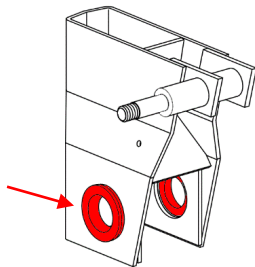


FB100 air suspension units

Identifiable on the air suspension bracket with welded small conical bushing for the eccentric bushing.



The axle set consists of the axle with mounted air spring bars – also with brake cylinders upon request.

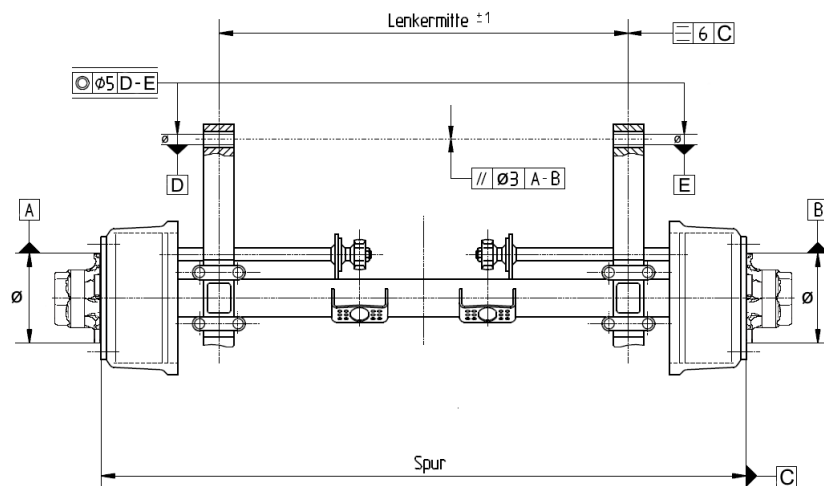
For pre-assembled air suspension units (air spring bars with air suspension bracket), due to the high number of installation options and versions, the air suspension brackets are not adjusted to ride height at the factory and the spring bolts are not tightened to the required torques at the factory. The factory-installed spring bolt and shock absorber screw fitting must be loosened and the prescribed tightening torque must be taken from the table at the end and observed.

Do not overstretch the air bellows when working on a raised chassis. The air suspension unit must be secured accordingly before the maximum ride height is reached.

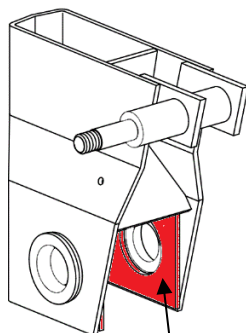
Recommendation!

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

If necessary, the two guide bars can be aligned e.g. by pegging on the spring eye with a $\varnothing 30$ mm round stock, provided that an assembly jig is not available. The prescribed tightening torque (table at the end) must be observed for the U-bolt fitting.



1. Design description



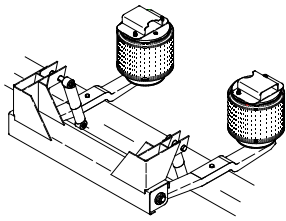
Thrust washer/plate

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

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

The guide forces which are absorbed by the 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 bracing to deal with the forces in the vehicle chassis. If there is insufficient support provided, no guarantee claims can be accepted in the event of any damage.

The air suspension bracket is equipped with a thrust washer on the inside of the spring eye mount area. It serves as a cardanic movement stop for the spring eye and increases road 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 model series by the flanged profile connecting the two sides of the vehicle. It largely absorbs all of the input transverse forces in the unit. Depending on the chassis construction, crossbeams are no longer required in the unit area.

However, the vehicle engineer must check whether the dimensions of their chassis are sufficient, i.e. whether reinforcement measures can be omitted.

Due to the very narrow connection brackets, the units can also be welded onto the back position vehicle.

You can find detailed information on the unit installation drawings, which are available upon request.

