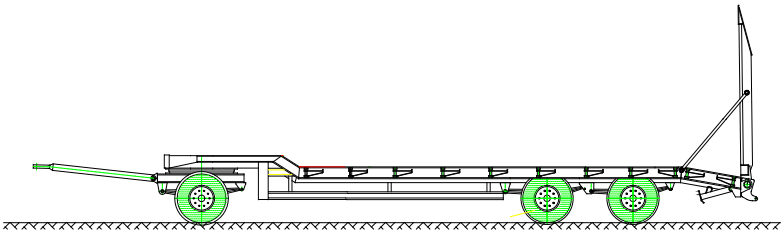
Operating and maintenance instructions
Low-bed drawbar trailer

LOW-BED DRAWBAR TRAILER

Type of vehicle:

Vehicle identification number:



Langendorf GmbH
Bahnhofstraße 115

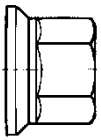
45731 Waltrop

Tel.: (0 23 09) 9 38-0
Fax: (0 23 09) 9 38-1 90
E-Mail: kundendienst@langendorf.de
Internet: www.langendorf.de

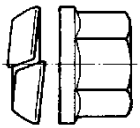
Ausgabe Juli 2021 engl. (Übersetzung)

After having taken the vehicle, please check fixed seat of the wheel nuts after 50 km. Please repeat the checking after 50 km loaded driving (and also after every wheel change).

Tightening torques

BPW axle with spigot alignment	**630 Nm**		**M 22x1,5**
SAF axle with spigot alignment	**600 Nm**		

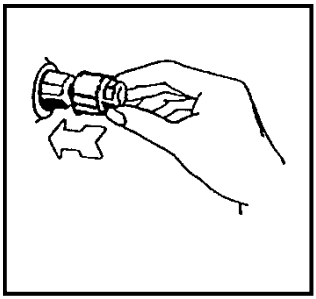
Wheel nut with pressure plate

BPW axle with bolt centre	**510 Nm**		**M 22x1,5**
SAF axle with spigot alignment	**430 Nm**		

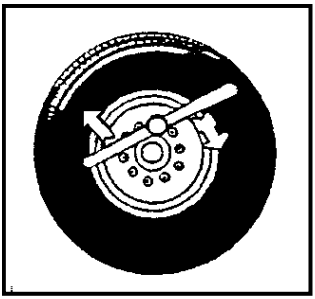
Protecting cover for wheel nuts

Installation

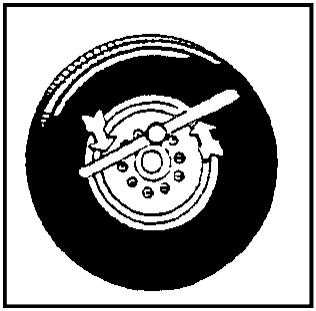
The protecting cover is attached by hand to the wheel nut to be protected and is tightened by means of the same key as the wheel nut by a clockwise rotation of approx. 15° to a stop. At the first tensions the click into place can be noticed clearly by a SNAP. At the same time with the rotation you should slightly press the protecting cover so that the cover is pressed onto and that the screw connection is sealed.
The disassembly is executed with the same key by an anticlockwise rotation of 15°. The cover hex is made in a way that at a disassembly the cover is removed at the same time with the key.

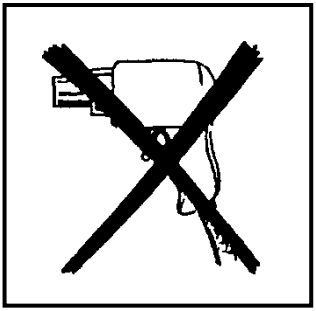


Disassembly with the key 15° to the left hand side



But do not use any impact screw driver





Operating and maintenance instructions
Low-bed drawbar trailer

I n d e x

1. Introduction

This Langendorf vehicle has been manufactured with the support of computers according to the latest technical findings. Thus the vehicle is sophisticated regarding efficiency and endurance.

Please read very carefully the following

OPERATING AND MAINTENANCE INSTRUCTIONS

Independent of these instructions, the valid national regulations, prescriptions and security directions must be respected.
Regular maintaining will guarantee long vehicle endurance; many necessary repairs can be avoided by respecting the regular intervals for maintenance and inspection, according to our instructions. These operating instructions shall help you to accustom yourself easily with the vehicle.

Before putting your vehicle into operation, listen to the instructions of our technical personnel when taking delivery of the vehicle.
As we always do the utmost to improve our products, it is possible that your vehicle shows innovations which could not been considered when printing these instructions.
We would like to point out that we cannot accept any claims - of whatever kind - arising from the contents of these instructions.
In case you are in need of spare parts, please order them at our works with the vehicle identification number and the construction year of the vehicle.

The leading principle for a correct traffic behaviour:

"For participating in traffic, caution and mutual consideration are always indispensable".

We have produced a reliable and safe vehicle. It is now up to you to move it safely in the traffic.

Good journey!

Langendorf GmbH
D-45731 Waltrop

1.0. General information on these instructions

In these present operating and maintenance instructions several trailer types which correspond to each other with regard to their basic components, are contained. Besides, important special equipment and additional devices have been considered so that the execution of your vehicle can be different in some descriptions and illustrations. We have summarized in these operating and maintenance instructions the essential points for due operation and maintenance. These instructions are part of the vehicle and have to be carried along with it during operation. Please note when selling the vehicle, these instructions have to be passed to the new owner. If the vehicle is changed later (extensions or modifications), it has to be documented in **"annex B"**.

Chapter 1 Introduction
In this chapter you will find general security instructions for operating the trailer

Chapter 2 Technical data
In this chapter you will find the "Technical Data" of the trailer.

Chapter 3 Operation
In this chapter you will find exact information how to operate the trailer.
This makes it easier for you to get quickly and safely into the handling of the trailer.

Chapter 4 Legal obligations
In this chapter you will find information on legal regulations.

Chapter 5 First inspection
In this chapter you will find information on the works which have to be done for the first inspection.

Chapter 6 Maintenance and inspection
In this chapter you will find information on an easy and due maintenance for a long lasting safety in traffic and readiness for service of your trailer.

Chapter 7 Hints for a long time stop period of the trailer
In this chapter you will find information on a long time stop period of the trailer.

Chapter 8 Tightening torques
In this chapter you will find information on the tightening torque of screws.

Chapter 9 Lubrication plan
In this chapter you will find information on the greasing.

Annexe A Check list for the regular examination and maintenance works
In this chapter you will find a check list for the maintenance and servicing.

Annexe B Supplements
In this chapter all modifications concerning the operation or maintenance of the trailer have to be recorded.

Annexe C Wiring schemes
In this chapter you will find the standard brake, air suspension and electric wiring schemes.

You will find following symbols in these instructions in order to point out dangers or especially important points. These symbols mean the following:

Wherever you find this symbol, there is **danger for persons and their lives** if you do not observe exactly these instructions.

Wherever you find this symbol, there might be **damages on the vehicle** if you do not observe exactly these instructions.

