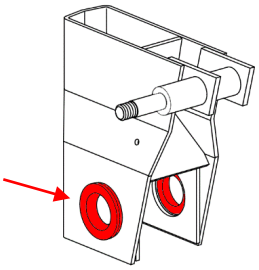
Air suspension units FB100

Can be identified by the air suspension brackets with welded-in conical bush for the eccentric bush.



The axle set consists of the axle with mounted springs – brake cylinders on request.

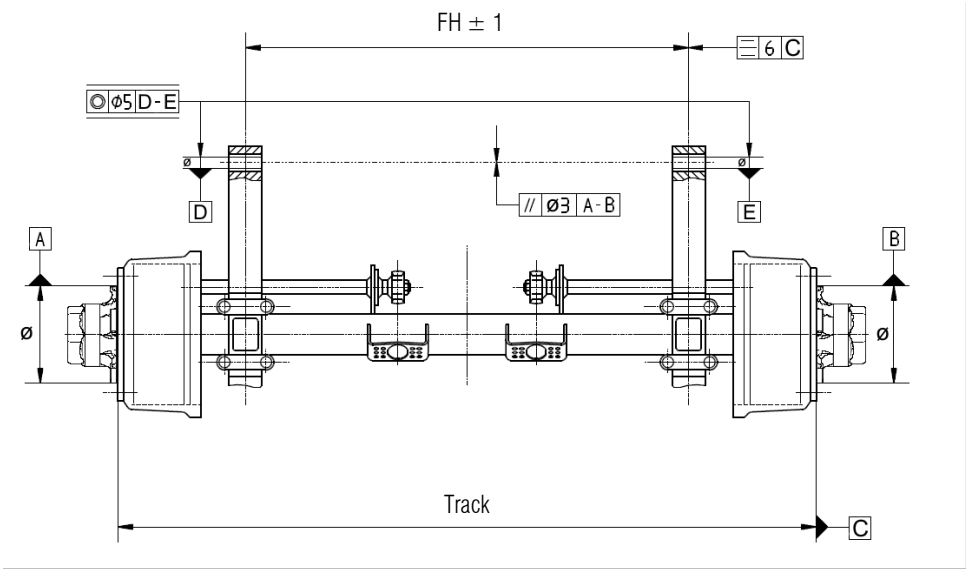
At preassembled air suspensions (spring with air suspension bracket) is due to fact of various installation options and various air suspension brackets the ride height not factory-adjusted. Also the spring bolt is not factory-adjusted. The factory-adjusted spring bolt and shock absorber connection are to unloose and the tighten according tightening torque value of the table.

An over flexion of the air bellows is to avoid during working at a lifted chassis. The air suspensions has according to this be fixed latest at maximum riding height.

Recommendation!

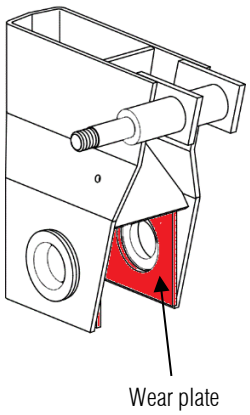
With a separate delivery of a FB100 unit, the assembly of the axle set should be carried out using an assembly fixture to ensure that the dimensional tolerances are complied with.

The alignment of the two springs can be done e.g. by attaching to the spring eye with a Ø 30 mm round material done, if no mounting device is present. The prescribed torque (table at the end) must be observed for the U-bolt screw connections.



Shape and positional tolerances for the axle set

1. Design description

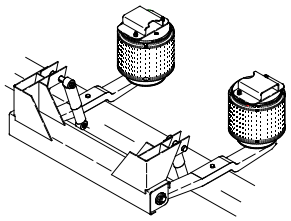


GIGANT air suspension units can be used as single or multi-axle units.

The springs are used to apply the guide forces of the axle. The u-shaped arrangement of the springs and stabilises the vehicle and, when there is lateral acceleration, counteracts the rolling torque.

The guide forces which are absorbed by guides are transferred in the horizontal plane to the air suspension brackets to the vehicle chassis. Vertical forces are also absorbed by the air bellows and the air suspension bracket. The chassis members must be provided with suitable tracing to deal with forces in the vehicle chassis. If there is insufficient support provided, no guarantee claim can be accepted in the event of any damage.

The air suspension bracket is at the inner side equipped with a washer for the spring eye. This serves as a gimbal movement impact and increase the driving safety. In addition, it serves as a wear plate and can be replaced if necessary.



The GIGANT C-profile air suspension units differ from the standard series due to the folding profile connecting both sides of the vehicle. This takes over as far as possible all introduced into the unit lateral forces. Cross members can be omitted depending on the frame construction in the aggregate area.

However, the vehicle manufacturer must check whether the dimensioning of his chassis is sufficient, i.e. whether to do without reinforcing measures.