2. Positional tolerances

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

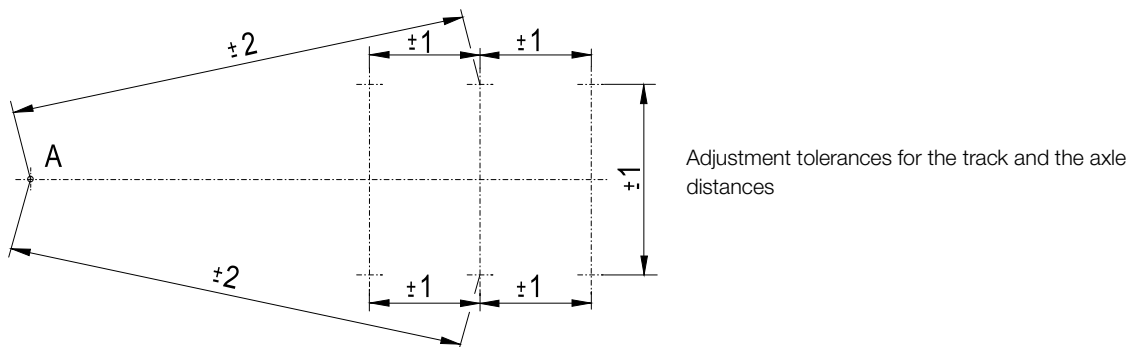
Alignment in the longitudinal direction of the vehicle

The four centres of the holes in the air suspension brackets form the base line of an 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 holes of the eccentric bushings of the air suspension brackets on the other axes should be parallel to one another with a 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 axes has a tolerance of ± 1 mm.

Example: 3 - Axle unit



Note:

For multi-axle units, the centre axle must always be used as the reference point for the diagonal alignment ± 2 mm.

3. Fitting the air suspension bracket

GIGANT has the welded and the screwed version for attaching the air suspension bracket onto the chassis.

3.1 Welded version of the air suspension bracket

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

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 the clamping contact (earthing) to the guide bars is not permitted.
- The guide bars and air bellows must be protected against welding beads, electrodes and welding tongs during welding work.

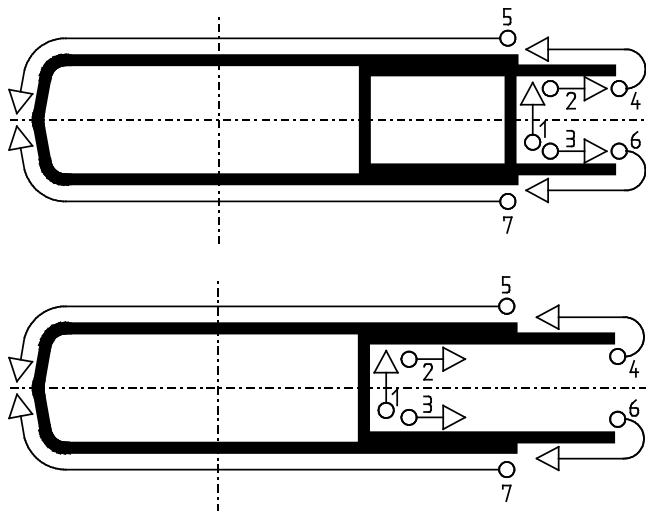
3.1.1 Welding process

No tack welds or weld seams may be applied within 50 mm from the corner edges of the air suspension bracket (see figure). Weld seams (suggested: gigant a5  according to 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).

Important!

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

Standard air suspension brackets

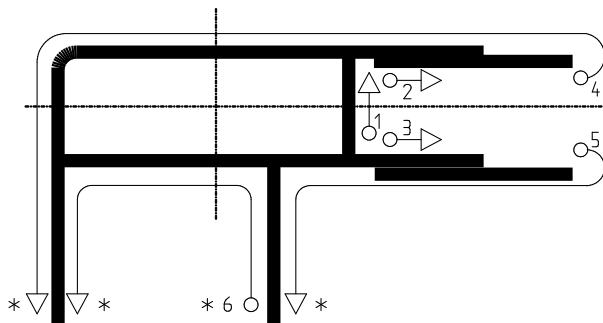


Avoid end craters and undercuts

1 , 2 and 3 = approx. 50 mm

Avoid end craters and undercuts

Air suspension bracket with C-profile



1 , 2 and 3 = approx. 50 mm

Avoid end craters and undercuts

* Do not weld up to the edge of the longitudinal beam

3.2 Screw-on air suspension bracket with cover

There are two versions of the air suspension bracket with cover. One version has welded stud bolts and the second has through holes in the cover. The screwed version of the air suspension unit may not be used on construction sites and off-road.

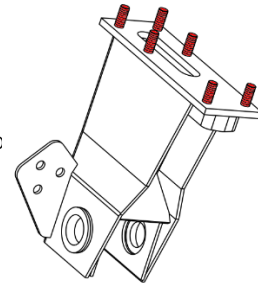
Important!

- For the use of screwed air suspension brackets, the lower belt must be at least 120 mm wide and the minimum distance from the outer edge of the lower belt must be observed for the through hole (e.g. DIN 997 Tracing Dimensions for Bars and Rolled Steel Sections). The distance for the stud bolts or through holes can be found in the installation drawing.
- The threaded connections of the air suspension brackets must be maintained after the first laden trip and every 3 months; if applicable, maintenance must be performed more frequently depending on the use of the vehicle (e.g. city traffic). gigant has no control over this and it must be noted in the vehicle documentation by the vehicle manufacturer.

