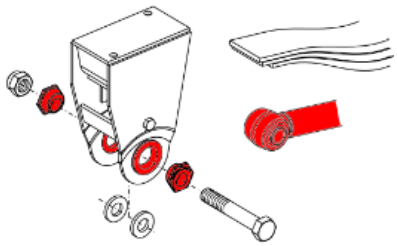
Installation guideline: GK, GKT and LK-type mechanical suspension units

GK and GKT units differ from the LK units in that the springs of the GK units have a spring eye at the front.

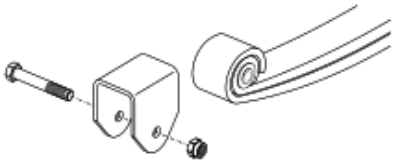
LK units:

Front mounting bracket:
Pin / eccentric bushing / locknut / torque arm



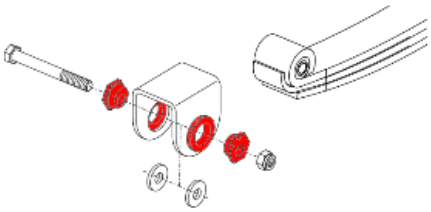
GK units:

Front mounting bracket:
Pin / locknut



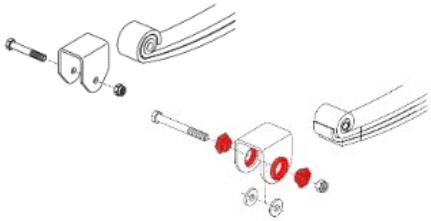
GKT units:
For track adjustment:

Front mounting bracket:
Pin / eccentric bushing / locknut



Special feature with one-sided GKT units

One-sided mounting bracket assemblies from GK



1. General information

Mechanical GIGANT units are designed to be used as single or multi-axle units depending on the type of vehicle. Normally the axle sets are delivered pre-assembled – separately if desired.

- **Installation space**

  All screw fittings and lubrication points must be easily accessible for maintenance. In every case, proper tyre clearance must be guaranteed, taking the static and dynamic deflection into account and, on multi-axle units with axle compensation, the compensation path.

  Attention:

  - If necessary, recesses must be provided for the compensation path in the chassis in accordance with the GIGANT drawing.
  - The main mounting bracket is welded onto the lower belt of the frame, as the lower belt of the frame acts as a stop for the equaliser. If the design is different, an external stop must be installed, contact GIGANT if necessary.

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- **Handling parabolic springs**

  The parabolic spring is a leaf spring mainly loaded in the bending direction with optimal material utilisation. It can be designed to be single-layer or multi-layer. Using highly tempered materials and strain hardening of the tension stressed surface makes the parabolic spring a highly sensitive spring element which must be handled with care. In particular, the surface must be protected from all types of damage, as even damage which appears to be slight can cause a fatigue fracture.

  Important:

  - Springs and their corrosion protection coatings must not be damaged by hammer blows, sharp objects and weld splatter.
  - When welding near parabolic springs, these must be protected against welding beads and also from contact with electrodes or welding pliers.
  - In the event of a parabolic spring being damaged, it must be replaced completely (i.e. not individual layers).

- **Design of the brake device**

  All the multi-axle units described here have a static axle load compensation. In addition, LK units have a dynamic axle load compensation that permits uniform braking performance for all axles of a unit.

  Applies to all units: the determination of the unit travel for the ALB control setting may only be drawn from the respective valid spring diagrams. Dimensions "A" and "B" in the drawings are not precise enough to cover the respective application. The valid spring diagrams are provided by GIGANT GmbH upon request.

- **Unit installation with self-steering axle**

  When installing the unit with a self-steering axle, it is mandatory to observe GN0045 (self-steering axles K2, K3 and GH7 12010) and TM 01/2012 (optimisation of stabilisation on self-steering multi-axle vehicles for low-loaders).

  Download at: https://www.gigant.com/service/download/

2. Design description

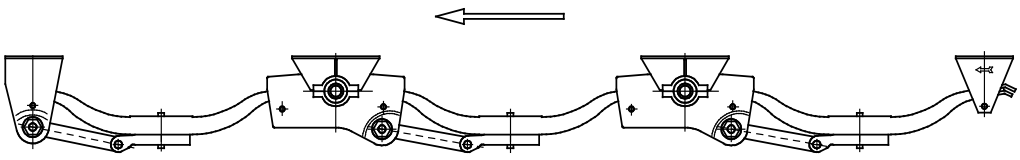
2.1. LK unit series

The LK units are available with both leaf springs and parabolic springs.

Dynamic brake balance: The kinematics of the LK unit is adjusted by the linkage of the trailing arm in the compensation equaliser. The reaction force acting on the trailing arms causes a self-aligning torque which counteracts the braking torque.

By using offset compensation equalisers, the unit is suitable for use in steering axles.

The track is finely adjusted using standard eccentric bushings (see chapter 8).



Pendulum paths	Axle 1	Axle 2	Axle 3
LK1400	±40 mm	±80 mm	±40 mm
LK1310	±45 mm	±90 mm	±45 mm

(Pendulum paths should be considered in addition to the spring paths)

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The max. unit inclination is ±1°. This ensures the greatest possible axle compensation up to a 3-axle unit. If the max. value is exceeded or if there are more than 3 axles, this may lead to axle loads being exceeded, resulting in damage to the components on uneven surfaces.