Wherever you find this symbol, your attention is called to a **particularity** .

Copyright

1.1 General security instructions and operation conditions

Pay attention to all the labels concerning security and danger on the vehicle.

All the labels concerning security and danger on the vehicle must always be complete and always readable!

No modification of the vehicle (modification and mounting) must be made without the permission of the manufacturer! This concerns also the installation and adjustment of security systems and valves as well as the welding of carrying pieces.

Use only original spare parts!

All parts relevant to the chassis and type specific parts such as springs, air bellows, shock absorbers, axles, tipping cylinders, hydraulic and pneumatic valves etc. are especially adapted to the Langendorf vehicles and cannot be compared to the parts available in the shops.
We can accept any guarantee claims only when using original spare parts.

Use according to the rules

The vehicle is manufactured according to the technical level and the recognized technical rules concerning security. But the use can lead to danger of life and limb of the user or of another person resp. to impairments of the vehicle and of other things.

The vehicle must be used only in faultless condition and under consideration of the security and of the dangers according to the operating instructions! A defect which can impair the security must be repaired at once!

For the due use the prescribed operating, maintenance and care conditions of the manufacturer must be respected.

The vehicle can only be used, maintained and cared by persons, who know the vehicle and are informed about the dangers.

Unauthorized modifications on the vehicle exclude a responsibility of the manufacturer for the resulting damages.

Basic rules for the operation of the vehicle

Before putting the vehicle into operation check it concerning the traffic and operating security.

1. Consider the general valid security regulations and safety rules in addition to the operating instructions.
2. The respective rules are valid when using the public traffic ways.
3. Before beginning the work, the driver and operator of the vehicle must know all devices and operating elements as well as their functions! It is too late during the work!
4. Before driving, check the area around and under the vehicle (children!). You must have enough sight!
5. The clothes of the operator shall fit narrowly. Avoid loose clothes.
6. Keep the system clean in order to avoid fire danger.
7. The transport of persons on the loading area is not allowed!

Driving operation

1. The driving speed must always correspond to the surrounding condition. Avoid a sudden turn during trips in mountains and valleys.
2. Observe the perm. axle loads and total weights!
3. Observe the max. perm. Support load of the trailer coupling!

Parking the vehicle

The vehicle must be secured so that it can not roll away (parking brake, chocks)

Hydraulic system

Only workers with special knowledge and experiences in the hydraulic can work on hydraulic devices!

1. There is a high pressure on the hydraulic system!
2. Use the corresponding devices for the search of leaks! Danger of hurt.
3. The hydraulic system must be totally without pressure before starting repair works.
4. Components moved by hydraulic cylinders have to be secured mechanically before working on the hydraulic system.

Brakes

1. Check the function of the brakes before each trip!
2. A detailed examination must be made regularly as for the brake systems!
3. Adjustments and repair works on the brake system can only be made by specialized workshops or recognized brake services!

Wheels and tires

1. Check that the vehicle is parked safely and secured so that it can not roll away (chocks) for works on the tires.
2. Repairs on the tires can only be made by specialists and with the suitable mounting tools!
3. There is a danger of explosion if there is a too high air pressure on the tires!
4. Check the air pressure regularly!
5. Tighten the wheel screws with the corresponding tightening torque! (see page)

2. * Technical data

Weights:

Please find the current weights in the vehicle documents

Perm. drawbar trailer total weight:	_____kg
Perm. drawbar trailer axle load front.	_____kg
Perm. drawbar trailer axle load rear	_____kg
Dead weight approx.	_____kg
Payload with irregular load distribution approx.	_____kg

Dimensions:

Total length incl. drawbar, without ramps...	_____ mm
Loading length including ____ mm drive-up slope	_____ mm
Loading length platform	_____ mm
Loading width	_____ mm
Laden loading height with full capacity approx.	_____ mm

Department for delivery: _____
(date, signature)

* All dimensions are approximate values and may vary depending on the technical design!

3. Operating the trailer

These instructions also describe several functions and equipments which do not belong to the normal scope of supply, but which can be ordered additionally as special equipment.

When combining the train, make sure that the coupling heights match. If this is not the case, the trailer coupling and the drawbar will be damaged.

3.1 Hitching and unhitching of the trailer

Hitching:

Before hitching, proceed as follows:

1. Secure the wheels of the trailer (operate the parking brake and put the chocks under the rear wheels).

2. Adjust the drawbar of the stable trailer exactly to the height of the coupling device by means of the height adjustment device.

3. Open the fifth wheel coupling.

4. The coupling is thus ready and closes when the drawbar eye engages.

When pushing back, the co-driver or assistant must under no circumstances stand between the motor vehicle and the trailer. He must position himself in such a way that he can observe the traffic situation and the coupling process and has visual contact with the driver.
The motor vehicle must always approach the trailer; never let the trailer push.

5. After successful coupling, check the locking.

6. Couple the electrical, hydraulic and air connections. Pay attention that the connections are correct and tight. The lines must give way to all movements without tension, friction and bending when cornering.
   - first line: connect brake line (yellow).
   - second line: connect supply line (red).

7. Put the chocks away and put them in the according supports

8. Release the parking brake of the trailer.

! If combining the train (tractor - trailer) newly, you have to ensure before driving that all connection lines have the necessary length even with the max. steering angle.
Furthermore, make sure that there is adequate clearance between the towing vehicle and the trailer when cornering.

9. Check the function of the brake, light and hydraulic system.

Unhitching:

For unhitching the trailer, proceed as follows:

1. Secure the parking brake of the trailer and additionally block the wheels of the last axle with chocks.

2. Remove electrical, air and hydraulic lines.
   - first line: remove supply line (red)
   - second line: remove brake line (yellow)

   This order must be strictly observed when removing the coupling heads because otherwise the trailer brake would be released.
   Connect the connection couplings to the empty couplings on the drawbar in order to avoid dirt accumulation.

3. Release the coupling, move the towing vehicle forward.

4. The drawbar eye must have about 20 cm ground clearance when uncoupled..

3.2. Loading

The drawbar trailer has been designed for transporting construction vehicles and mixed cargo. The construction vehicles have to be loaded over the ramps; driving onto the drawbar trailer from the side is only permitted if the drawbar trailer is designed particularly for that (special equipment).
Mixed cargo can be loaded with fork lift, portal crane or other corresponding devices.

Keep within the permissible total weights and within the permissible axle loads of the tractor as well as of the drawbar trailer. Overloading reduces life of tyres, axles, springs and chassis frame. In addition the braking distance becomes longer than usual and the safety is herewith reduced. Please make sure that the load is **sufficiently fixed**.

All accessory parts, such as lashing chains, tools, wooden planks, loose floors, widening planks, supports for long material etc., also have to be secured and fixed according to regulations. Pay attention to the fact that these parts cannot slide or fall down in normal driving situations as well as in extreme situations (drastic brake, obstacle-avoidance manoeuvre etc.)..