By very narrow connection consoles, the units can be welded in the supine position of the vehicle.

Detailed information can be found on technical drawings, which are available on request.

2. Positional tolerances

To ensure a smooth installation the axle with fitted springs, the position of the air suspension brackets must be within certain tolerances.

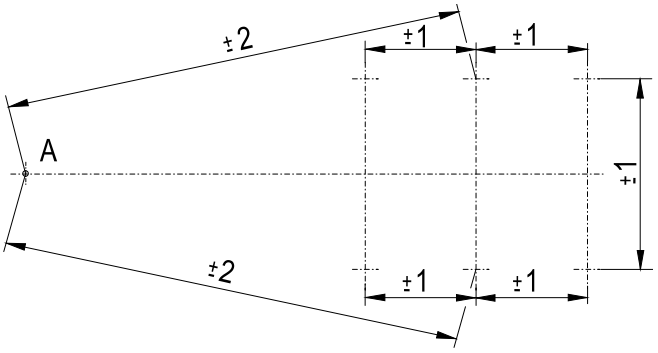
Alignment in the longitudinal direction of the vehicle

The four centres of the conical bush on the air suspension brackets from the base line of the equilateral triangle. The intersection of the two sides should lie on the pulling point of the vehicle. These sides have a tolerance range of ±2 mm to form an equilateral triangle. The centre lines through the conical bush of the air suspension brackets on the other axles should be parallel to one another with the tolerance of ±1 mm. If these tolerances are not observed, the track will not be able to be adjusted properly.

Alignment in the transverse direction of the vehicle

The separation of the air suspension brackets and the centre lines through the air suspension brackets on the other axles has a tolerances of ±1mm.

Sample: 3 – axle suspension



Adjustment tolerances for the track and axle distance

Note:
With multi-axles units, the centre axle must always be taken as the reference point for the diagonal alignment ± 2 mm.

3. Fitting the air suspension bracket

GIGANT has the welded and bolted version for attaching the air suspension bracket to the chassis.

3.1 Air suspension bracket welded design

The FB100 air suspension brackets are suitable for welding to the narrow bottom plates found in modern vehicle designs thanks to their small width.

Important!

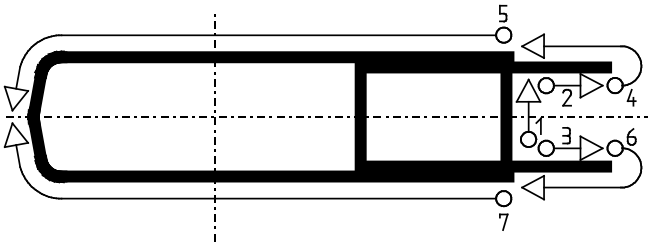
- Bearing damage will be avoided by ensuring that the clamping contact (grounding) of the welding equipment is not attached to the components of the axle.
- Welding and attaching the clamping contact (grounding) to the guide bars is not permitted.
- The springs and air bellows must be protected against weld spatter

3.1.1 Welding process

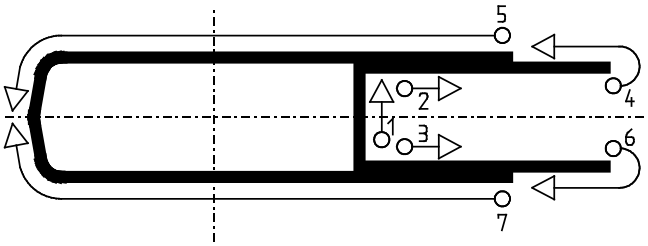
No tack welds or welding start points may be applied within 50 mm from the corner edges of the air suspension bracket (see figure below). Welds (suggested: GIGANT a4 ◺ according to DIN 1912) are to be made in accordance with the evaluation group B of DIN EN ISO 5817.

Important!
GIGANT air suspension brackets are manufactured from the material 1.0976 (S355MC).

Standard air suspension bracket



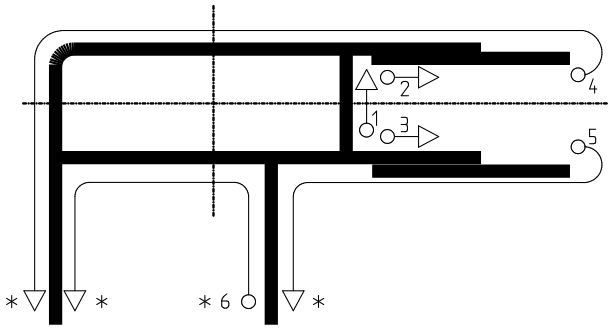
Avoid end craters and penetration marks



1 , 2 and 3 = approx. 50 mm

Avoid end craters and penetration marks

Air suspension bracket with C-profile



1 , 2 and 3 = approx. 50 mm

Avoid end craters and penetration marks

* not welding till the edge of the longitudinal support!