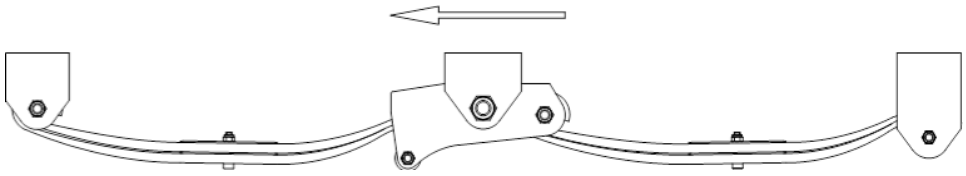
The vehicle design must be adjusted in combination with the tractor according to the max. unit inclination. Any greater inclinations required by the design must be compensated with intermediate layers up to max. 40 mm on the 1st axle and 20 mm on the 2nd axle, following prior consultation with GIGANT.

2.2. GK/GKT unit series

GK/GKT units are available with both leaf springs and parabolic springs.

In the standard version of the GK unit, the vehicle is rigidly bolted with the unit components. The special version of the GKT unit is equipped with a welded conical bushing and pin on one side or both sides with an eccentric bushing for track adjustment. The track is finely adjusted using standard eccentric bushings (see chapter 8).

Static axle load compensation: With the spring ends being mounted on the rotating equaliser, a static axle load compensation is achieved for normal driving operation.



Pendulum path:	Axle 1	Axle 2
	±25 mm	±25 mm

(Pendulum paths should be considered in addition to the spring paths)

The max. unit inclination is ±0.5°. This ensures the greatest possible axle compensation for the tandem unit. If the max. value is exceeded or if there are more than 2 axles, this may lead to axle loads being exceeded, resulting in damage to the components on uneven surfaces.

The vehicle design must be adjusted in combination with the tractor according to the max. unit inclination. Any greater inclinations required by the design must be compensated with intermediate layers up to 20 mm on the 1st axle, following prior consultation with GIGANT.

2.3. Clearance calculation with axles above the springs for LK and GK/GKT units

To prevent a collision of the mounting with the chassis, there must be enough clearance during compression. The GIGANT set drawings indicate a necessary recess.

When using axles from third-party manufacturers, the clearance must be determined. This clearance is ensured when the minimum required installation space (B_{min}) is larger than the structure above the spring (HA) and the oscillation (d) of the unit.

B_{Min} is calculated from the distance between the spring and the lower belt minus the spring travel and the impact or safety factor, which, for example, takes account of the additional spring travel caused by an impact such as driving though a pothole.

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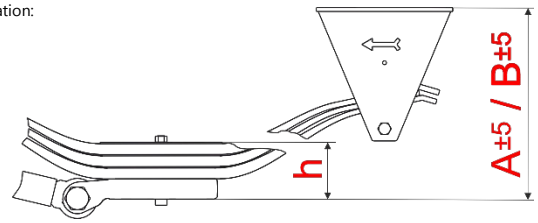
This results in the clearance, when B_{min} > oscillation (d) + HA. The following demonstrates how B_{min} and RA are determined and how the required information can be found in the unit drawing.

B_{min} from the specifications in the GIGANT unit drawing (in mm):

Example illustration:



A = Installation height of the unit when the spring is unloaded
B = Installation height of the unit with the corresponding axle load (loaded spring)
h* = Thickness of the spring assembly (value = 0 mm, when the top side of the spring is used as the reference line for A/B)

Example illustration: Excerpt from the unit drawing

Aggregattyp Type	Best.Nr. Order no.	Gewicht weight ±2%	Feder/Spring Best.Nr./order no.	h	A±5	B±5 8t	9t	10t	12t	14t	16t
				116	393	371	368	366	362		

← Achslast axle load

Calculation of **B_{min}:** $$B_{min} = A - h^* - (A - B) \times 1.7$$

Oscillation = (d) as information from the GIGANT unit drawing (in mm):

Note: For 3-axle units, the oscillation for the 1st and 3rd axle is smaller than for the middle 2nd axle.

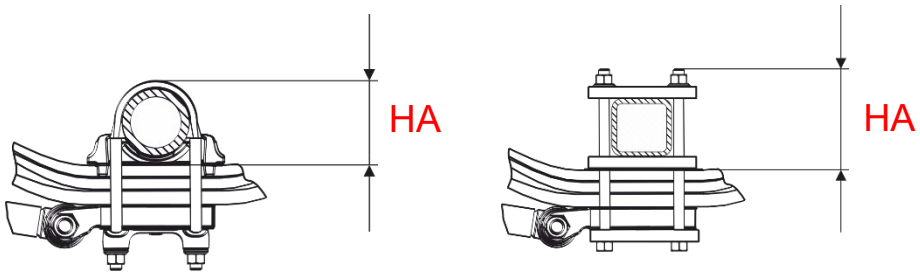
Example illustration: Excerpt from the unit drawing

(d) Pendelweg der 1. und 3. Achse ca. ±40mm.
Pendelweg der 2. Achse ca. ±80mm.
axial movement of 1st and 3rd axle appr. ±40mm
axial movement of 2nd axle appr. ±80mm.

HA (height of axle body unit) with regards to the specifications in the axle drawing or utilised components (in mm):

Definition of **HA**:

Example illustrations:



Clearance is ensured when: B_{min} > oscillation + HA

Attention: If the value B_{min} is smaller than the sum of the oscillation + HA, there will be a collision with the chassis. In this case, welded-on components with a higher design must be purchased from GIGANT or the chassis must be released.