3.2.1 Loading a container

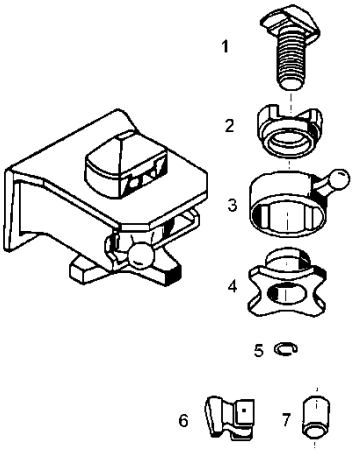
To load the drawbar trailer with a container, proceed as follows.

1. Open the four container locks (fully lowerable execution) and lift the rotatable tensioning bolt 1.

2. Put the container onto the trailer with a suitable device (e.g. portal crane or fork lift) so that the container is centred over the tensioning bolts.

3. After the container is put down, the tensioning bolt 1 has to be turned by 90° until it falls into guide bushing 2. Tighten clamping nut 4 and secure it against loosening by means of the drop securing 6 (or ball securing 7).

To release the container locking you have to proceed in reverse order.



To countersink the tensioning bolt 1, the grooved bushing 3 must be turned so that the guide bushing 2 countersinks in the grooved bushing 3. With the guide bushing also the tensions bolt countersinks completely.
Tighten clamping nut 4 and secure it against loosening by means of the drop securing 6 (or ball securing 7).

3.2.2 Pneumatic low-voltage device for containers

The low-voltage device is controlled via spring-loaded cylinders. This means that the lock can only be opened when sufficient air is available.

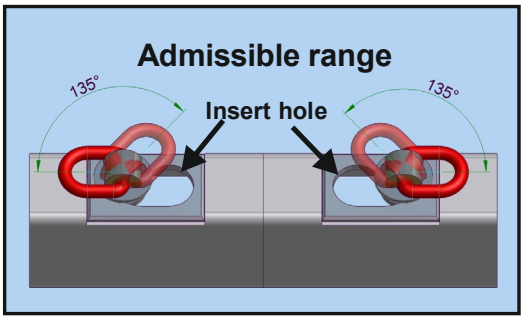
3.2.3 Load securing for containers

The securing of the load is prescribed by the German regulation (StVZO = Road Traffic Licensing Regulations) and VDI 2700, 2701 and 2702.
The load securing of the containers may only be carried out with approved lashing equipment which is suitable for the intended use and designed for the corresponding load conditions or for the expected tensile forces.

3.2.4 Use of the plug-in lashing rings

The plug-in lashing rings may only be used on the positions marked on the drawbar trailer as shown in the drawing. Pay attention that the lashing rings must fit closely in the narrow part.

The use of the lashing rings in the insert hole is not permitted.



3.4. Air suspension

Before driving, let the engine run until the operation pressure in the brake system directed and the driving height of the air suspension is obtained. If existing, check the lever position of the lifting/lowering device or the level adjustment of the ECAS system. Do not drive in any case with air bellows without pressure or partially ventilated air bellows because there is not any balance between the axles or an insufficient balance, and parts of the air suspension might be damaged.

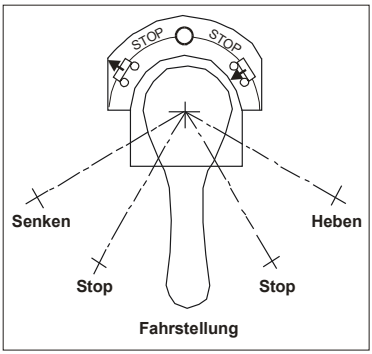
When there is a defect of the air suspension system, the vehicle must be stopped as soon as this is possible without danger, and the air suspension system has to be repaired.

! Because of the sinking of the air suspension, the total trailer weight presses on the spring stops in the air bellows. The vehicle should be driven out of the traffic with walking speed subject to the traffic situation. Please consider that the damages to be expected at the bellows resp. in the air suspension system are increasing considerably the faster you drive and the longer the driving distance is.

Second driving position of the air suspension (special equipment)

The driving height of the air suspension can be raised, e.g. for off-road driving. To do this, the block ball valve on the trailer must be switched according to the signs.

3.4.1 Lift and lower valve



The driving height can be changed by means of the lift and lower valve. This might be required, for example, for loading or unloading or for passing through bridges and gateways.
The lift and lower valve is on the left in the driving direction. To raise or lower the vehicle, the lever must be set to the corresponding symbol. (Note that the lever is locked in the driving position). When the desired height is reached, move the lever to the stop position.
In this lever position, there is no axle load compensation, which means that when driving over obstacles, the entire trailer weight rests on one axle. For this reason, the vehicle may only be driven at walking speed and must be brought into the driving position (lever position in the middle) as soon as possible. The normal driving height adjusts automatically.

Lifting or lowering the air suspension via the WABCO control box

The driving height can be changed by means of the WABCO control box. This might be required, for example, for loading or unloading or for passing through bridges and gateways. By pressing the arrow keys the driving level can be changed correspondingly. Pay attention that outside the normal driving height no axle compensation is made. In this case, when driving over obstacles, the total trailer weight may be carried by one axle. Therefore the vehicle may only be driven at walking speed and must be brought back to driving height (green button) as soon as possible. The normal driving height is automatically adjusted at a speed of 20 km/h.

Electronic adjustment of the air suspension via the WABCO SmartBoard

If your vehicle is equipped with a WABCO SmartBoard, please read the separate operating instructions of the producer.

3.5. Mechanical axle unit

The vehicles can also be equipped with a mechanical axle unit.
These axle units are low-maintenance. The bearing of the equalising device is made in long-lasting special rubber bushes. The axles are guided via the spring and held in place by the trailing arms, in which silent blocks serve as support and damping.

3.6. Brake system

Automatic load-depending two-line compressed air brake including parking brake according to EU regulations; with ABS system, including sensors for the axles.

3.6.1 Parking brake

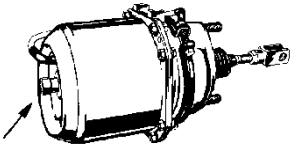
Do not operate the parking brake immediately if the brake is overheated because otherwise the brake drums / brake discs might be damaged (cracks).

This kind of parking brake is a linkage-free brake which effects on the wheels of the axle(s). The brake force is produced by a robust spring, which is mounted in the spring parking brake cylinder. The advantage is that, even when there is no supply of pressure, the brake is nevertheless effective. The spring is preset with released brake by air pressure which effects on a piston, and therefore the piston rod is released. For braking the spring brake is ventilated by means of the change-over cock. By this the power of the spring effects on the brake via the piston rod. When there is no air supply, the spring brake can be released by a mechanical emergency device.

Before releasing the spring brake, the drawbar trailer must be secured against rolling, because neither the brake system nor the parking brake are working.