3.2 Air suspension bracket with a covering to screw

The air suspension bracket has two versions of covering. On with welded countersunk bolts and the other with through holes. It is not allowed to use the screwed version for construction area and off road.

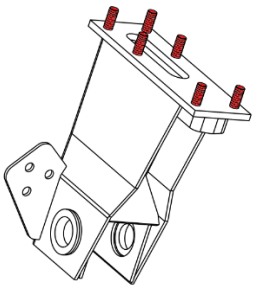
Important !

- For use of the screwed air suspension brackets must have the bottom chord a minimum thickness of 120 mm. The minimum distance for the drillings to the side of the bottom chord have to be looked for (e.g. DIN 977). The measurement of the stud bolts or drillings have to be taken from the set drawing.
- The bolt connections of the air suspension bracket have to be maintenance after first heavy duty drive and every three month. Maybe the maintenance intervals could be more often, due to reason of case of operation (e.g. city use). This is not from GIGANT influenceable and has to be noted by the trailer manufacture in his documentation.

3.2.1 Covering with stud bolts for screwing

Important !

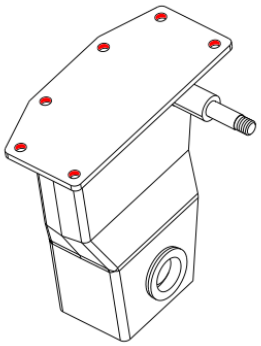
- Covering with welded in countersunk bolt M16 x 60 (10.9 / Black / DIN 9771)
- Secure nuts are not included in the delivery
- Ø 17 drillings at the bottom chord according DIN EN 20273
- The location surface of the secure nuts M16 DIN EN ISO 7040 (class 10) must be parallel to the cover, if necessary compensate (e.g. taper washer DIN 434 at U-Profil)
- If necessary by high surface pressure use a washer
- Evenness screwing surface bottom chord < 1 mm
- Crevice corrosion between covering and bottom chord has to avoid
- Tightening torques take from the table



3.2.2 Covering with through hole

Wichtig!

- Covering with through hole Ø 17mm / Ø 22mm
- Screwing kit is not included into the delivery
- Ø 17mm / Ø 22mm through hole at bottom chord according DIN EN 20273
- The location surface of the secure nuts must be parallel to the covering, if necessary compensate (e.g. taper washer DIN 434 at U-Profil)
- If necessary by high surface pressure use a washer
- Evenness screwing surface bottom chord < 1 mm
- Crevice corrosion between covering and bottom chord has to avoid
- GIGANT recommend the use of hexagon screws M16/M20 (10.9) DIN EN ISO 4014 a secure nuts M16/M20 DIN EN ISO 7042 (class 10).
  ! In case of use of other screwing connection the trailer manufacture is responsible for this connection!
- Tightening torques take from the table



4. Lateral support

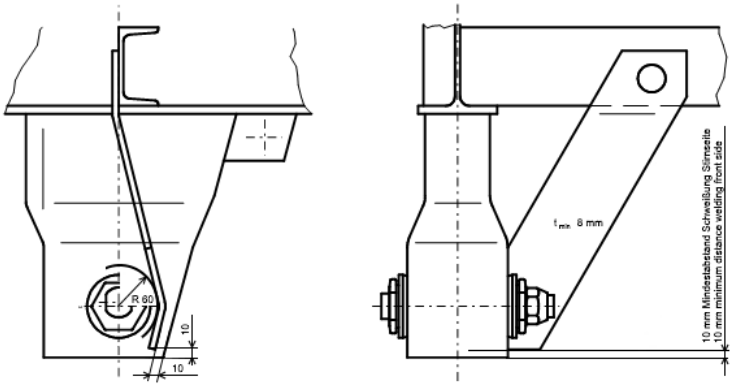
To be able to withstand the lateral forces, air suspension brackets must be braced laterally. The lateral support should be supported on a cross-member on the chassis so that the forces can be evenly distributed to the vehicle chassis. When using a C-profile, no additional lateral support is required.

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

With rigid vehicle chassis the bracing of the air suspension brackets can be carried out in a rigid manner (e.g., tanker, silo or box-body vehicles). GIGANT recommends open profiles, such as the U-profiles. Torsionally rigid, closed profiles are to be avoided as cross beams (risk of cracking at the weld joints).

4.1 Lateral support welded

Suggestion:



The data and instructions shown here are to be considered as a suggestion. The bracing and dimensioning depend on the type of the vehicle and its conditions of use. These data are only known to the vehicle manufacturer, and are taken into account during the design. The previous information according welding have to be taken care for!

