shafts, torsionally elastic (60 82 xxx):



The clutch component (item 3) is supplied mounted on the tube (item 4) with pin. .
Slide clutch component (item 1) and star (item 2) onto the gearbox shaft of one of the gear units.
Insert the linkage shaft (items 3 and 4) into the clutch half (item 1).
If pillow-block bearings are required, they must be pushed onto the tube now.
If there are several pillow-block bearings, they should be distributed equally over the length of the tube.
Slide clutch component (item 5) onto the tube.
Slide the clutch component (item 7) and the star (item 6) onto the gearbox shaft of the other gear unit.
Mount the gearbox in the desired position and tighten the screws only slightly.

Gear units with non-rotating spindle:

Align the fixing flanges, fork links or link-rod heads on the same level.

Gear units with rotating spindle:

Align the flange nuts on the same level.

Mark the position of the clutch component (item 5) and rotate the linkage shaft by hand.

Adjust the pillow-block bearings in such a way that the linkage shaft is not tensioned.

Remove the linkage shaft. Secure clutch component (item 5) by drilling and pinning with the attached adapter sleeve. Carefully remove the chips.

Mount the linkage shaft again. Slightly tighten the screws on the gear units and the pillow-block bearings. Rotate the linkage shaft by hand. When it turns easily tighten the screws firmly.

See chapter 7.2 for tightening-torque values for fixing the gear unit.

Tighten the threaded pins in the clutch components (1) and (7) firmly.

8. Operation

Forces, cycle times, torque or any other relevant working conditions on which the lay-out 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.

When used in areas with explosion hazard, the operator must take care that the surface temperature of 80℃ 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).

Caution!
The surface of the gear unit, the spindle and the nut can reach temperatures of more than 65 ℃ 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

9. Maintenance

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

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).

9.1. Cleaning the spindle from grease:

Once a year or at the end of the emptying time of the lubricator the spindle must be cleaned from old grease and subsequently the total usable length has to be greased again. Depending upon the working conditions (dust, moisture, etc.) complete cleaning is required at shorter intervals in order to ensure sufficient lubrication of the spindle and the nut. Insufficient lubrication leads to increased wear.

9.2. Cleaning the basic gear unit:

Dust on the gearbox in excess of 5 mm 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 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 cleaning agents.

After cleaning the basic gear unit it is necessary to grease the spindle and the nut again.

9.3. Changing the gearbox lubricant:

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

ATLANTA screw-jack gearboxes are either filled with grease or synthetic oil (acc. to the table below):

Gear unit	Lubricant	Lubricant designation	Quantity of oil in liters	Amount of grease in cm^3
60 x3 xxx	oil	Castrol Tribol 800/680	0.05	
60 x4 xxx	oil	Castrol Tribol 800/680	0.11	
60 x5 xxx	oil	Castrol Tribol 800/680	0.165	
60 x6 xxx	oil	Castrol Tribol 800/680	0.42	
60 x7 xxx	oil	Castrol Tribol 800/680	1.0	
61 x2 xxx	grease	BP Energrease L21 M		20
61 x3 xxx	grease	BP Energrease L21 M		30
61 x4 xxx	grease	BP Energrease L21 M		60
61 x5 xxx	oil	Castrol Tribol 800/680	0.32	
61 x6 xxx	oil	Castrol Tribol 800/680	0.54	
61 x7 xxx	oil	Castrol Tribol 800/680	1.1	

Recommended synthetic oils:
Aral: Degol GS 220
BP: Energol SG-XP 220
Klüber: Klüber Synth GH6-220
DEA: Polydea PGLP 220
Shell: Tivela S 220
ATLANTA order code for 1 liter of Klüber Synth GH6-220: 65 90 010

Recommended grease:
Castrol: Moly Grease
Texaco: Molitex EP2
Esso: Multi-Purpose Grease Moly
Klüber: Grafloscon C-SG 460
Shell: Retinax AM
Mobil: Mobilgrease Special
DEA: Glissando ME P2
ATLANTA order code for 1 kg of DEA Glissando ME P2: 65 90 005

Synthetic oils must not be mixed with mineral oils.
Mineral oils reduce the transmissible power and must not be used without consulting ATLANTA.
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 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 nominal values and limit values.
- The operator checks the gear unit regularly (every 2 weeks) for oil leakage.
- The surface temperature reaches max. 80℃.