3.2.1 Screw-on cover with stud bolts

Important!

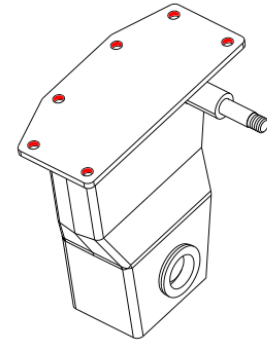
- Cover with welded countersunk screws M16 x 60 (10.9 / black / DIN 9771)
- Locknuts are not included in the scope of delivery
- Ø 17 mm through hole in the lower belt in accordance with DIN EN 20273
- The contact area of the locknut M16 DIN EN ISO 7040 (class 10) must be parallel to the cover, equalise if necessary (e.g. wedge plates DIN 434 for U-profile)
- Use washers if necessary for higher surface pressure
- Evenness of the mounting surface of the lower belt <1 mm
- Prevent contact corrosion between the cover and lower belt
- The tightening torque can be found in the table at the end



3.2.2 Cover with through holes

Important!

- Cover with through holes Ø17 mm / Ø22 mm
- The screws are not included in the scope of delivery
- Ø 17 mm / Ø 22 mm through hole in the lower belt in accordance with DIN EN 202
- The contact surface of the locknut must be parallel to the cover, equalise if necessary (e.g. wedge plates DIN 434 for U-profile)
- Use washers if necessary for higher surface pressure
- Evenness of the mounting surface of the lower belt <1 mm
- Prevent contact corrosion between the cover and lower belt
- gigant recommends using hexagonal screws M16/M20 (10.9) DIN EN ISO 4014 and locknuts M16/M20 DIN EN ISO 7042 (class 10).
! When using other threaded connections, all responsibility is born by the vehicle manufacturer.
- The tightening torque can be found in the table at the end



4. Lateral support

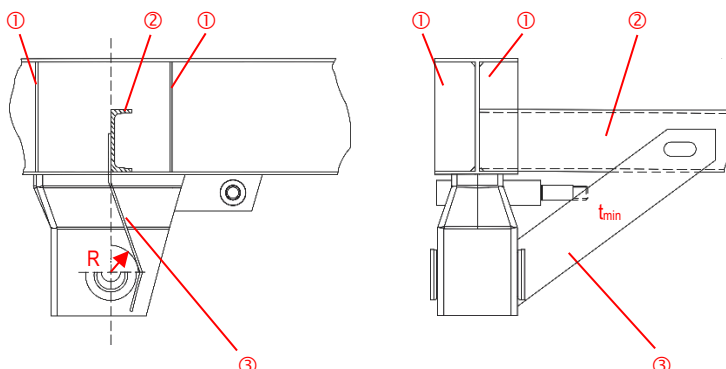
To be able to withstand the lateral forces, air suspension brackets must be braced laterally. The lateral braces should be supported on a cross-member on the chassis so that the forces can be evenly distributed to the vehicle chassis. When using a C-profile, no additional lateral support is required.

With **torsionally soft vehicle chassis**, care should be taken to ensure that the torsional softness is maintained but that the air spring 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 U-profiles. Closed profiles as cross beams are to be avoided (risk of cracking at the weld joints).

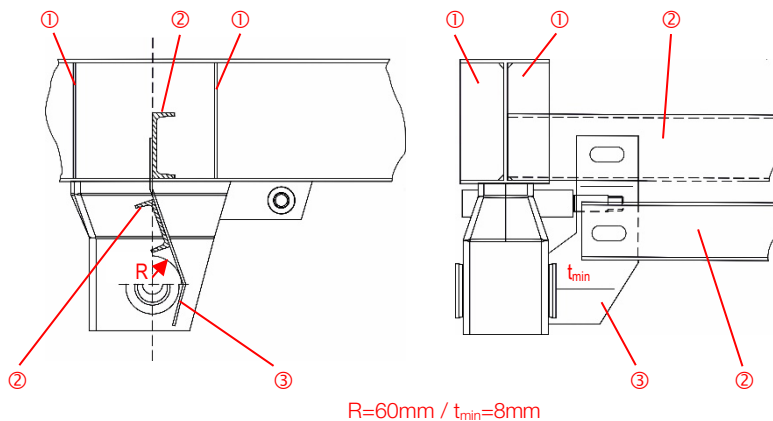
4.1 Welded lateral support

Example illustrations of torsionally soft vehicle chassis



R=60mm / $t_{\min}=8\text{mm}$

Example illustrations of rigid vehicle chassis



① Bars:

The bars that are installed vertically in the vehicle chassis are used for bracing. It is important here that the flow of force from the air suspension bracket is absorbed force fitted in the chassis. Accordingly, the front bar must be set approx. 10 mm to the rear. The rear bar should be positioned in the flow of force of the inner brace of the air suspension bracket or be at least 20 mm in front of the end of the air suspension bracket, depending on the version.