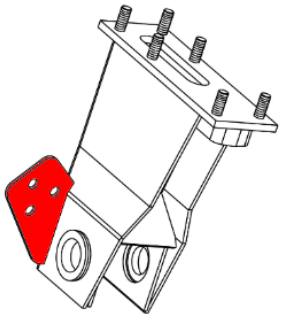
Avoid welding starts and stops at the edges/corners. Take care for enough space for adjusting the eccentric bush.

4.2 Lateral support screwed

GIGANT deliver the air suspension bracket with cover for screwing also with the lateral support for screwing.

Important!

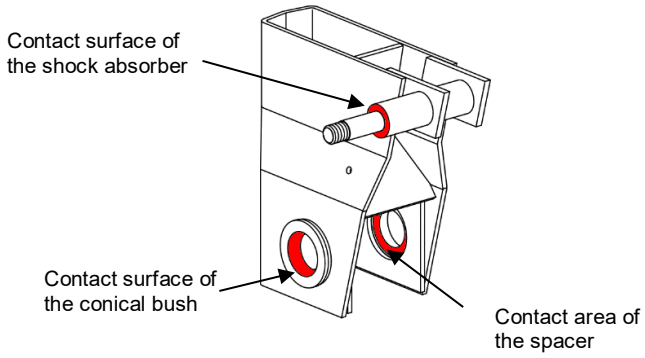
- Through-hole for lateral support Ø17
- Bolting kit is not included in the delivery
- The location surface of the secure nuts must be parallel to the lateral support
- If necessary by high surface pressure use a washer
- Evenness screwing surface < 1 mm
- Crevice corrosion between bolting surface and lateral support has to avoid
- GIGANT recommends the use of hexagonal bolt DIN EN ISO 4014 and use of secure nuts DIN EN ISO 7042.
  ! In case of use of other screwing connection the trailer manufacture is responsible for this connection!
- Tightening torques take from the table



The data and instructions shown here are to be considered as a suggestion. The bracing and dimensioning depend on the type of the vehicle and its conditions of use. These data are only known to the vehicle manufacturer, and are taken into account during the design.

5. Surface protection

The air suspension bracket for welding or screwing can be provided with or without a cataphoretic paint coat as requested. It is necessary to apply a surface coating.



Observe!
The coating thickness of the surfaces on which components (seating surfaces of the eccentric bushing, bearing sleeve of rubber block and shock absorber) are fitted may be 30 µm at most. At putting on thicker paint layer/final coating the red marked areas have to cover.

Important!
The responsibility of the zinc coating of the front air suspension is placed by the trailer manufacture and cannot influenced by GIGANT. The following parameters are specified for the proper functioning of the components:

- The contact surfaces must be free from welding residues, scale, zinc noses or other unevenness
- It has to be secured, that enough adhesion is existing between zinc coating and surface (No disengage of the zinc coating from the surface is allowed!)
- Coating thickness 85µm ± 5µm

6. Assembly

6.1 Mounting the air bellows to the vehicle frame

Important!

- Air bellows must be protected against weld spatter and the effects of excessive heat!
- When mounting without air, the air bellows contracts under load. When setting down the vehicle, care must be taken to ensure proper rolling of the air bellows over the pistons.
- An overstretching of the bellows under operating pressure is not permitted. A limitation to DL_{max} must be made in accordance with point 7.7.

6.1.1. Mounting to the vehicle frame

- Dimensions for the mounting of the air bellows can be found in the drawing of the air suspension set.
- Holes: according to DIN ISO 273
- Separation of the holes: according to DIN ISO 2768m

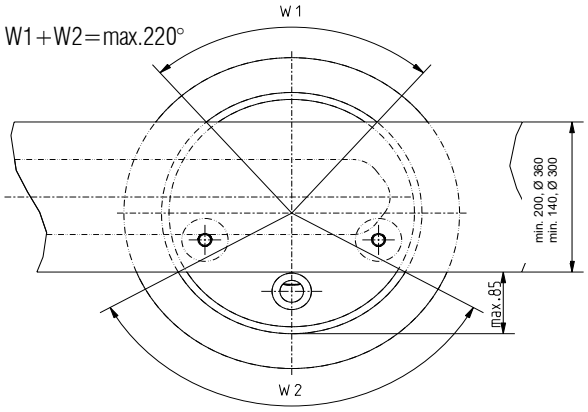
With designing the top plate of the air bellow, the load capacity of the frame beam must be taken into account.

The top plate may protrude 85 mm over the edge of the abutment. Overall, 40% of the length of the top plate edge must be supported directly on the thrust bearing.

It is a minimum top carrying surface area of 200mm (air bellow Ø 360mm) necessary for a top plate with a max. offset from 20mm. For slimmer chassis is a bellow plate or top bracket to use. For an offset bigger then 20mm must if necessary the contact area proportionately wider designed. In this case follow below shown condition.