In the case of oil-lubricated gear units and operation under differing operating conditions and 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	Input speed for v=0.5 m/s
61 12 xxx	680 min^{-1}
60 13 xxx / 61 13 xxx	490 min^{-1}
60 14 xxx / 61 14 xxx	390 min^{-1}
60 15 xxx 61 15 xxx	365 min^{-1} 320 min^{-1}
60 16 xxx 61 16 xxx	300 min^{-1} 285 min^{-1}
60 17 xxx	250 min^{-1}

Gear units with grease filling should be cleaned of old grease and refilled with new grease after approx. 600 hours of operation or 18 months.

9.4. Measuring the wear of the trapezoidal-thread nut:

In trapezoidal-thread drives there is a sliding motion. Depending on the load and the lubrication, the trapezoidal-thread nut is subject to wear. When the wear exceeds a certain tolerance the supporting nut must be replaced in order prevent the system from breaking down.

Increased noise, unwieldy transmission and consequently increased current drain are an indication for wear. We recommend to measure the current drain and to compare this value with the reference value measured after the start-up. (See paragraphs 7.4/7.5)

Before removing the fork link, the link-rod head, the spindle mounting flange or the spindle nut the system must be supported by suitable measures so that it can hold the load.

Gear units with non-rotating spindle:
In such units the wear can only be measured indirectly.

- The wear corresponds approximately with the axial play of the trapezoidal-thread nut.
- In order to determine the axial play, the attachment to which the spindle end is fixed (by means of fork link, link-rod head or the mounting flange), has to be supported.
- Then dismount the fork link, the link-rod head or the mounting flange from the attachment and rotate the spindle downwards by 2-3 revolutions.

- Position the spindle in the direction of the attachment so that the flanks are in contact and then measure the distance between the bore of the fork link/link-rod head or the contact surface of the mounting flange and the attachment.
- Position the spindle in the opposite direction of the attachment so that the flanks are in contact and then measure the distance between the bore of the fork link/link-rod head or the contact surface between mounting flange and attachment.
- The difference between the distances measured equals directly the wear. The maximum permissible wear (W max) is mentioned in the table below.
- When the wear exceeds this value, the supporting nut has to be replaced.

Gear unit with rotating spindle without safety grip nut:

In such units the wear also can only be measured indirectly.

- The wear corresponds approximately with the axial play of the trapezoidal-thread nut.
- In order to determine the axial play the attachment to which the spindle end is fixed has to be supported.
- Then screw off the nut from the attachment and rotate 2-3 revolutions downwards.
- Position the spindle in the direction of the attachment so that the flanks are in contact and then measure the distance between nut and attachment.
- Position the spindle in the opposite direction of the attachment so that the flanks are in contact and measure the distance between nut and attachment.
- The difference between the distances measured equals directly the wear. The maximum permissible wear (W max) is mentioned in the table below.
- When the wear exceeds this value, the supporting nut has to be replaced.

Gear unit with rotating spindle and safety grip nut:

In this type of gear unit the wear can be measured directly.

- Measure the distance between supporting nut and safety grip nut.
- This distance is the dimension „Y“ of the following calculation formula.
- The original distance „X“ between supporting nut and safety grip nut at the time of delivery is noted on the nameplate on the outside of the gearbox.
- The maximum permissible wear between supporting nut and safety trip nut is calculated as the difference between the two distances by means of the following formula:
  W max = X – Y
- It is shown in the table below.
- When the wear exceeds this value, the supporting nut has to be replaced.

Spindle size	Max. permissible wear **W max** [mm]
Tr 14x4, Tr 18x4, Tr 20x4	1.2
Tr 30x6	1.8
Tr 40x7	2.0
Tr 60x9	2.5

Example: Spindle Tr18x4

Value on nameplate: X = 2,45 mm (this is the measurement adjusted when delivered)
Measured distance: Y = 1,25 mm

Existing wear: W max = X – Y = 2.45 – 1.25 = 1.2 mm = W max

Result: The supporting nut has to be replaced.