② Cross brace:

In the cross brace in the vehicle chassis, for example, the input forces occurring when driving in curves are directed from the air suspension bracket via the lateral supports. Open profiles are closed and therefore profiles with more torsion resistance should be preferred. A carefully designed cross brace must be ensured in the design, so that e.g. changes in stiffness does not cause the formation of cracks in the vehicle chassis. With rigid vehicles, a second cross brace is often installed on the lateral support or on the front of the air suspension bracket. Here, the same criteria as for the cross brace in the vehicle chassis must be observed to avoid the formation of cracks.

For welded or bolted cross braces, the usual standards must be observed in terms of the lateral distance for hole/welds, etc.!

③ Lateral support:

The lateral support transfers the compressive and tensile loads from the air suspension bracket into the cross brace. If possible, the lateral support with a material thickness ($t_{\min}$) is to be placed centred above the spring bolt fitting. The connection to the air suspension bracket must be attached behind the spring bolt fitting as viewed in the direction of travel and go approx. 30 mm over the centre point of the bushing. The radius (R) must be maintained to be able to adjust the track without any problems. For the construction of the lateral support, it must be ensured that, for example, there are no changes in stiffness that can cause the formation of cracks in the vehicle chassis.

For welded or bolted lateral supports, the usual standards must be observed in terms of the lateral distance for hole/welds, etc.!

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 welding information provided above must be observed!

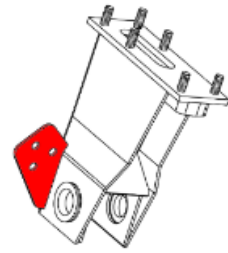
Welds at the edges as well as at the beginning and end of the weld must be avoided. Sufficient space for adjusting the eccentric nuts must always be ensured.

4.2 Screwed lateral support

For air suspension brackets with a screwed cover, GIGANT also provides the version with screwed lateral support.

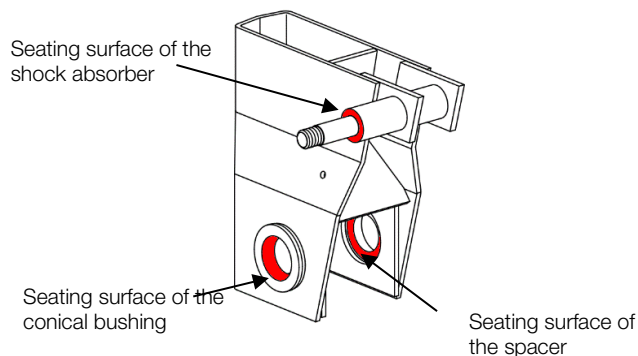
Important!

- Through holes for lateral support Ø17 mm
- The screws are not included in the scope of delivery
- The contact surface of the locknut must be parallel to the lateral support.
- Use washers if necessary for higher surface pressure
- Evenness of the mounting surface <1 mm
- Prevent contact corrosion between the mounting surface and lateral support
- GIGANT recommends using hexagonal screws M16/M20 (10.9) DIN EN ISO 4014 and locknuts M16 DIN EN ISO 7042 (class 10).
! When using other threaded connections, all responsibility is born by the vehicle manufacturer.
- The tightening torque can be found in the table at the end



5. Surface protection

The air suspension bracket 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 or spacer, bearing sleeve of the silent block and shock absorber) are supported may not exceed 30µm (CDP/coating). When applying thicker paint coats/final coat, the surfaces marked in red must be covered.

Important!

Galvanising of the air suspension brackets is the responsibility of the vehicle manufacturer, and 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.
- It must be ensured that there is sufficient adhesion between the zinc layer and the seating surface (peeling of the zinc layer from the surface is not permitted!)
- Coat thickness 85µm ± 5µm

6. Assembly

6.1. Mounting the air bellows to the vehicle frame

Important!

- Air bellows must be protected against weld splatter and the effects of excessive heat!
- During assembly without air, the bellows contract under the load. When lowering the vehicle, proper rolling of the bellows over the piston must then be ensured.
- Overexpansion of the air bellows under operating pressure is not permitted. A limitation to DLmax must be accomplished according to Point 7.7.