There are two different brake cylinder types. Releasing the spring parking brake is made as follows:

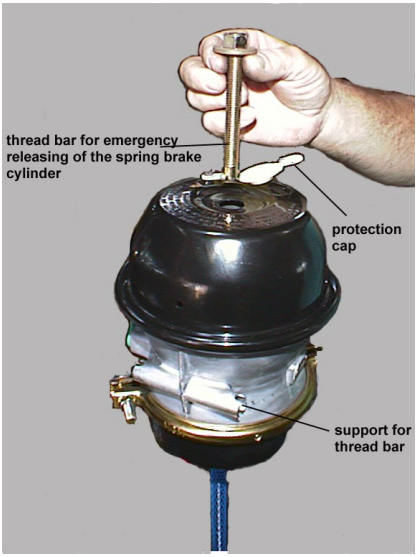
Typ1
For emergency releasing of the spring parking brake, the hex bolt (spanner size 24) at the cylinder has to be screwed out entirely.



Type 2

- Take the thread bar out of its support.
- Remove the protection cap
- Put the thread bar into the bore and fasten it by making a 90° turn.
- By turning the nut (spanner size 19) to the right hand side, the mounted spring is retracted and the brake released.

Before continuing the normal road driving, the cylinder has to be repaired or replaced.



3.7 Antiblock device (ABS)

When pressing the brake pedal too hard, normal brake systems can lock the wheels, especially on slippery streets. By this the steering ability is lost and the braking distance is becoming longer, the vehicle can also skid. The ABS system prevents from this locking of the wheels and keeps the directional control and the steering ability, even during an emergency brake operation. It enables the driver to brake and steer at the same time also in critical situations. Furthermore this device always controls the optimal utilization of the transmittable brake power and cornering forces between the tyres and the road.

But ABS cannot compensate driving habits which are not adjusted to the current traffic and road circumstances. Especially the driver is not exempted from the estimation of brake distances and maximum cornering speed, which are resulting from the constant physical laws.

! When working on vehicles with ABS note the following:

- **Welding on the trailer or tractor**
  Tests have shown, that arc-welding is not dangerous for the ECU, the electronical control unit.
  In this connection it is assumed, that no mechanical and/or electrical components (incl. the ECU box) are used as ground for the welding power.
- **Paintworks**
  The maximum heat for the ECU during paintworks is 85°C.

3.8. Hydraulic equipment

The hydraulic pressure for loading ramps, supports, operation of winches, loading areas to be lifted and lowered hydraulically, detachable gooseneck and hydraulic steering can be built up by different systems.

- by the hydraulic system of the tractor
  The drawbar trailer is fed by the tractor.
  Before it is possible to operate the hydraulic control valves, the engine of the tractor and the auxiliary drive have to be switched on. For this pay attention to the operation instructions of the tractor manufacturer
- by an electric pump assembly (not possible for equipment with hydraulic winch)
  The hydraulic pressure is produced by an electric pump on the drawbar trailer.
  Additionally the button for the electric pump assembly has to be operated during the operation of the hydraulic control valves.

Note that when the drawbar trailer is equipped with batteries, the battery main switch has to be switched on.
In case of voltage supply by the tractor, the corresponding supply cable has to be connected.

- by hand pump
  The required pressure can be produced via a hand pump mounted in the drawbar trailer. This kind of supply is most of the time intended for emergency operation on the un-hitched drawbar trailer..

These kinds of pressure supply can be connected to each other. The change-over between the different systems is made via block ball cocks (for this please note the signage on the vehicle).

! ***The change-over between the systems must be carried out as a basic principle for the pressure line and the return line (2 separate ball cocks), because otherwise it would come inevitably to an overflow of the oil reservoir on the hand pump or to a damage of the hydraulic system in the tractor when operating the tractor hydraulics.***

When connecting a pressure supply system (motor vehicle hydraulic system or pump assembly) to the hand pump there might be problems under certain conditions. The following example shall serve for better understanding.
The vehicle is parked and the hydraulic pressure supply is switched to hand pump operation. The ramps are folded down by operating the hand pump. Due to the lowering the cylinders on the ramps are retracted and the oil situated there flows back into the oil reservoir of the hand pump. If the operation would be stopped at this point and the ramps lifted by means of the hydraulic system of the tractor, the oil level in the reservoir remains unchanged. That means that when lowering the ramps by the hand pump next time, the oil level in the reservoir would increase so that the reservoir would overflow.
To avoid this we recommend completing each commenced working motion in one operation circuit. That means that the lifting **and** lowering motion of a cylinder is carried out by operating the hand pump.
If this should not be possible because of a defect, note the oil level in the reservoir of the hand pump and adjust it correspondingly by letting off or refilling some oil. In driving condition of the trailer the oil level should be 2/3 of the reservoir volume.

In the following description it is assumed that the „hydraulic pressure supply“ is provided from the tractor. If other supply systems are installed, these ones have to be treated analogically.

3.9. Hydraulic support

The hydraulic support serves for increasing the stability and for relieving the axles when loading and unloading. Before lowering the ramps the supports must be pulled out as far as they have ground contact. The supports shall avoid that the last axle is overloaded during loading. For this pay attention that the ground under the support feet has sufficient carrying capacity; if necessary, put wooden planks under the supports.
The support cylinders are controlled via the hydraulic valves mounted in the rear area under the outer frame (for this, please note the signage on the vehicle). For safety reasons the cylinders should be moved only one by one.

3.9.1 Hydraulic support for docking the spreading ramps to a loading ramp

This hydraulic support serves for lifting the vehicle rear part in order to be able to dock the spreading ramps to a loading ramp. Pay attention that the ground under the support feet has sufficient carrying capacity; if necessary, put wooden planks under the supports.
The support cylinders are controlled via the hydraulic valves mounted in the rear area under the outer frame (for this, please note the signage on the vehicle). For safety reasons the cylinders should be moved only one by one.

To support the low-bed drawbar trailer, proceed as follows:

1. Place the vehicle on even, carrying ground.

2. To avoid a continuous adjusting of the air suspension, the ECAS system must be switched to “STOP” position. Please note the instructions in paragraph 3.5

3. Place aluminium jacks under the support cylinders.

4. Lift the vehicle evenly by operating the hydraulic control valves. The control valves for doing so can be found on the right hand side in driving direction.

To lower the vehicle, pay attention to following points:

1. Lower the vehicle via the hydraulic control valves just as far as the wheels have ground contact.

2. Switch the ECAS system to driving position (normal levels I, II or III). Visual check of the air bellows!

3. Retract the support completely and take away the aluminium jacks.

3.10 Important hints for using the hydraulic loading ramps

For driving on the loading ramps, the following hints must be paid attention to:

1. If the illumination equipment is hidden when the ramp is folded down, the other road users must be warned. This can be made e.g. by means of the warning triangle or the yellow revolving lamp.