9.5. Replacing the trapezoidal-thread nut:

When the amount of wear exceeds the value „dx“ mentioned under paragraph 9.4, the trapezoidal-thread nut has to be replaced. Otherwise there is a risk that the threads break and the machine/system collapses.

Before replacing the trapezoidal-thread nut it must be assured that the load cannot start moving. We recommend to dismount the gear unit for replacing the nut.

Gear unit with non-rotating spindle:
The trapezoidal-thread nut is integrated in the worm-wheel and is situated in the gearbox. For this reason the gear unit and, if necessary, also the spindle has to be sent to ATLANTA for replacement.

Gear unit with rotating spindle:
Here it is possible to replace the nut.

For this purpose support the load and remove any attachments. Remove the spindle nut. Mount the new spindle nut.
Proceed as described in paragraphs 5 and 7.

When replacing the trapezoidal-thread nut the spindle should be inspected for traces of wear (scores, steps, reduction of the threads) and, if necessary, be replaced. Before putting the new spindle into operation it must be lubricated on the usable area.

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 (if any) 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 spindle is a safety relevant component. It transmits the axial forces.

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.

Gear unit with non-rotating spindle:

- Remove the spindle mounting flange, the fork link or the link-rod head.
- Remove the protective tube. For this purpose loosen the 4 screws at the protective tube flange.
- Screw out the spindle in the direction of the protective tube.
- If there is a turning-out protection, remove it and fit it again on the new spindle and secure it with a new lock pin.
- Screw in the new spindle into the gearbox from the protective tube side. Rotate by hand over the full length of the stroke and check for easy running.
- Lubricate the spindle on the usable area.
- Fix again the spindle mounting flange / fork link / link-rod head as described in the relevant paragraph of paragraph 5.
- Remount the protective tube. Tightening torque of the screws as listed in the table below.
- Reinstall the gear unit in the system as described in paragraph 7.
- Check the switching positions of the limit switches.

Screw size	Strength class of screws	Tightening *) torque
M 4	8.8	2.7 Nm
M 5	8.8	5.5 Nm
M 6	8.8	9.5 Nm
M 8	8.8	23 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).

Gear unit with rotating spindle and lock-nut fastening (Part number: 60 2x xxx) :

Removal of the spindle:

- Remove the flanged nut and the existent attachments. Remove the screwed cap and then the tube.
- Clamp the gearbox on the work bench.
- In the case of small gear units screw out the threaded pin from the clamping nut.
- Screw out the clamping screw of the lock nut and screw the lock nut from the spindle by means of the radial bores. The lock nut must be loosened slowly and carefully in order to avoid damage to the teeth of the worm-wheel.
- Should there be an indentation on the spindle caused by the threaded pin, smoothen it with file or emery paper so that the nut is not damaged when screwing out the spindle.
- Pull out the spindle from the top.
- Loosen the second lock nut in the same way as the first one and screw off from spindle.

Mounting the new spindle

- Screw one of the two lock nuts onto the spindle (up to the mounting space in the gear-box).
- Grease the spindle on the mounting portion with a paste against fretting corrosion (e.g. Klüberpaste 46 MR 401 from Klüber).
- Screw the spindle into the gearbox from above until the spindle end projects at the bottom so far that the lower lock nut can be screwed on.
- Screw the lower lock nut so far onto the spindle that the spindle end is flush with the lock nut.
- Use new clamping screws and tighten these as shown on the table below. In the case of small lock nuts also tighten the threaded pin which is only used in such nuts.
- File the clamping screw slightly off so that the plug tube can be mounted.
- Screw the spindle with the lock nut against the gearbox and lock it with the aid of the radial bores in the lock nut.
- Screw the upper lock nut also against the gearbox and secure it in the same way.
- Tighten the clamping screw in the upper lock nut according to the tale below. In the case of small clock nuts also tighten the threaded pin.
- Lubricate the spindle on the usable area.
- Perform a true-running check at the spindle acc. to paragraph 4.1.
- For putting the gear unit again into operation proceed as described in paragraph 7.