Recommendation

- Air bellow Ø 300 mm: Bellows plate / top bracket of at least 200 x 245 x 6 mm
- Air bellow Ø 360 mm: Bellows plate / top bracket of at least 200 x 305 x 6 mm

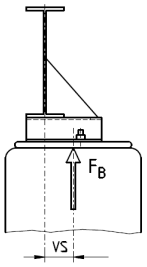


Alignment of the air bellow and the protrusion

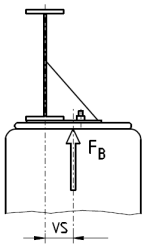
In the case of air bellows without offset (VS) or an offset of 20mm are coming up less bending moments. If the offset is bigger than 20 mm, the bending moment has to be intercepted with a lateral support.

According to the designed air suspension, a bellow plate or top bracket is necessary and has to be screwed or welded to the vehicle chassis. If required a support has to assembled. Dimensions according the technical document.

Design suggestion off air bellow support.



Air bellow with top bracket



Air bellow with bellow plate

- Welds (suggested: GIGANT a4 ◺ according to DIN 1912) are to be made in accordance with the evaluation group B of DIN EN ISO 5817.
- The minimum clearance between air bellow and tire respectively brake cylinder has to be 30 mm.
- The maximum permitted offset of the upper and lower fastening of the air bellows is max. 10 mm laterally
- It is not allowed to assemble the lower and upper air bellow support in twisted position.

Note:

The Ø 300 mmm air bellow is if necessary used for air suspension with 10t axle load. The minimum top contact area must be 140mm and a bellow plate/-support of 200 x 245 x 6 is recommended. The above announced items have also be taken care!

If the air bellow is not technically correct supported, there will be not taken over any warrantee in case of damage.

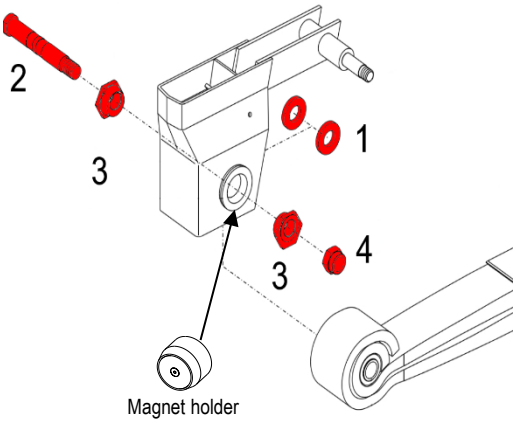
6.2 Compressed air

Pressurise the air bellow with compressed air which is free from foreign matter.

Minor tolerances are produced due to the manufacturing processes. The air bellows may lose air. Tolerance value: Loss of 0.5 bar (within 24 hours with a starting pressure of 2 bar).

Guarantee claims can only be made if the vehicle is fitted with in-line filters in its compressed air supply and signal lines.

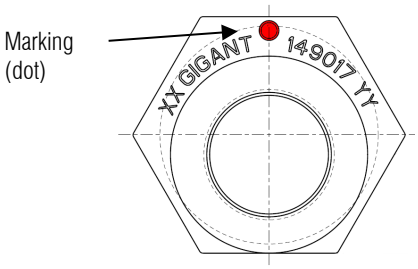
7 Air suspension bracket



Before placing the spring eye into the air suspension bracket must be placed the spacer (1) in the hole of the wear plate inner side of the air suspension bracket. The spacer could be hold by a magnetic holder (70009001).

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

Place the axle into the air suspension brackets and remove the magnet holder. Stick from outside the spring bolt (2) with eccentric bush (3) through the air suspension bracket into the silent bloc. If necessary the spacer of the other side of the hole must move to the correct position. This protect the threat of the spring bolt, when it is pushed complete through. On the other side put on the second eccentric bush (3) and secured with the lock nut (4)

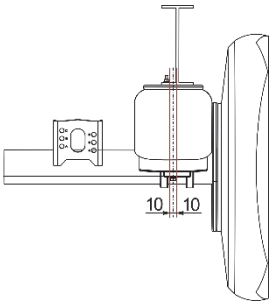


Observe!
The marking on the eccentric bushing must point to the ground when the vehicle is standing upright. Pre tightening spring bolt screwing by 200 Nm and tighten after track alignment to final torque (see table at the end).

Deviation in the angular positions on both eccentric bush on air suspension bracket after screwing together of up to 10° relative to each other is permitted.

7.1 Fitting the air bellow to the spring

- The maximum permitted offset of the upper and lower fastening of the air bellow is max. 10 mm laterally.



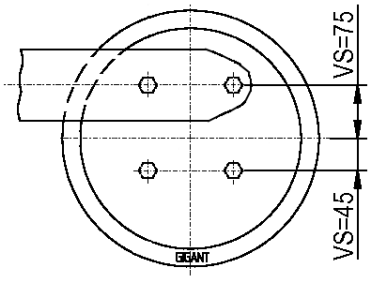
- The lower and upper bellows seat must not be twisted.
- Fitting the air bellow in a twisted position is not permitted.
- The gap between the air bellow (at maximum circumference) and the tyres must be at least 30 mm!