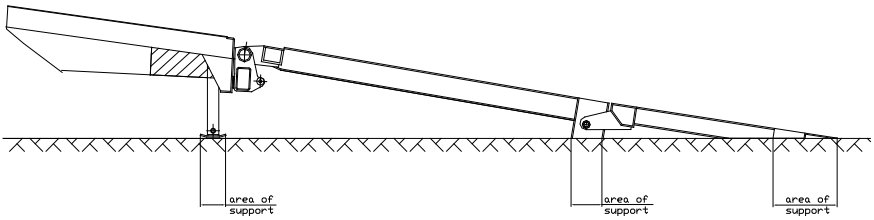
2. The loading ramps have to be shifted laterally in a way that they correspond to the wheel track of the vehicle to be loaded. One-sided loading of the ramps leads inevitably to damages on the ramp and the ramp bearing.

3. Loading ramps covered with floor grid may be driven on with track-type vehicles only when laying an appropriate cover (e.g. conveyor belt rubber) between chain and floor grid.

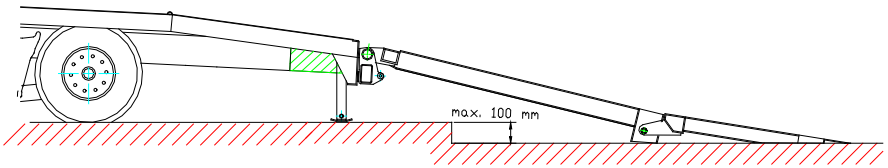
4. For driving on the loading ramps the air suspension should be in driving position in normal case so that part of the load is taken by the air suspension. The air suspension must in no case be lowered completely.

5. The place for loading / unloading of the low-bed trailer should be chosen in a way that the ramp tips, the ramp middle sections and the support feet have a firm, even contact surface.

Depending on the local circumstances this can possibly be made by putting wooden planks under or by changing slightly the vehicle height via the lift/lower valve.



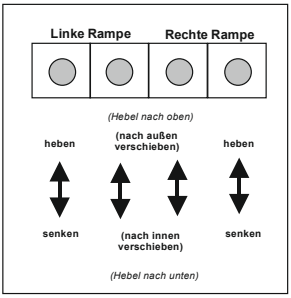
6. To avoid an overload of the last axle, the support must be folded down / telescoped before driving onto the loading ramps. Pay attention to following points:
   - The ground under the support feet must have sufficient carrying capacity; if necessary, put wooden planks under
   - When the support foot is folded down / telescoped, the distance between support plate and ground must not be larger than the remaining suspension travel of the axle; if necessary, compensate by putting under wooden planks



   - When driving onto the ramp, the vehicle rear part is compressed and the load has to be carried by the support legs.
   - After the normal driving height is adjusted in the air suspension, the supports can be retracted / pulled in without difficulty.

3.10.1 Folding down the loading ramps

It is forbidden to stay in the area of danger of the ramps!



The ramps must have a firm, safe support in folded down condition, not lower than the tyres are standing. The vehicle must not be driven with folded down ramps.

The control valves for folding down and shifting the loading ramps are mounted in the rear area on the right-hand side under the outer frame.

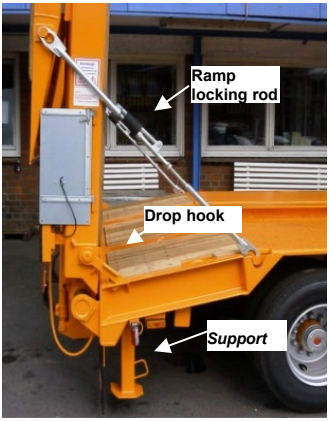
To fold down the ramps, proceed as follows:

1. Make sure that the vehicle rear part is supported safely to avoid an overloading of the last axle.

2. Release the ramp locking
   Push up rubber sleeve, open turnbuckle and hang out ramp locking rod. Or remove lashing strap.

3. Operate the ramp control valve shortly into direction „lower ramp". When doing so, the ramp no longer leans against the drop hook and the hook can be pulled up.

4. After the ramp is no longer locked, it can be folded down completely. When doing so, the ramp is automatically spread by the expanding rod. The ramp control valves are mounted in the rear area under the outer frame.



For safety reasons it is allowed to move the ramps only one by one. When folding down the ramps pay attention that there is nobody or nothing in the pivoting range of the ramp. If you cannot see one of the ramps because of loaded goods, a second person must assist as observer.

5. The ramps are folded up in reverse order.

Before starting to drive the ramp securing device must be locked and duly secured again because otherwise the ramp and the ramp mounting could be damaged.

Due to decreasing hydraulic pressure on the ramp cylinders, the ramp is moving after some time. Depending on driving behaviour and road conditions hard chocks and pushes can occur leading to damages on the ramp bearing / breaking off of mounting parts.

3.10.2 Hydraulic ramp shifting device

The ramps must be shifted in vertical position only.

To shift the ramps, proceed as follows:

- Release ramp locking
- Operate the ramp control valve shortly into direction „lower ramp”. When doing so, the ramp no longer leans against the drop hook and the hook can be pulled up.
- This ramp can be shifted now by operating the corresponding control valve.
- Before starting to drive the ramps must be brought back to driving position (drop hook lying in the recess), and the ramp securing device must be locked and duly secured.

3.10.3 Docking the ramps to a loading ramp (special equipment)

Pay attention that for docking the spreading ramps to a loading ramp an additional support is required.

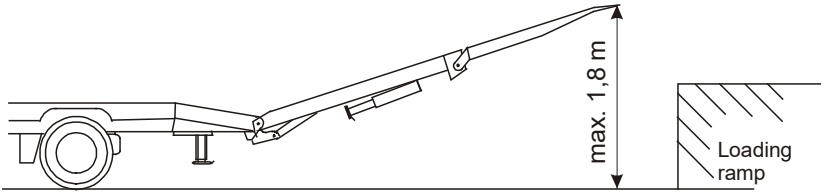
To dock the spreading ramps to a loading ramp, proceed as follows:

1. Place the vehicle with a distance of at least 5 m to the loading ramp.

2. Fold down ramps as described under point 3.10.1.

3. Lock spreading joint of the ramp with bolts.

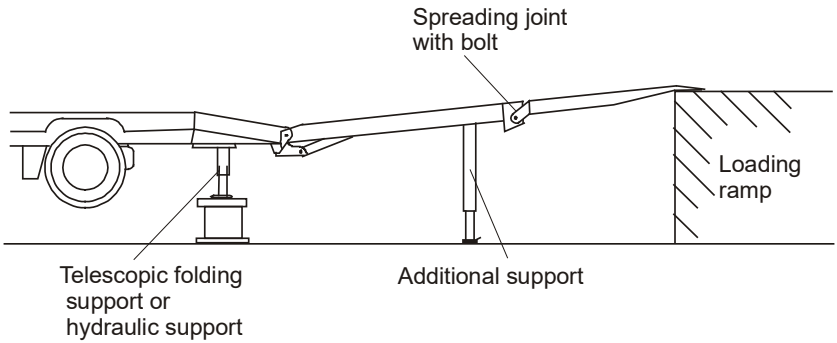
4. Lift the ramps by operating the hydraulic control valves just that high that the vehicle can be backed up to the loading ramp.