Gear unit	Screw size	DIN	Strength class of screws	Tightening *) torque
60 33 xxx	M 5x12	7984	8.8	3.5 Nm
60 34 xxx	M 5x12	7984	8.8	3.5 Nm
60 35 xxx	M 6x15	7984	8.8	8.9 Nm
60 36 xxx	M 6x20	912	8.8	8.9 Nm
60 37 xxx	M10x25	912	8.8	40 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).

Gear unit with rotating spindle and key assembly
(Part numbers: 60 3x xxx und 61 2x xxx) :

Removing the spindle:

- Remove the nut and any attachments. Remove the screwed cap and then the plug tube.
- Clamp the gearbox on the work bench. Secure the input shaft against twisting.
- Loosen the lock nut and screw it off. Loosen it slowly and smoothly in order to avoid damage to the worm-wheel teeth.
- Pull out the spindle from the top. Remove the key.

Mounting the new spindle:

- Insert a new key in the new spindle.
- Coat the new spindle on the cylindrical part with a paste against fretting corrosion (e.g. Klüberpaste 46 MR 401, Fa. Klüber).
- Insert the spindle into the gearbox from above.
- Install the bushing (provided for depending on the size of the gear unit) into the gearbox from below.
- Screw the self-locking nut onto the spindle.
- Tighten with the torque indicated in the table. Tightening has to be done slowly and smoothly. For this purpose block the gearbox at the input and tighten cautiously against the gear teeth.
- Pay attention that the permissible forces on the spindle (see table) will not be exceeded during the following operation.
- Lubricate the spindle on the usable area.
- Check for true running at the spindle acc. to paragraph 4.1.
- For putting the gear unit into operation again proceed as described in paragraph 7.

Gear unit	Spindle	Compressive load		Tensile load	
		Tightening torque [Nm]	Max. strength [kN]	Tightening torque [Nm]	Max.strength [kN]
60 33 xxx	Tr 18x4	3	5	13	5
60 34 xxx	Tr 20x4	2	8	6	10
	Tr 30x6	6	10	6	10
60 35 xxx	Tr 30x6	2	18	20	25
	Tr 40x7	20	25	20	25
60 36 xxx	Tr 40x7	2	28	40	50
	Tr 60x9	40	50	40	50
60 37 xxx	Tr 60x9	2	56	165	70
	Tr 70x10	165	70	165	70
61 22 xxx	Tr 14x4	5	2	4	2
61 23 xxx	Tr 18x4	3	5	13	5
61 24 xxx	Tr 20x4	2	8	6	10
	Tr 30x6	6	10	6	10
61 25 xxx	Tr 30x6	10	23	20	23
61 26 xxx	Tr 40x7	40	35	40	35
61 27 xxx	Tr 60x9	110	70	110	70

10. Marking

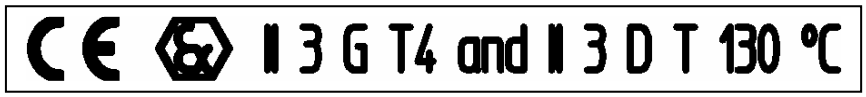
The gear unit is identified by a nameplate containing the basic gear number, the gear ratio, the max. axial force, the max. speed, the assembly date, and the serial number of the gear unit.

A separate oil-type nameplate contains the type of oil.

When used in areas with explosion hazard, the gear unit must be marked accordingly by means of an additional nameplate. Only with this identification it may be used in such an area.

Pay special attention to the category indicated there.