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3. Installation of the front mounting bracket, main mounting bracket and slide shoes

The front mounting bracket, main mounting brackets and slide shoes **must** be properly aligned towards the centre of the vehicle. A fine adjustment of the track can only be done retroactively on the LK/GKT units using the standard eccentric bushings.

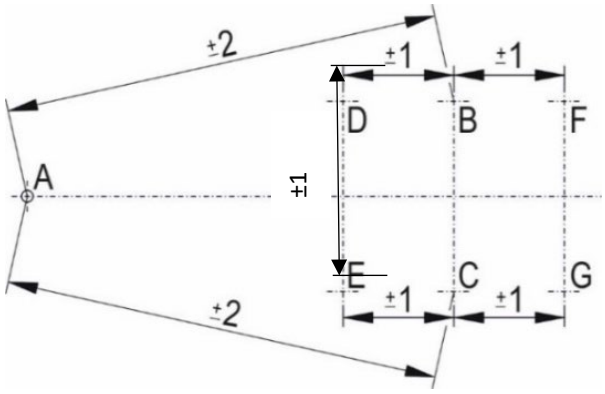
The lateral tolerance for alignment of the front mounting bracket, main mounting bracket and slide shoe is ± 1 mm parallel to the centre line of the vehicle on the lower belt of the longitudinal beam.

The distance for the individual components is measured from the centre of the kingpin or centre of the eye of the A-frame drawbar to the centre of the main mounting bracket (LK17 at the centre between the mounting brackets), as well as from there to the centre of the torque arm screw of the front mount towards the front. If applicable, the measurement is made up to the centre of the bolt for the rubber roller of the slide shoe towards the rear, and for 3-axle units, to the centre of the main mounting bracket and then further to the slide shoe.

Example for 2-axle unit:

The diagonal distances A-B and A-C must be determined by comparative measurements (tolerance ± 2 mm).

Distances B-D and C-E for the front axle as well as B-F and C-G for the rear axle must be checked and corrected if necessary (tolerance ± 1 mm).



The front mounting brackets, main mounting bracket and slide shoe must be braced laterally to be able to withstand the lateral forces. The lateral braces should be supported on a cross-member on the chassis so that the forces can be evenly distributed to the vehicle chassis.

Suggestions for providing lateral support as well as welding information can be found in the respective unit descriptions.

3.1. unit brackets - welding information

Weld seams on the chassis (suggested: min. a6 according to DIN 1912) are to be made in accordance with quality level C of DIN EN ISO 5817 (except for numbers 2017, 5012, since they are assessed in accordance with quality level B).

Important!

- Bearing damage can be prevented , by ensuring that the clamping contact (earthing) of the welding equipment is not attached to the components of the axle.
- Welding and attaching a clip contact (earthing) to a spring is not permitted.
- The springs must be protected against welding beads, electrodes and welding tongs during welding work.

As a guide for the welding sequence, tack welds or the beginning of the weld are not permitted in the front and rear areas (approx. 50 mm distance from the edges) of the mounting bracket components. The components must be welded all the way around, weld penetration undercuts and corners are to be avoided.

The front mounting brackets, main mounting brackets and slide shoes are made of S235JR in accordance with DIN EN 10025-2.

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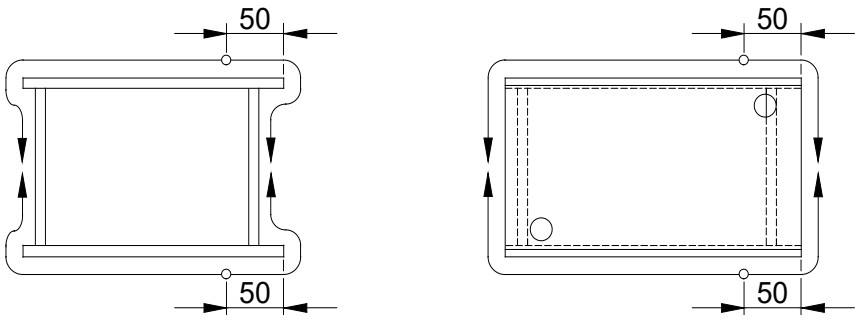


3.2. Lateral support

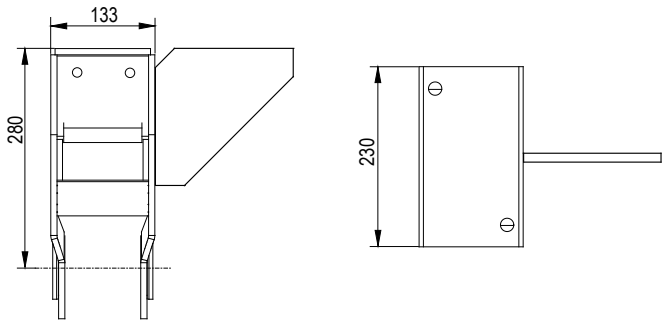
Note

On **torsionally soft** vehicle chassis, care should be taken to ensure that the torsional softness is maintained but that the unit brackets are prevented from bending (e.g. on flatbed vehicles).

On **torsionally rigid** vehicle chassis, the bracing of the unit brackets can be rigid (e.g., tanker, silo or box-body vehicles). GIGANT recommends open profiles, such as U-profiles. Closed profiles as cross beams are to be avoided (risk of cracking at the weld joints).