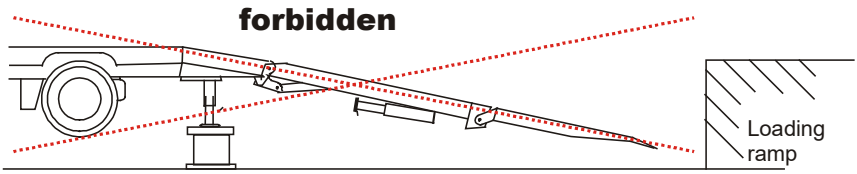
! The ramp must be lifted only that high that the ramp tip is max. 1.8 m above ground. Otherwise there is the danger that the spread rod loosens out of its bearing.

5. Drive the vehicle to the ramp; if necessary, ask someone for assistance.

6. Fold down additional support on the ramp and pull out to corresponding length.



7. Lower spreading ramp and lift the vehicle via the hydraulic support until you have safe seat on the loading ramp.



! It is forbidden to lower the ramp completely when the low-bed drawbar trailer is supported because the ramp spreading rod would inevitably be damaged.

3.11. Important hints for using the servo loading ramps

For driving on the loading ramps, the following must be paid attention to:

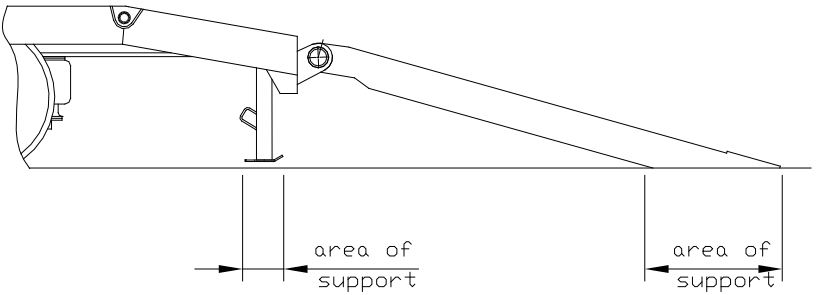
1. If the illumination equipment is hidden when the ramp is folded down, the other road users must be warned. This can be made e.g. by means of the warning triangle or the yellow revolving lamp.

2. The loading ramps have to be shifted laterally in a way that they correspond to the wheel track of the vehicle to be loaded. One-sided loading of the ramps leads inevitably to damages on the ramp and the ramp bearing.

3. Loading ramps covered with floor grid may be driven on with track-type vehicles only when laying an appropriate cover (e.g. conveyor belt rubber) between chain and floor grid.

4. For driving on the loading ramps the air suspension should be in driving position in normal case so that part of the load is taken by the air suspension. The air suspension must in no case be lowered completely.

5. The place for loading / unloading of the low-bed trailer should be chosen in a way that the ramp tips, the ramp middle sections and the support feet have a firm, even contact surface.
   Depending on the local circumstances this can possibly be made by putting wooden planks under or by changing slightly the vehicle height via the lift/lower valve.



6. To avoid an overload of the last axle, the support must be folded down / telescoped before driving onto the loading ramps. Pay attention to following points:

- The ground under the support feet must have sufficient carrying capacity; if necessary, put wooden planks under
- When the support foot is folded down / telescoped, the distance between support plate and ground must not be larger than the remaining suspension travel of the axle; if necessary, compensate by putting under wooden planks
- When driving onto the ramp, the vehicle rear part is compressed and the load has to be carried by the support legs.
- After the normal driving height is adjusted in the air suspension, the supports can be retracted / pulled in without difficulty.

3.11.1 Folding down the loading ramps

Before moving the ramps, it must be ensured that there are no persons or things in the swivelling area of the ramps. The ramps must have a firm, safe support in folded down condition, not lower than the tyres are standing. The vehicle must not be driven with folded down ramps.

To fold down the ramps, proceed as follows:

1. Make sure that the vehicle rear part is supported safely to avoid an overloading of the last axle.

2. Release the ramp locking. For doing so, the turnbuckle on the ramp locking rod must be released and the rod hung out.

3. The ramp can be folded down when releasing the hook (2nd safety device) at the same time.

4. Folding up the ramps is made in reverse order.

5. Before driving, the ramp safety device must be locked and duly secured.

3.11.2 Shifting the loading ramps

The servo ramps can be shifted by means of the rod. For shifting, the ramp must be in vertical position and the ramp locking must be released.

Attention: The ramp is no longer secured and might fold down; do not enter the swivelling area of the ramp.

3.11.3 Important hints for using the ramps

For driving on the loading ramps, the following must be paid attention to:

1. If the illumination equipment is hidden when the ramp is folded down, the other road users must be warned. This can be made e.g. by means of the warning triangle or the yellow revolving lamp.

2. The loading ramps have to be shifted laterally in a way that they correspond to the wheel track of the vehicle to be loaded. One-sided loading of the ramps leads inevitably to damages on the ramp and the ramp bearing.

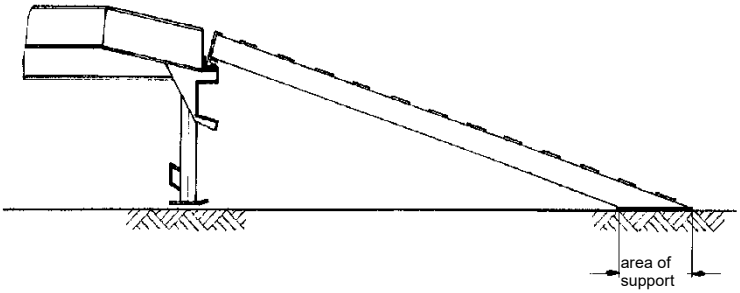
3. The ramps must be secured against slipping. According to the directive of the German trade association a gradient of 30% (16.5 degrees) must not be exceeded.

   ! Loading ramps made of aluminium may be driven on with track-type vehicles only when laying an appropriate cover (e.g. conveyor belt rubber) between chain and floor grid.

4. For driving on the loading ramps the air suspension should be in driving position in normal case so that part of the load is taken by the air suspension. The air suspension must in no case be lowered completely.

5. The place for loading / unloading of the low-bed trailer should be chosen in a way that the ramp tips and the support feet have a firm, even contact surface in order to avoid a “wobbling”.

Depending on the local circumstances this can possibly be made by putting wooden planks under or by changing slightly the vehicle height via the lift/lower valve.



6. To avoid an overload of the last axle, the support must be folded down / telescoped before driving onto the loading ramps. Pay attention to following points:
   - The ground under the support feet must have sufficient carrying capacity; if necessary, put wooden planks under
   - When the support foot is folded down / telescoped, the distance between support plate and ground must not be larger than the remaining suspension travel of the axle; if necessary, compensate by putting under wooden planks
   - When driving onto the ramp, the vehicle rear part is compressed and the load has to be carried by the support legs.
   - After the normal driving height is adjusted in the air suspension, the supports can be retracted / pulled in without difficulty.