- The torques can be found in the table at the end of the document.

7.2 Air bellow assembling with offset (VS)

At air suspensions with offset are the fixing positions respective of the air piston bottom plate shown.

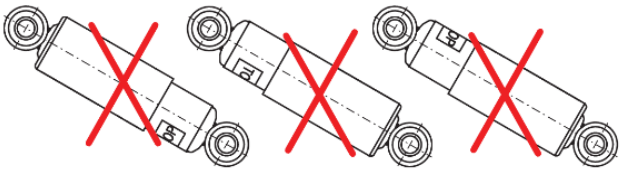
Sample illustration: Air bellow with VS75 mounted on the spring. (View from below)



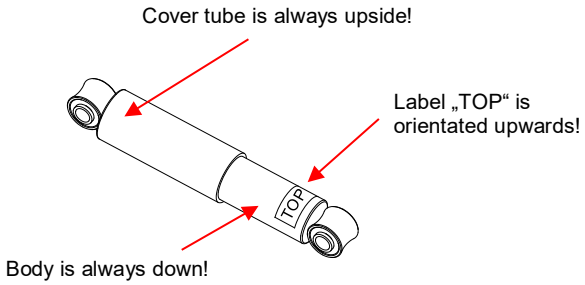
Note!
The offset measure (VS) of the air bellow take of the technical drawing.

7.3 Shock absorber

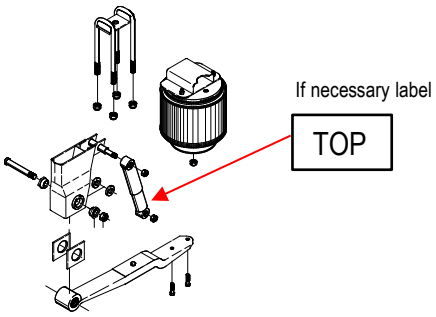
Orientated shock absorbers are marked with a label „TOP“ on the shock absorber body of the lower fixing point. The label “TOP” has to be orientated upwards to ensure a proper function of the shock absorber.



The shock absorber cover tube has to be assembled at the upper up to the upper fixing point.



Example figure:

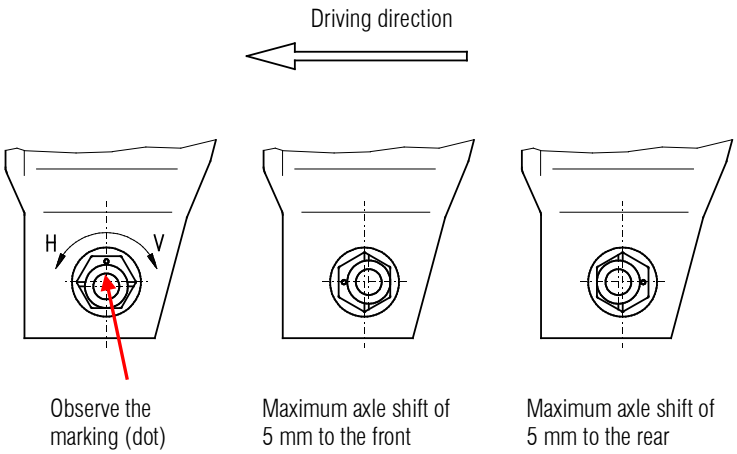


7.4 Manuel track alignment

The axles can be moved in the longitudinal direction using the eccentric bush and thereby the track can be adjusted.

Note:

- Place air suspension in ride height and pre-tightening spring bolt with 200nm.
- Both eccentric bushings on a air suspension bracket must have the same angular position
- The markings must be exactly opposite each other
- Use a centring tool 00311130, or an open-end spanner, SW 60
- Lock nuts on the spring bolt should be tightened up to the specified torque (see table)



Important!
The track may be set using an automatic tracking device if the conditions specified in the "Manual track adjustment" section are met.

7.5 Connection of the air suspension

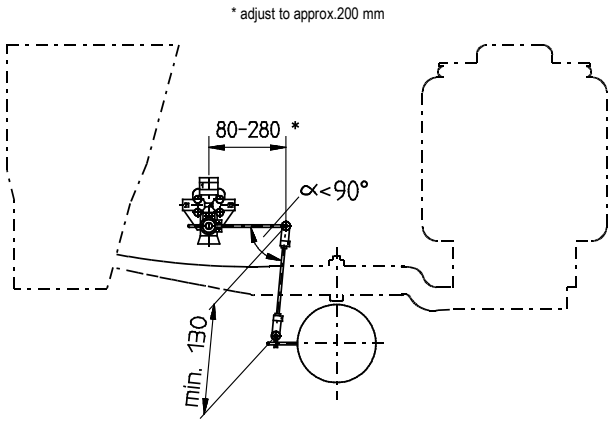
General:
GIGANT-air suspension needs standardly a levering valve. This valve regulate in relationship of the workload and every case of working load the ride height at the same level.