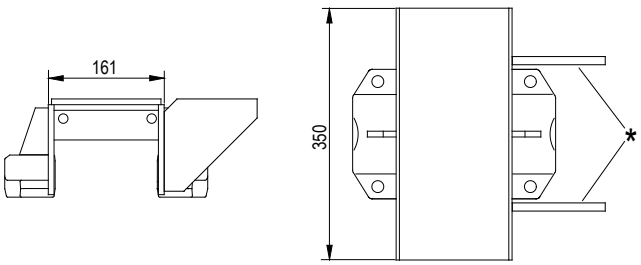
3.2.1 Lateral supports for LK units (suggestion)

Front unit:



Main unit:

With fitted balances, the rubber bushings must be protected from strong heat and weld splatter.



* 1 or 2 gusset plates

** The dimension of 161 mm changes for main mount with offset equaliser

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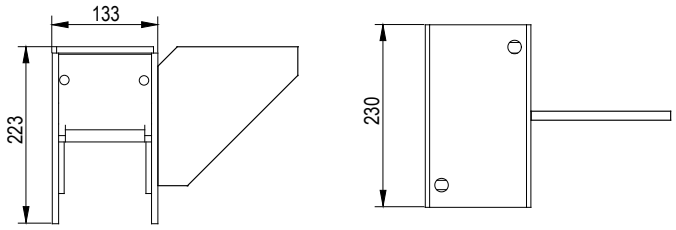
Slide shoe:

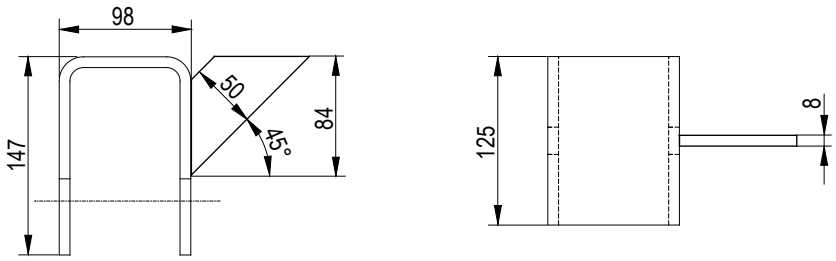


Weld seams (suggested: min. a5 according to DIN 1912) are to be made in accordance with quality level C of DIN EN ISO 5817 (except for numbers 2017, 5012, as they are assessed in accordance with quality level B), undercuts and corners must be avoided.

The sketches shown in these instructions, e.g. for lateral supports, can only be viewed as suggestions as the dimensions vary according to the type of vehicle and its conditions of use. This data is only known to the vehicle manufacturer, and are taken into account during the design.

3.2.2 Lateral supports for GK/GKT units (suggestion)

Front unit:

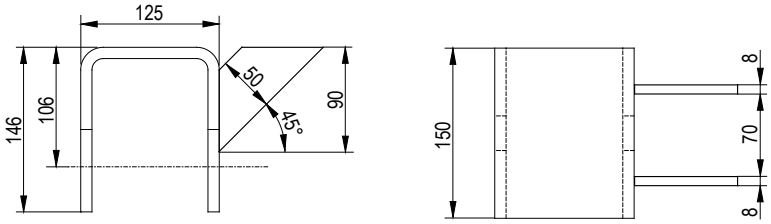


Note:

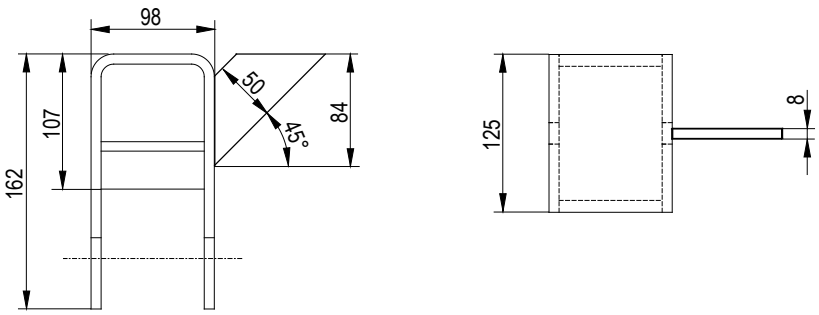
For the GKT front mounting bracket version, place the reinforcement plate above the welded conical bushing and adjust accordingly.

Main unit:

With balances fitted, the rubber bushings must be protected from strong heat and weld splatter.



Slide shoe:



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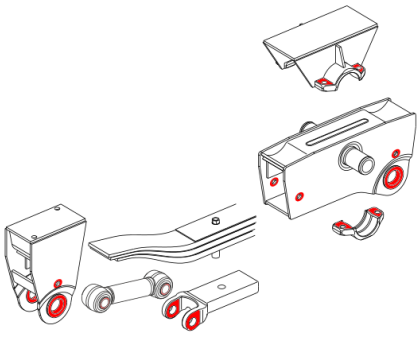
Weld seams (suggested: min. a5 according to DIN 1912) are to be made in accordance with quality level C of DIN EN ISO 5817 (except for numbers 2017, 5012, as they are assessed in accordance with quality level B), undercuts and corners must be avoided.