Example for ATEX nameplate:



11. Storing

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

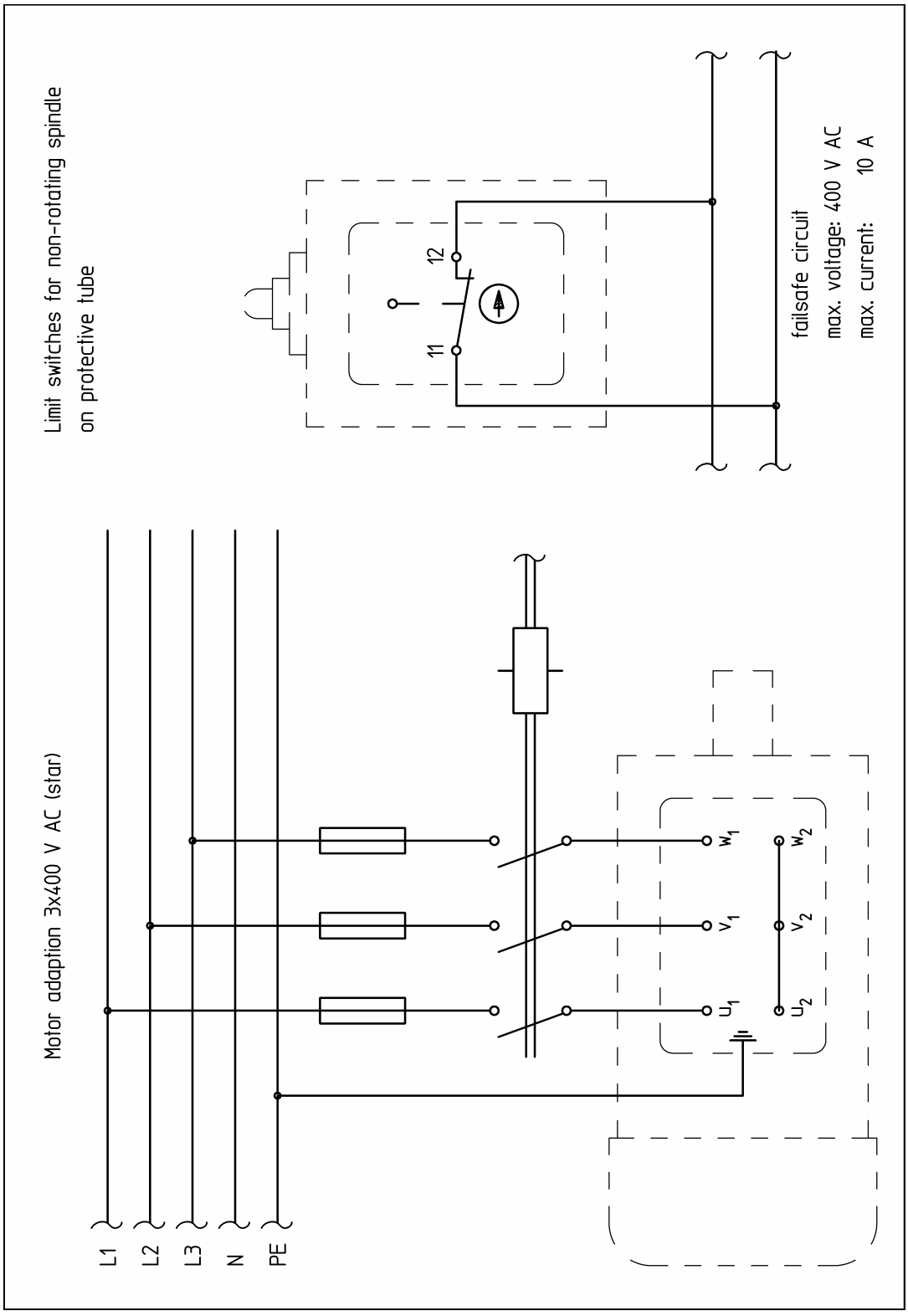
- The ideal way of storing is suspended vertically with the spindle hanging freely.
- Alternatively: Store the gear unit with horizontal spindle and input shaft (worm-shaft) lying horizontally on top. Support the nut in such a way that the spindle comes to lie horizontally. In the case of long spindles 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 of 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.

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

Occasional rotating of the input shaft of the gear unit will facilitate the start-up.

Before installing the gear unit after the 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.

12. **Motor connecting diagram for three-phase motor without brake - with limit switches on the protective tube for gear units with non-rotating spindle:**



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