The ride height adjustment (FH) has to be done according the technical drawing of the air suspension.

The control unit must grant, that the air supply will be closed to the air bellows of the air suspension, when the max. lift height is reached. The measure of the max. lift height (DL_{max}) take from the technical drawing.

Vehicles which are equipped with and lift and lower function is the locking valve to adjust, that the air supply stops, when the max. allowed shock absorber length (DL_{max}) according the technical drawing is reached.

The air spring valve should be placed if possible for three axle suspension at the middle axle and double suspension at the rear axle. For axles with lifting device is the location of the air spring valve in correlation to the lifting axle.

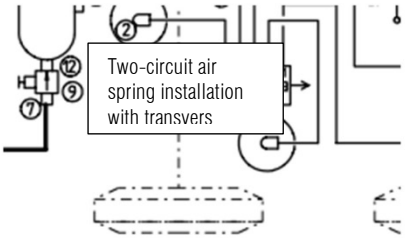


The valve lever should be adjusted by approx. 200 mm. In ride height he has located in horizontal position. The angle of the coupling rod to the axle has to be less 90°. The function test will be done by pushing a little down the lever and air will exhaust out.

To avoid a knock over of the connection rods is a check of the air suspension necessary. The air suspension has to lower down to the air bellow stop and lift up to the lift restriction (DL_{max} of technical drawing). In the case of lowering the angle has be less between the connection rods then approx. $\alpha_{EF} > 15°$ and at lifting approx. $\alpha_{AF} < 165°$

Recommendation!
For the greatest possible functionality and safety while driving, GIGANT recommends a dual-circuit air suspension installation with a transverse choke.

Observe!
Manufacturer's documentation for the air suspension unit.



Air suspension unit

When using in a single-circuit air suspension unit, higher loads on the axle and unit components can arise. These can lead to damage to the vehicle chassis and suspension. For this reason, GIGANT cannot accept any guarantee claims in these circumstances.

Note:

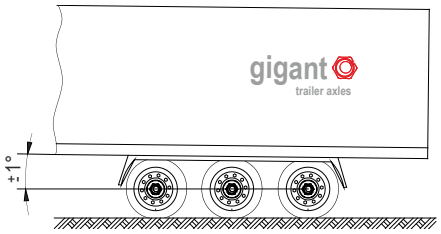
The hole plate for fixing the connection rods of the lever from the ride height valve is located at the middle of the axle beam.

Observe!
The control unit manufacturer's documentation.

7.6 Setting the drive heights

The ride height of the air suspension axles is to be adjusted by loaded vehicle to the specified minimum suspension provided by GIGANT.

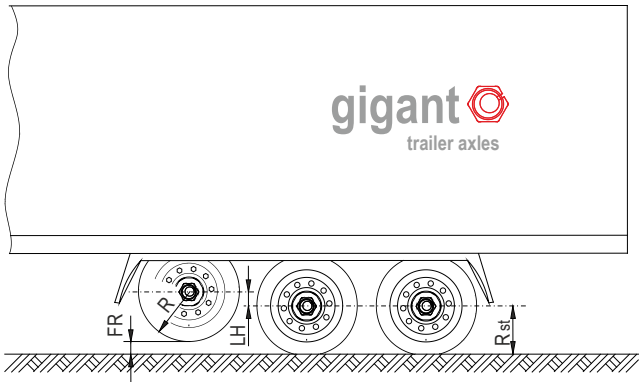
- Single axles: 60 mm
- Multiple axles: 70 mm
- **Exception** – multiple axles with axle lift: 100 mm



The maximum attachment tilt of the semitrailer must not be less than ±1° or 20 mm/m!

Important!
To retrofit an axle lift contact GIGANT.

The lift of the axle lift corresponds to the deflection of the axle. The free space (FS) under the tyres is reduced by the deflection of the tyres.



$FR = LH - (R - R_{st})$

- FR = Free space
- LH = Lift stroke; $LS_{min.}$ 100mm
- R_{st} = actual free tyre radius, loaded
- R = free tyre radius, unloaded

7.7 Right height restriction

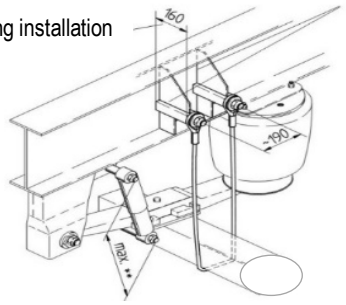
Only the following listed items are for GIGANT-air suspensions with levelling valve for adjusting the ride height sufficient.