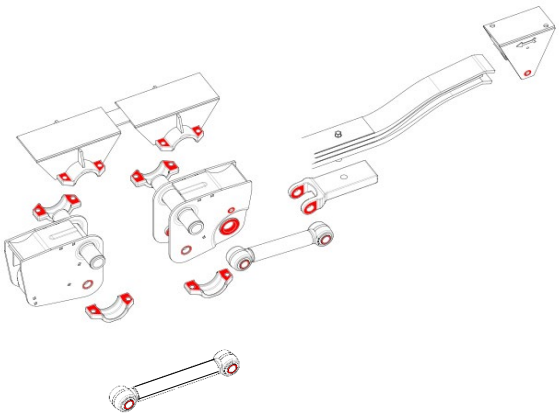
The sketches shown in these instructions, e.g. for lateral supports, can only be viewed as suggestions as the dimensions vary according to the type of vehicle and its conditions of use. These data are only known to the vehicle manufacturer, and are taken into account during the design.

4. Coating information

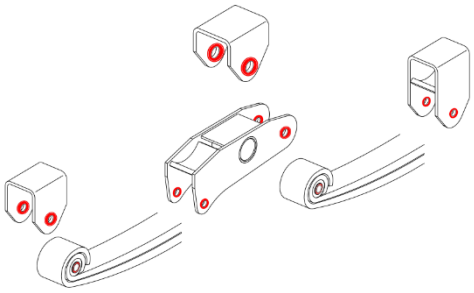
LK



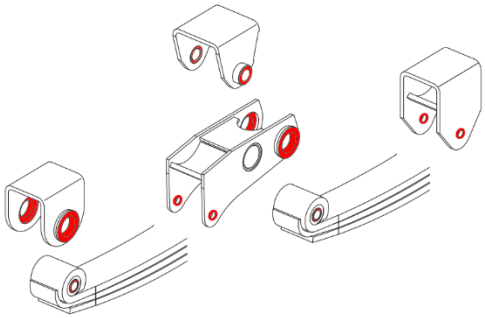
LK17



GK



GKT



Paint finishes and paint coatings on components may be a maximum of 30 µm on surfaces on which other components are supported or where forces are transferred. This applies in particular for the seating surfaces of the eccentric bushings / spacers on the conical bushings as well as the seating surfaces of the threaded connections.

The vehicle manufacturer is responsible for galvanising the mounting bracket components; this cannot be influenced by GIGANT. The following parameters are prescribed for proper function of the components:

- The seating surfaces must be free of welding residues, scale, zinc runs or other unevenness
- Make sure that there is sufficient adhesion between the zinc coating and the seating surfaces (peeling of the zinc layer from the surface is not permitted!)
- Layer thickness 85 µm ± 5 µm

All contact surfaces and butt joints must be free of pimples, runs or other irregularities. The zinc coatings must be resilient enough so that the zinc coating on the seating surfaces does not peel off or become damaged.

Note:
The welded parts of the LK unit have drain holes. When coating after welding the components onto the frame - e.g. with CDP or galvanising - these drain holes are used on the front mounting bracket, main mounting bracket and slide shoes to drain various fluids from the immersion baths.

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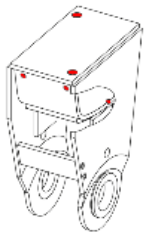
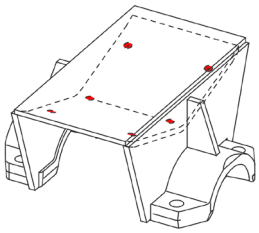
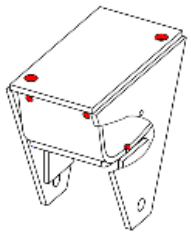
These drain holes prevent water from accumulating in the mounted part in the field.

Front mounting bracket:	Main unit:	Slide shoe:
		

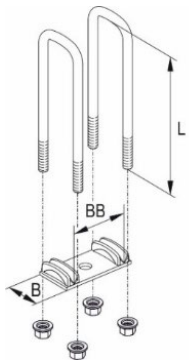
5. Installation of the spring with axle body

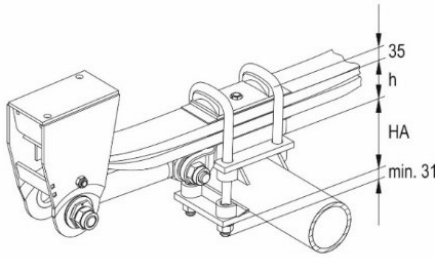
Upon delivery with pre-assembled springs: GK/GKT units continue with Point 6
LK units continue with Point 5.4

5.1. Spring mounting

The designs of GIGANT spring mountings depend on the unit, the axle body and the axle plate arrangement.

The use of a GIGANT spring mounting with U-bolts and U-bolt intermediate plates is recommended. These parts are available from the GIGANT product range. When ordering, indicate the axle type or hole pattern (HP) together with the dimension across the spring pads (HA).





B = 98 mm for 100 mm spring width
78 mm for 80 mm wide springs
HP = hole pattern (depending on the type of axle)
L = U-bolt length

Example calculation to determine the U-bolt length "L"

35	mm	U-bolt intermediate plate
h	mm	assembly thickness of the spring including the steering plate (41 mm)
HA	mm	height of the axle including the axle plate
min. 31	mm	thread length to fasten the locknut
L	mm	round up the total!

Values in 20 mm intervals, e.g. 300, 320, 340 etc.

Attention!

When using third-party axles, care must be taken to ensure that the axle plates are connected sufficiently to the axle casing.