3.13. Mechanic forced steering

The steering impulse is carried out via the fifth wheel coupling by means of the steering wedge and from there via steering rods and steering arms on the wheels of the rear axles.
For stabilization when driving straight-on, a steering stabilizer is mounted in the vehicle rear part. If the complete drawbar trailer is aligned straight, the roles of the stabilizer must abut on the slot of the guiding curves.
The steering is adjusted before collection of the vehicle by the works. The mechanic forced steering must only be adjusted in a specialised workshop. In case of failures please immediately make an appointment with our customer service for the purpose of new adjustment.

3.13.1 Pressure adjustment of the steering stabiliser (only with mech. axle unit)

Different trailer loads also require different levels of pressure on the steering stabiliser. The adjustment is made by the adjusting valve with the options "empty", "half load" and "full load".
Before starting each drive, the stabilising pressure must be set according to the load.
For example, the rear axles of a loaded trailer set to "empty" would not be sufficiently stabilised when driving straight ahead; the impression of "*floating*" could arise.
Optimum driving and steering behaviour also requires a correctly set stabilising pressure.

3.14. Trailing steered axle

The drawbar trailer can be equipped with a trailing steered axle.
The stabilisation for driving straight-on is made over compressed air cylinders which get pressure depending on the load and therefore counteract the steering motion.
When cornering, a steering angle of the axle is produced by the lateral forces occurring. To avoid this steering angle, e.g. when backing-up, the axle must be blocked. For this the axle has to be in “straight” position. Depending on the equipment the axle can be blocked optionally from the tractor via an electric switch or directly on the trailer by a block ball cock (according to the signage). The steering linkage of the axle is locked by a bolt moved by a compressed air cylinder.

! To avoid an uncontrolled steering angle of the axle, it must be blocked before backing-up.

3.15. Folding loading bed widening

The low-bed drawbar trailer can be equipped with a loading bed widening by up to 250 mm per side. When driving with loading bed widening following safety measures have to be paid attention to:

1. All widening planks have to be fixed and secured with the bolts in a way that under ordinary driving situations they cannot slide or fall down.

2. The excess width has to be marked with warning signs or other safety identifications according to DIN 30710.
   In addition the corresponding road regulations have to be observed. Driving with excess width requires an exceptional approval.

3. When driving without loading bed widening pay attention that all folding supports are folded in and are locked in this position by means of the retaining spring. The widening planks have to be safely fixed on the vehicle.

3.16. Hydraulic winch

For the equipment with hydraulic winch please note the separate operating and maintenance instructions of the winch manufacturer.

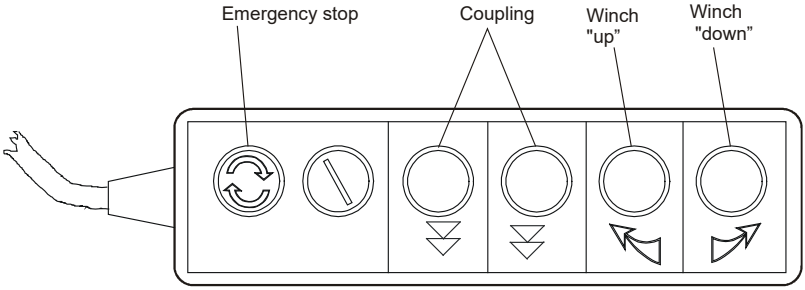
! Please note that before putting into operation of the winch the separate leak-oil pipe must be connected (not required for Ramsey winches).

The winch can be controlled by three different ways.

1. **By the hydraulic control valve,**
   mounted on the right side in driving direction under the outer frame. Here the movements “up” and “down” are possible. The wider the control lever is brought out of its neutral position, the higher the rope speed.

2. **By the remote control (special equipment).**
   To produce the voltage supply for the remote control, the parking light and the key switch of the control unit for the hydraulic steering have to be switched on.

The remote control can be connected to one of the two sockets mounted in the middle of the vehicle. The steering options are winch “emergency stop”, “up” and “down” and “coupling”. For operating the coupling both buttons have to be pressed and kept pressed at the same time. Now the rope can be pulled from the winch manually by a helping person.



3. By the radio control

To establish the voltage supply for the radio remote control, the parking light must be switched on.

When operating the winch by the radio control it comes to a delayed “switching on” and “off” of the winch; that means that the winch is running for some seconds (approx. 30 cm rope) after releasing the button of the radio control.

The receiver with „emergency stop switch“ of the radio control is mounted on the left side on the additional control unit. It can be controlled winch “coupling”, “up” and “down”.

3.17 Lubrication assistance

If equipped with a lubrication assistance, all lubrication points of the steering mechanic difficulty accessible are shifted to the outside. There are lubricating nipples for filling the lubrication line.

! For lubrication, carry out max. 3 strokes with a usual grease-gun. Otherwise the pressure in the line system might increase so that the lines burst.

3.22 Central lubrication system (special equipment)

The vehicle can be equipped, if requested, with a central lubrication system. The central lubrication system is filled with grease of "Li" quality. Please note when refilling the system, that grease of the same specification is used. For progressive systems we recommend grease with EP additive (**extreme pressure**). Grease of that kind keeps its lubricity also at high pressures. Some surplus grease will come out at some points because of the different grease consumption. In order to avoid tamping at these points, we recommend clearing away this surplus grease regularly (every three months).

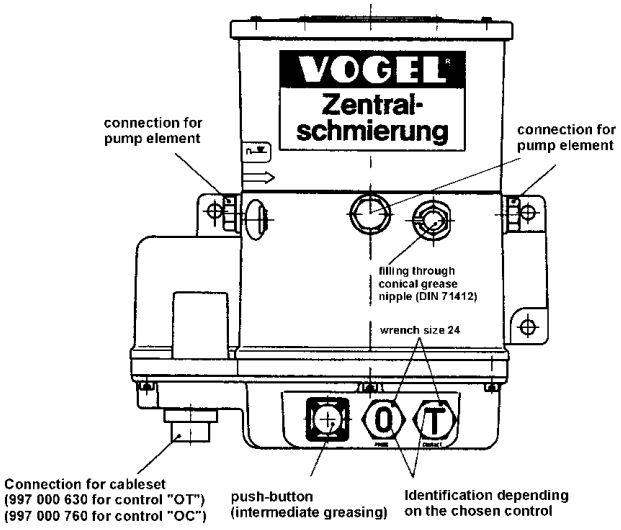
Vogel progressive central lubrication system with piston pump KFGS

The Vogel central lubrication system is a progressive system which can supply grease up to NLGI Kl. 2 (**use grease with EP additives**). Progressive means that the greasing points of a central lubrication system are all greased one after the other. Due to this greasing of the greasing points in succession it is possible to control a progressive central lubrication system very easily by means of a pressure relief valve. If a greasing point would not take any grease from the distributor, the progressive distributor blocks and in the central lubrication system a pressure of 280 bars is built up. Over a pressure relief valve on the pump the grease is sprayed.