6.1.1. Mounting to the vehicle frame

- Dimensions for attachment of the air bellow can be found in the installation drawing
- Holes: according to DIN ISO 273
- Separation of the holes: according to DIN ISO 2768m

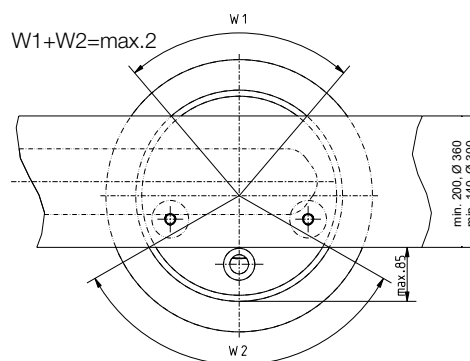
The load-bearing capacity of the frame beam must be taken into account when designing the U-shaped plate.

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

A top load-bearing seating surface of at least 200 mm (air bellows Ø 360 mm) is required for the U-shaped plate with a maximum offset of 20 mm. With narrow frames, a bellows plate or a bellows attachment must be used. With an offset greater than 20 mm, it may be necessary to widen the seating surface accordingly. In doing so, the conditions listed below must be observed.

Recommendation

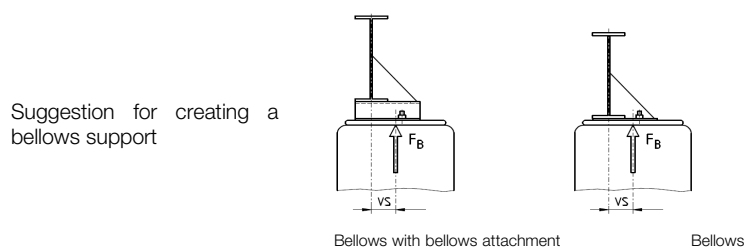
- Air bellows Ø 360 mm: Bellows plate/attachment of at least 200 x 305 x 6 mm
- Air bellows Ø 300 mm: Bellows plate/attachment of at least 200 x 245 x 6 mm



Alignment of the air bellows and the protrusion

For air bellows without offset (VS), there are no bending forces, and with small bellows offset (VS) of 20 mm, only minimal bending forces may occur. With a bellow offset larger than 20 mm, greater bending forces occur, which must be structurally compensated with lateral support.

Depending on the air suspension unit, a bellows plate or a bellows attachment is required for structural reasons. They must be bolted or welded onto the vehicle chassis and supported if necessary. The dimensions can be found in the technical documents.



- Weld seams (suggested: gigant a5  according to 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).
- The clearance between the air bellows and the tyres or brake cylinder must be at least 30 mm.
- The maximum permitted lateral offset between the lower and upper bellows mount may not exceed 10 mm.
- The lower and upper bellows mount may not be aligned twisted towards each other.

Note:

The Ø 300 mm air bellow is used for units with max. 10 t axle load, if necessary. Here, the upper seating surface must be at least 140 mm and a bellows plate/attachment of 200 x 245 x 6 mm is recommended. The points listed above must also be observed here!

If the air bellow is not supported properly, no guarantee claims can be accepted in the event of damage to the air bellows.

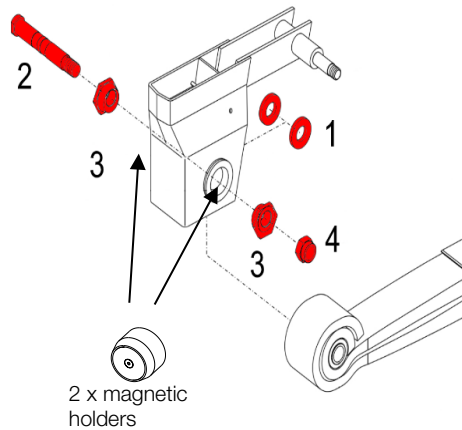
6.2. Compressed air

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



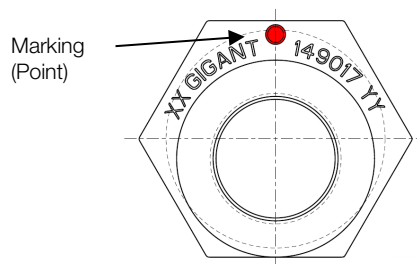
Before inserting the spring eye into the air suspension bracket, the spacers (1) must be placed in the holes of the thrust washer on the inner side of the air suspension bracket. The spacers are held with the magnetic holder (700090015).

Important!