All axle plates must have a flatness tolerance of ± 1 mm. In addition, the size of the mounting components must be selected so that when pre-tension force is applied, no deformation occurs which may affect safety. In addition, the operating forces must be able to be safely transferred from the spring to the axle.

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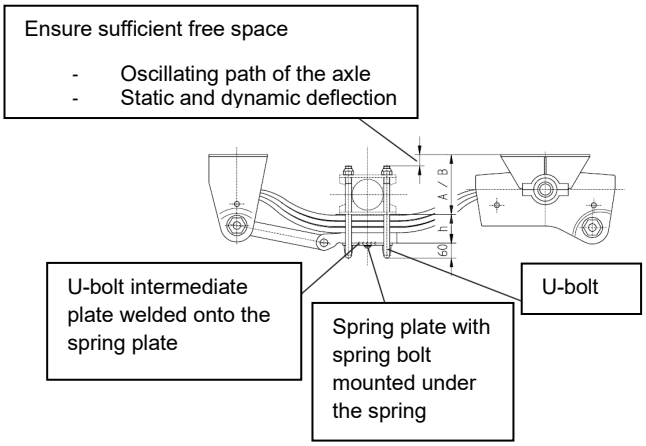
Note:

When installing, the information provided on the respective installation drawings / instructions of the manufacturer must be observed!

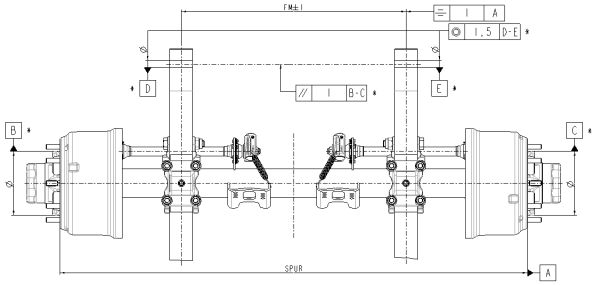
5.2. LK units: Installing the spring plate for units with hanging springs (U-type)



5.3. Installation of the spring on the axle body

Recommendation!

With a separate delivery of the mechanical unit, the axle set should be installed on an assembly jig, to ensure that the required dimensional tolerances are complied with.



* Applies only for GK units

Shape and positional tolerances for the axle set

Note only for LK units:

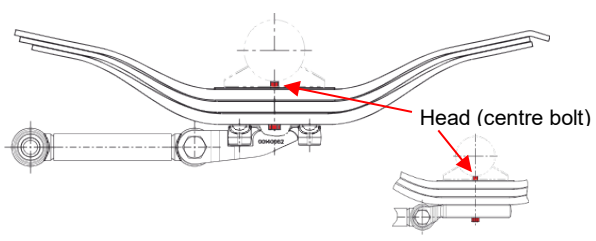
When installing the spring mounting with spring plate and torque arm, a Ø 30mm rod must be pushed through the eyes of the torque arm, which is aligned parallel to the axle body. It must also be noted that the centre to centre distance of the spring eyes corresponds of the centre of the spring.

Installation of the centre bolt and the spring plate for the spring under the axle body:

U-version

With the U-version, the head of the centre bolt must be installed towards the axle plate.

The welded spring plate has a recess for the nut. With the forged spring plate, it is bolted onto the spring.



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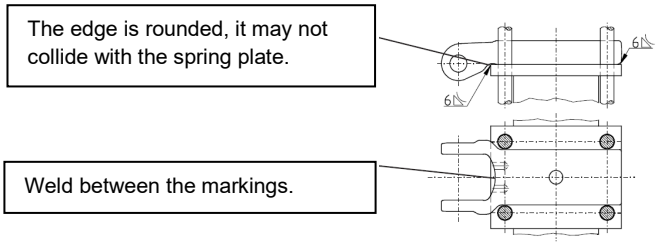
5.4. LK unit: Welding the spring plate

LK units have a torque arm to transfer the longitudinal forces, which is connected to the spring plate on the axle side.

If the spring mounting is expected to loosen (rough off-road or agricultural operations), the spring plate should be welded to the spring pads. (see fig.)

Important!

- Bearing damage can be prevented by ensuring that the clamping contact (earthing) of the welding equipment is not attached to the components of the axle.
- Welding and attaching a clip contact (earthing) to a spring or U-bolt is not permitted.
- The springs must be protected against welding beads, electrodes and welding tongs during welding work.

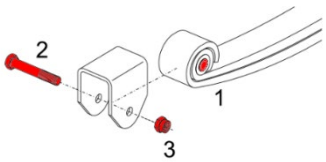


Weld seams (suggested: least a6 in accordance with DIN 1912) are to be made in accordance with quality level C of DIN EN ISO 5817 (except for number 2017, 5012, since they are assessed in accordance with quality level B).

6. Spring installation on GK/GKT units

GK units:

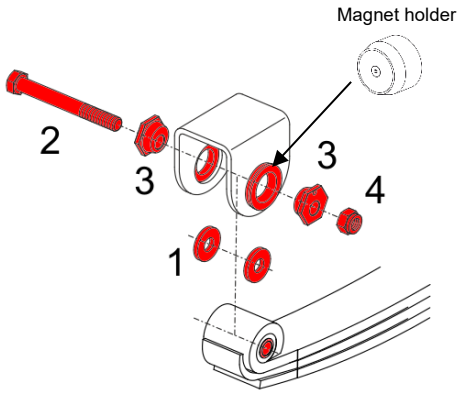
Important: The threaded connection and the seating surfaces must be free of grease!