- Vehicles with an equipped lift and lower function need a lift restriction.
- Vehicles which are quick unloaded (e.g. tipper, container trailer and so on) as well vehicles for crane-, ship- and train loading need next to the lift restriction an quick release valve (if necessary a release control). This is necessary to avoid an uncontrolled bounce up of the air suspension and therefor resulting damage of the chassis.

Note

- The max. lift height (DL_{max}) take out of the technical documents.
- The right height restriction can done pneumatic or mechanical with catch stripes.

Adjust during installation



Support using bracing plates (not supplied)

** see the unit installation drawing

To determine the fixing points for the square pin, the vehicle must be raised to the maximum lifting height (DL_{max}).

The catch straps must be pulled as tightly to the axle body as possible and the square pins welded to the longitudinal beam.

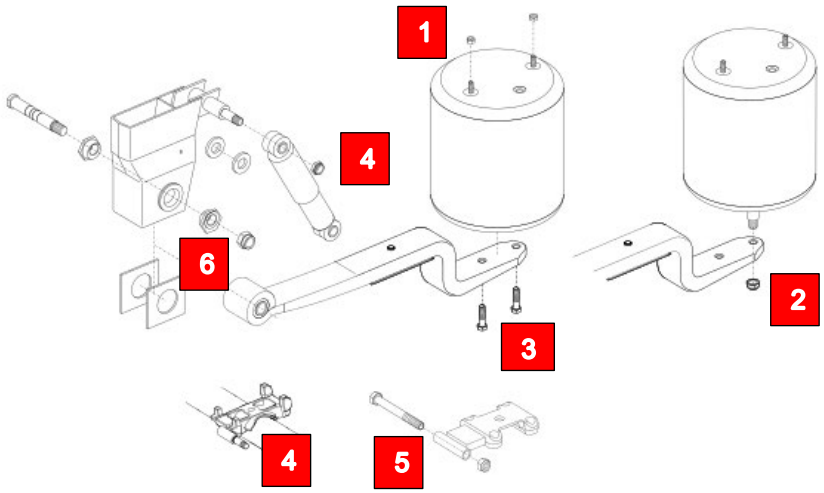
7.8 Air suspension assembly with self-steering axle

With assembling of self-steering axle the additional documents have to be observed: ST232 and TM 01/2012 (Download at: https://www.gigant.com/en/service/download/).

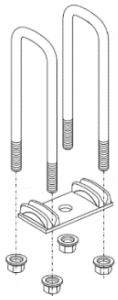
8 Prescribed tightening torques

Description	Thread	Tightening torque
Air suspension unit		
1. Threaded pin (rolled bellow)	M12	55 Nm ± 5 Nm
2. Piston with drawbar (rolled bellow)	M20 x 1,5	300 Nm
3. Piston bottom plate –spring (rolled bellow)	M16	280 Nm ± 10 Nm
4. Shock absorber screw fitting (axle plate with pin)	M22 x 1,5	400 Nm ± 20 Nm

5. Shock absorber screw fitting (axle plate with tube)	M 24	620 Nm ± 30 Nm
6. Spring bolt	M27 x 1,5	575 Nm ± 25 Nm



Description	**Thread**	**Tightening torque**
Connection		
U-bolt (with spigot wheel nut)	M22 x 1,5	675 Nm ± 25 Nm
U-bolt (with lock nut/washer)	M22 x 1,5	700 Nm ± 25 Nm
U-bolt (with nut/washer)	M24x2	900 Nm ± 50 Nm



To 2

- Per spring, gradually tighten up the nuts on the U-bolt to half of the specified torque screwing the nuts cross-wise.
- Evenly tighten up the nuts cross-wise to the specified torque value.

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

Air suspension bracket with covering to screw		
Covering with stud bolts for screwing*	M16	280 Nm ± 10 Nm
Covering / lateral support with drillings*	M16	280 Nm ± 10 Nm
Covering with drillings for screwing*	M20	550 Nm ± 10 Nm

*Screw connection according chapter: 3.2 / 4.2

Important!

The used lock nuts, U-bolts and spring bolts have to be replaced by new components after each disassembling!

These installation instructions are a part of our terms and conditions of sale and supply. Failing to observe them means that we will not be able to accept any claims in the event of damage.
The prescribed axle loads may not be exceeded. Observe changes to the centre of gravity heights and instructions on the installation drawings. When dimensioning, it should be considered that, with a semitrailer, the coupling load must be stabilised via the saddle coupling of the tractor. Ensure that there is sufficient space for the tyres and the axle components, especially when the vehicle is lowered.

-	1	Modified sketches and descriptions	2020.01.19	HU
-	0	New document, replace I010402	2019.01.30	HU
Modification number	Index	Description of change	Date	Signature

Created/reviewed:	Approved:
2020.02.19 HU _____ _____ Date Signature	2020.02.20 KK _____ _____ Date Signature