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

Position the axle in the air suspension brackets. Remove the magnetic holder and push the spring bolt (2) with an eccentric bushing (3) from the outside through the air suspension 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 spring bolt can be inserted without damage.

Place the second eccentric bushing (3) on the opposite side and fix with the locknut (4).



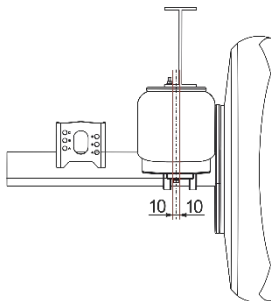
Observe!

The circular mark (point) on the eccentric bushing must point to the chassis frame at 12 o'clock with the vehicle upright before the track adjustment. Pre-tighten to a torque of 200 Nm and after adjusting the track, tighten to the end torque (tightening torques in the table at the end).

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

7.1. Fitting the bellows to the steering unit

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

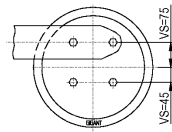


- The lower and upper bellows mount may not be aligned twisted towards each other.
- Fitting the air bellow in a twisted position is not permitted.
- The gap between the air bellow (at maximum Ø, see installation drawing) and the tyres must be at least 30 mm!
- The torques can be found in the table at the end of the document.

7.2. Bellows installation with offset (VS)

For air suspension units with an offset, this is illustrated via the corresponding fastening points of the piston head plate.

Example illustration: Air bellow with VS75 installed on the spring (viewed from below)



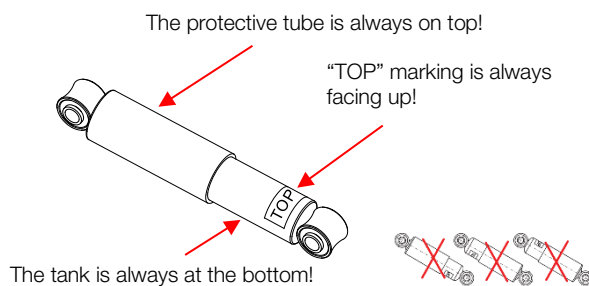
Observe!

The offset (VS) to be installed for the air bellow can be found in the installation drawing.

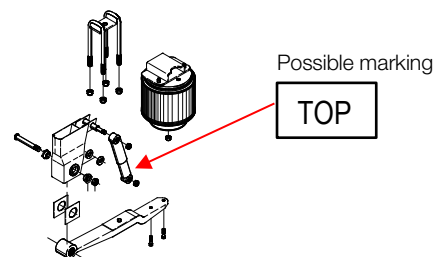
7.3. Shock absorber

Shock absorbers that must be fitted with a specific orientation are marked with a "TOP" marking (e.g. sticker) on the lower shock absorber attachment. The "TOP" marking is aligned towards the top to ensure proper function of the shock absorbers.

The shock absorber is always fitted with the protective tube on the upper shock absorber attachment.



Example illustration:

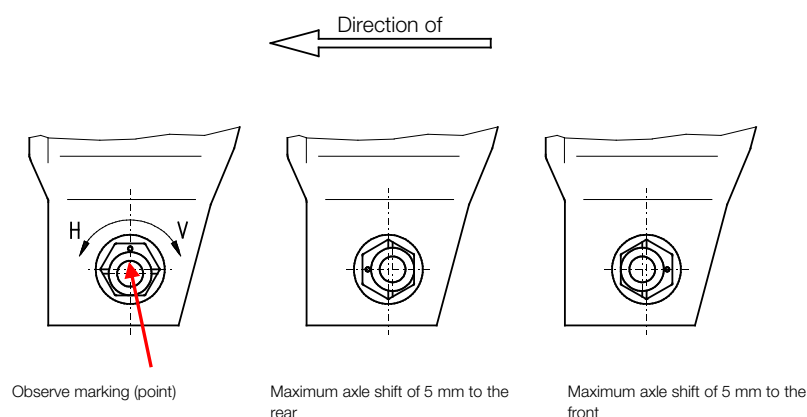


7.4 Manual track adjustment

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

Note:

- Move the unit to ride height and pre-tighten the spring bolt to 200 Nm.
- Both eccentric bushings on a bracket must have the same angular position
- The marking points must be precisely opposite
- Use a centring tool 700311047, or an open-end spanner, SW 60
- Tighten the locknut of the spring bolt according to the prescribed tightening torque (table at the end)



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 aspects:

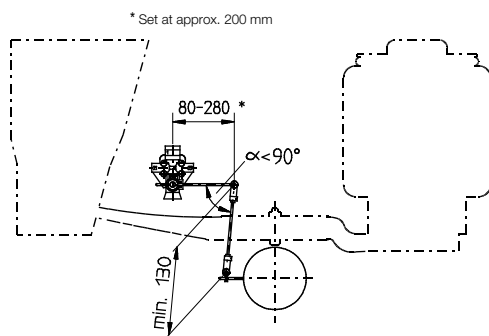
GIGANT air suspension units need an air spring valve as a standard. This valve regulates the pressure depending on the load and maintains the ride height at the same level in any load state.