Position the spring with the spring eye (1) in the mounting bracket and insert the pin (2), securing it with the locknut (3). Tighten the threaded connection to the tightening torque specified in the table at the end.

GKT units:

Important: The threaded connection and the seating surfaces must be free of grease!



Before inserting the spring eye into the mounting bracket, the spacers (1) must be placed in the holes on the inner side of the mounting bracket. The spacer is held with the magnetic holder (700090015).

Position the spring with the spring eye in the mounting bracket. Remove the magnetic holder and push the screw (2) with an eccentric bushing (3) from the outside through the mounting bracket and the silent block. If applicable, position the spacer properly in front of the through hole from the other side, so that the thread of the screw can be inserted without damage. Place the second eccentric bushing (3) on the opposite side and fix with the locknut (4).

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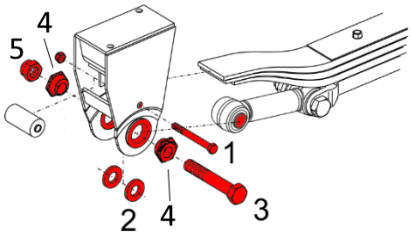
7. Spring installation on LK units

Important: The threaded connection and the seating surfaces must be free of grease!



Install the rubber roller with the bolt (1) M12 and tighten to the required torque (see table at the end). Place the spring on the rubber roller.

Before inserting the torque arm into the mounting bracket, the spacers (2) must be placed in the holes on the inner side of the mounting bracket. The spacer is held with the magnetic holder (700090015).

Position the torque arm and remove the magnetic holder and push the screw (3) with an eccentric bushing (4) from the outside through the mounting bracket and the silent block. If applicable, position the spacer properly in front of the through hole from the other side, so that the thread of the screw can be inserted without damage. Place the second eccentric bushing (4) on the opposite side and fix with the locknut (5).

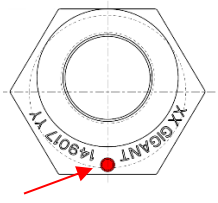
8. Track adjustment via the eccentric bushing (LK unit / GKT unit)

With LK and GKT units, tolerances in the unit alignment may be adjusted by a fine adjustment of the track. This minimises tyre wear and rolling resistance of the vehicle (fuel savings).

Important:

- The threaded connection and the seating surfaces must be free of grease!
- Before adjusting the wheel track, it must be ensured that all brakes are released and the compensation balances are in a horizontal position.

8.1. Eccentric bushing pre-adjustment

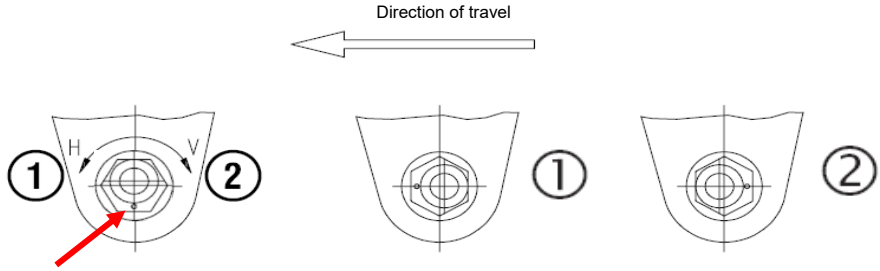


Marking (point)

With the vehicle standing upright, the round marking (dot) on the eccentric bushing must be facing 06:00 relative to the chassis frame before adjusting the track, and the spring fitting must be pre-tightened to a torque of 200 Nm.

8.2. Track adjustment

When adjusting the track (turning the eccentric bushings), it is important to make sure that both eccentric bushings on one bracket are at the same angle so that the marking dots lie exactly opposite each other. This is achieved using the GIGANT centring tool 700311045, alternatively with a WAF 60 open-end spanner.



Observe marking (point)

Maximum axle shift of 5 mm* to the rear

Maximum axle shift of 5 mm* to the front

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*GKT units with one-sided track adjustment have a maximum axle shift of 2.5 mm to the front and rear.

After adjusting the track, the torque arm screw (LK) and spring eye screw (GKT) must be tightened to the final torque as specified in the table at the end.

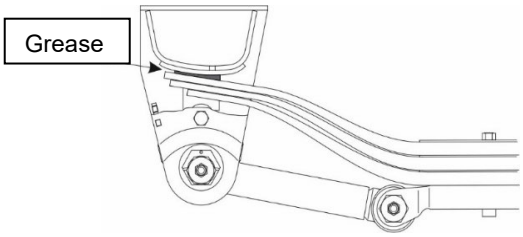
Important: The eccentric bushings must not turn when tightening the screws to the final torque.

Further information about track adjustment can be found in TM 07/2011 (download at: https://www.gigant.com/service/download/)

9. Greasing the spring ends

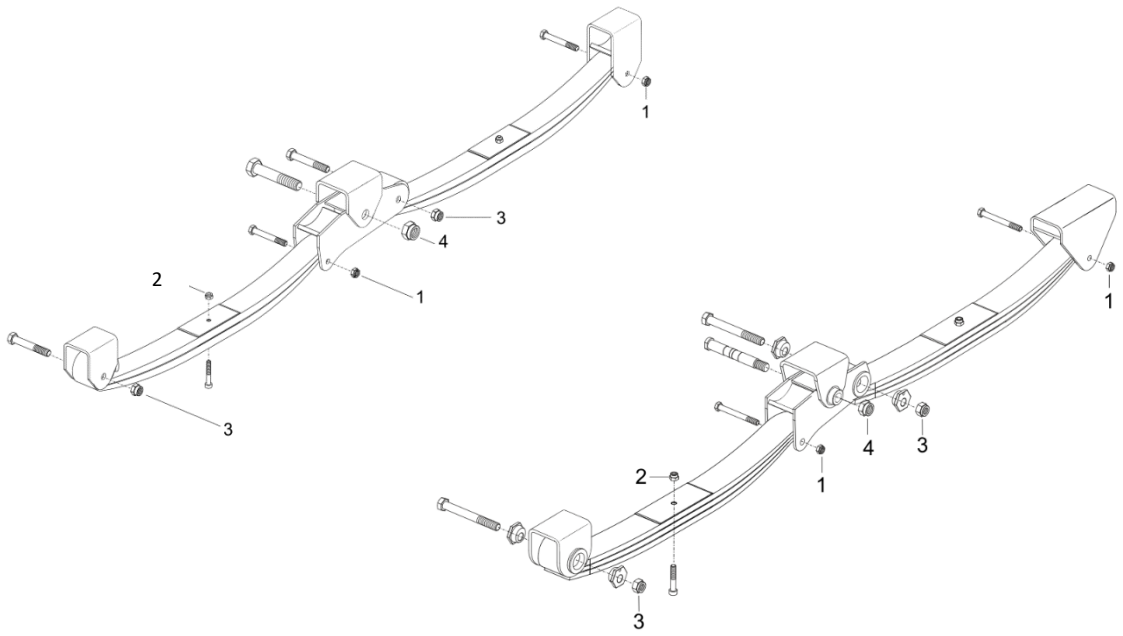
Wear can be significantly reduced if the spring ends are regularly checked and lubricated in accordance with The “ALL IN ONE Maintenance and Repair manual”.

After lifting up the vehicle, the GIGANT grease 704290063 (rhenus Norplex LKR25) must be applied to the bearing points using a suitable tool.



10. Recommended tightening torques

Use in GK / GKT	Thread	Tightening torque
1 Rubber roller bearing	M16	120 Nm ± 10 Nm
2 Centre bolt / screw (spring width **70 /80**)	M12	85 Nm
2 Centre bolt / screw (spring width **100**)	M16	210 Nm
3 Spring eye screw (spring width **70 /80**)	M20	400 Nm ± 20 Nm
3 Spring eye screw (spring width **100**)	M24	675 Nm ± 25 Nm
4 Bolt for balance bearing	M30	775 Nm ± 25 Nm



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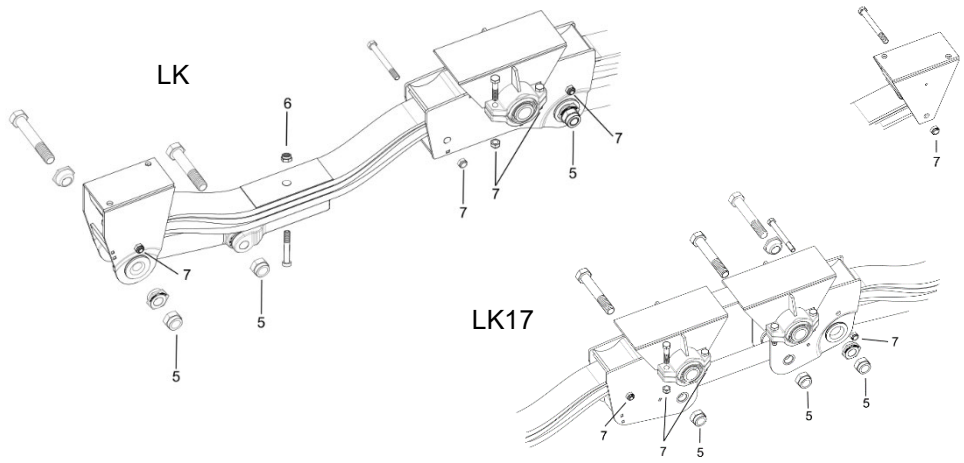
Use in LK	Thread	Tightening torque
5 LK Torque arm bearing / swing rod bearing (**LK17**)	M30	775 Nm ± 25 Nm
6 LK Centre bolt / screw (spring width **80**)	M14	135 Nm
6 LK Centre bolt / screw (spring width **100**)	M16	210 Nm
7 LK Rubber roller bearing / bearing shell fitting	M16	180 Nm ± 10 Nm



Mounting

 Nut and washer  Spigot wheel nut

	Thread	Tightening torque
U-bolt with nut and washer	M20x1.5	605 Nm ± 25 Nm
U-bolt with spigot wheel nut	M22x1.5	675 Nm ± 25 Nm
HEAVY DUTY U-bolt with nut and washer	M24x2	900 Nm ± 50 Nm

- On each spring, gradually tighten up the nuts on the U-bolt using half the specified torque in a criss-cross pattern.
- Evenly tighten up the nuts cross-wise to the specified torque value.

Important!

The U-bolts must not be tilted!
The threads must protrude equally above the nuts!

Important!

The locknuts, spring bolts, spring pin screws and U-bolts used must be replaced by new components after every disassembly!

11. Deviations from specifications

There are vehicle designs which result in deviation from the prescribed dimensions and permitted loads. These deviations must be agreed upon with GIGANT GmbH.

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