The ride height adjustment (FH) can be found in the installation drawing for the GIGANT air suspension unit.

The control provided by the control unit must guarantee that, at the maximum lift height of the air suspension unit, the air supply to the air bellows is closed off. The dimension for the maximum lifting height (DLmax) can be found in the installation drawing.

For vehicles that will be equipped with lifting and lowering function, the stop valve must be adjusted such that the air supply is closed at the max. permitted damper length (DLmax) specified in the installation drawing.

If possible, the air spring valve should be installed on the centre axle for triple-axle units and on the rear axle for double-axle units. For axles with axle-lifting devices, the selection of the connection for the air spring valve depends on the axle to be lifted.



The valve lever should be set at approx. 200 mm and is horizontal at ride height. The steering rod must have an angle of $< 90^\circ$ with the connection of the axle. To check for proper function, the lever is moved slightly down. In doing so, air must flow out through the venting chamber.

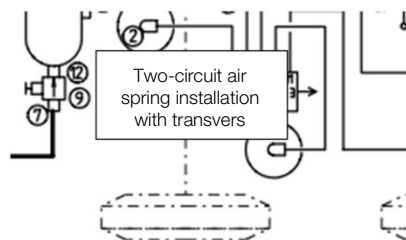
To prevent the valve lever from swivelling out, the air suspension must be compressed up to the air bellows stop and also be de-compressed up to the stop (DLmax in the installation drawing) for checking purposes. In doing so, the angle between the two valve gear levers must be approx. $\alpha_{EF} > 15^\circ$ during compression and approx. $\alpha_{AF} < 165^\circ$ during de-compression.

Recommendation!

For the greatest possible functionality and safety while driving, gigant recommends a dual-circuit air suspension installation with a transverse throttle.

Observe!

Manufacturer's documentation for the air suspension system.



Air suspension system

When using a single-circuit air suspension system, higher loads on the axle and unit components can occur, which can damage the vehicle chassis. For this reason, gigant cannot accept any guarantee claims in these circumstances.

Note:

To fit the ride height control units, a perforated plate is found in the centre of the axle to which the control units' linkage can be fastened.

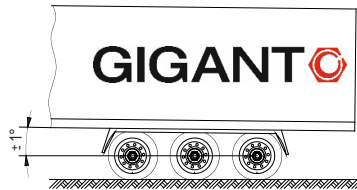
Observe!

The control units manufacturer's documentation.

7.6 Setting the ride heights

The ride height of the air suspension axles is to be adjusted in the permitted range specified by GIGANT. In doing so, the following minimum compression must be observed:

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

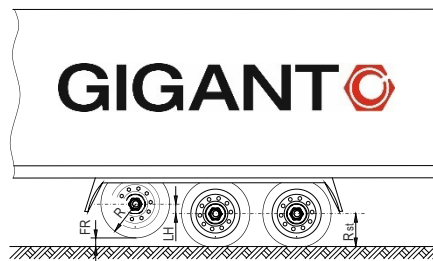


The maximum attachment tilt of the semitrailer must not exceed $\pm 1^\circ$ or 20 mm/m!

Important!

Consult GIGANT when retrofitting an axle lift.

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.



$$FS = LS - (T - T_{st})$$

- FS = Free space
- LS = Lift stroke; $LS_{min.}$ 100 mm
- T_{st} = free tyre radius, statically loaded
- T = free tyre radius, unloaded

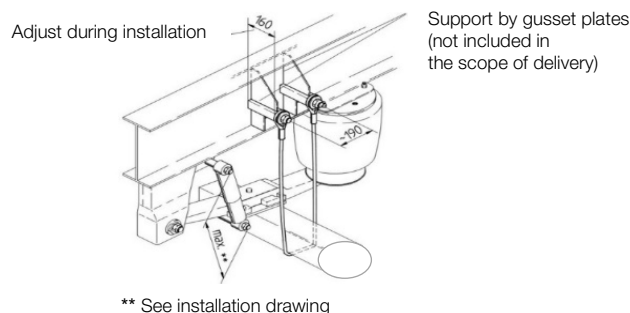
7.7 Ride height restriction

For GIGANT air suspension units, except for the points listed in the following, an air spring valve is sufficient for adjusting the ride height.

- Vehicles that are equipped with a lifting and lowering function require a lift limitation.
- Vehicles that are rapidly unloaded (e.g. tippers, container vehicles, etc.) as well as for crane, ship and rail loading, a quick bleed valve (with a bleed controller if necessary) is required in addition to the lift limitation to prevent uncontrolled bouncing up of the air suspension unit and resulting damage to the chassis.

Note

- The max. lifting height (DL_{max}) can be found in the technical documents.
- The lift limitation can be achieved pneumatically or mechanically with arresting cables



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

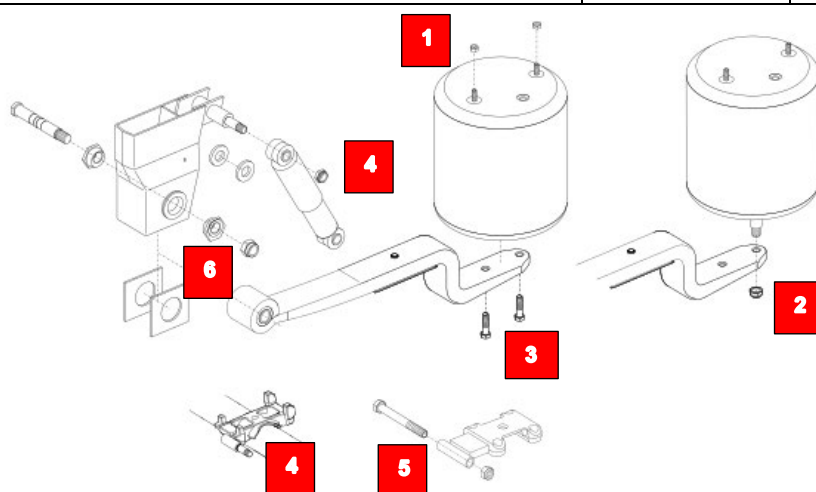
The rope must be pulled as tightly to the axle body as possible and the square pins welded to the longitudinal beam.

7.8 Unit assembly with self-steering axles

In conjunction with installing a self-steering axle, the supplementary documents GN0045 and TM 01/2012 must be observed (download at: <https://www.gigant.com/download/>).

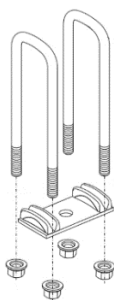
8. Prescribed tightening torques

Description	Thread	Tightening torque
Air suspension unit		
1. Threaded pegs (rolled bellows)	M12	55 Nm $\pm$ 5 Nm
2. Draw rod piston head (rolled bellows)	M20 x 1.5	300 Nm
3. Piston head plate spring (rolled bellows)	M16	280 Nm $\pm$ 10 Nm
4. Shock absorber screw fitting (threaded pin)	M22 x 1.5	400 Nm $\pm$ 20 Nm
5. Shock absorber screw fitting (tube with screw)	M 24	620 Nm $\pm$ 30 Nm
6. Spring bolt	M27 x 1.5	575 Nm $\pm$ 25 Nm



Connection

U-bolt (with spigot wheel nut)	M22 x 1.5	675 Nm $\pm$ 25 Nm
U-bolt (with locknut/washer)	M22 x 1.5	700 Nm $\pm$ 25 Nm
U-bolt (with nut/washer)	M24x2	900 Nm $\pm$ 50 Nm



To 2

- Per steering, gradually tighten up the nuts on the spring clamp to half the specified torque using a criss-cross pattern.
- Evenly tighten up the nuts cross-wise to the specified torque value.

Important!

The spring clamps must not be tilted!
The threads must protrude equally above the nuts!

Screw-on air suspension bracket with cover

Cover with stud bolts*	M16	280 Nm $\pm$ 10 Nm
Cover / lateral support with through hole*	M16	280 Nm $\pm$ 10 Nm
Cover with through hole*	M20	550 Nm $\pm$ 10 Nm

*Threaded connection according to Points: 3.2 / 4.2

Important!

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

These installation instructions are a part of our terms and conditions of sale and delivery. 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. Make sure there is enough space for the tyres and axle components, particularly when the vehicle is lowered.

A266-HU	2	Point 7.8: ST232 will be replaced by GN0045	2022.05.17	HU
-	1	Figures/descriptions updated	2020.02.09	HU
New	0	New text, replacing I010402	2019.01.30	HU
Change number	Index	Change description	Date	Signature

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2022.05.17	HU	2021.05.17	AK
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