Structure of the Vogel central lubrication system:
The electrically driven piston pump KFGS has 3 grease outlets for the connection of 3 progressive distributor circuits which are independent from each other. For each outlet a separate pump element is required.
There are fixedly adjusted and adjustable pump elements. The adjustable pump elements are used if a loading crane shall be connected to the central lubrication system.
The task of these pump elements is to distribute the grease to the progressive sub-distributors in the right relation. The progressive sub-distributors then supply the grease to the individual greasing points.

The electric control of the stop time and greasing time of the pump can be done in two different ways (depending on time or on pulse).

The filling of the supply reservoir is done via a conical grease nipple according to DIN 71412.



! Pay attention to cleanliness when filling!

Function and adjustment of the system
(execution "OC – pulse [brake light] controlled)
For this kind of central lubrication system the supplied grease rate depends on the frequency of the braking because the pump is controlled through the brake light.
With every brake operation - lighting up of the stop lamps - , the pulse counter in the control unit is increased by one. That means that depending on the use and the driving style an individual adjustment of the supply rate must be done. For vehicles which are used for long distances or which are equipped with a wear free brake (retarder) for example smaller stop times (pulse number) or longer contact times (pump running time) can be adjusted than for vehicles which are mainly used in the town traffic.

The duration of the stop time (pulse number) between two greasing procedures (1-200 pulses) can be adjusted by means of a screwdriver behind the screw plug labelled with "O" on the front side of the pump assembly, the pump running time (1-22 min.) behind the screw plug labelled with "C".

Before changing the values which were adjusted in the factory, you should write them down. This might be useful for finding an average value at a later point of time.

Pulse number:_____ pulses

Pump running time:_____ minutes

Intermediate greasing

When the ignition is switched on and the brake is operated (stop lamp lights), an intermediate greasing can be activated with the push-button on the housing of the pump.
During the whole greasing procedure the brake must remain operated.
This greasing pulse should be done directly after each car wash.

The adjustment in the factory is based on experimental values. We recommend to check the central lubrication system in the first weeks after putting into operation for following points and to adapt the adjustment according to your wishes.

- **Sufficient dosage on the bearing points – grease collar (depending on the construction of the bearing and the conditions of use).**
- **Check piping (greasing points, torn off hoses, leaks)**

Ventilation of the system

If the grease reservoir was inadvertently completely emptied, it might be necessary to ventilate the system.
This is done as follows:

1. Unscrew the main line from the pump outlet.
2. Activate the additional greasing pulse until bubble-free grease escapes the pump outlet.
3. Reconnect the main line.
4. Activate additional greasing pulse.

Function and adjustment of the system (execution "OT – time controlled)

The system works fully automatic. Greasing is made dependent on the operation hours of the vehicle (= on period of the ignition). When the ignition is switched on the operation hours are added up and saved when the ignition is switched off.

The duration of the stop time between two greasing procedures (0.25 up to 14 hours) can be adjusted by means of a screwdriver behind the screw plug labelled with "O" on the front side of the pump assembly, the pump running time (1-22 min.) behind the screw plug labelled with "T".

Before changing the values which were adjusted in the factory, you should write them down. This might be useful for finding an average value at a later point of time.

Stop time: _____ hours

Pump running time:_____ minutes

Intermediate greasing

When the ignition is switched on, an intermediate greasing can be activated with the push-button on the housing of the pump.
This greasing pulse should be done directly after each car wash. For the optimum distribution of the grease on the crane foot the crane must be swung several times during the greasing pulse.

For the equipment with loading crane it is possible to install alternatively 2 adjustable pump elements on the pump; a pump element which is not adjustable for the greasing of the trailer and each 1 adjustable pump element for the greasing of the crane foot and crane arm.

When adjusting the central lubrication system the following must be paid attention to:

1. **First of all the adjustment for the drawbar trailer must be done.** For this the greasing time (running time of the pump) and the stop time are adjusted. These adjustments must be chosen in a way that the drawbar trailer is duly greased.
   When parking the vehicle the greasing and stop times are interrupted and the accumulated data are saved. When switching on the ignition again, the functional flow begins at the point of interruption. The optimum adjustment should be in a way that after one week of operation there should be a narrow (approx. 2 mm) grease collar on a greasing point, e.g. on the brake camshaft of the axle.

2. The adjustment for the loading crane is done by a quantity regulation on the pump elements. Here different grease quantities for the crane foot and crane arm can be adjusted. The pump elements are directly mounted on the pump. An adjustment range of 0.8 cm³ per minute (min.) up to 2.4 cm³ per minute is possible. The optimum adjustment should be in a way that after one week of operation there should be a narrow (approx. 2 mm) grease collar on a greasing point.
   In the factory, the system is adjusted to the maximum supply rate (2.4 cm³/minute).

When changing the greasing times for the drawbar trailer the grease quantities for the crane must also be adapted, if necessary.
If for example the stop time is reduced, the more often grease is supplied from the pump to the distributors. In case that the greasing on the crane should remain the same, the supply rate on the pump element must be reduced.

The adjustment in the factory is based on experimental values. We recommend to check the central lubrication system in the first weeks after putting into operation for following points and to adapt the adjustment according to your wishes.

- **Sufficient dosage on the bearing points – grease collar (depending on the construction of the bearing and the conditions of use).**
- **Check piping (greasing points, torn off hoses, leaks)**

Ventilation of the system

If the grease reservoir was inadvertently completely emptied, it might be necessary to ventilate the system.

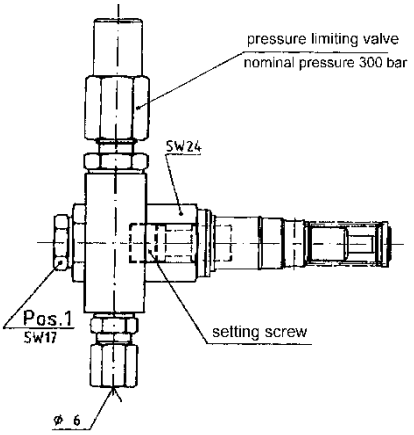
This is done as follows:

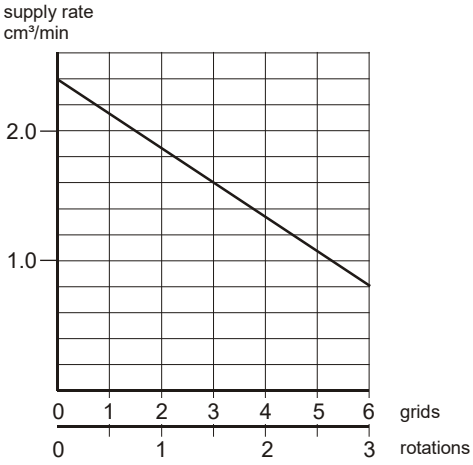
1. Unscrew the main line from the pump outlet.
2. Activate the additional greasing pulse until bubble-free grease escapes the pump outlet.
3. Reconnect the main line.
4. Activate additional greasing pulse.

Adjusting the supply rate on the adjustable pump elements

For adjusting the supply rate, you must keep to the following instructions.

- Remove screw plug pos. 1 by means of hexagon socket spanner (spanner size 17).
- Adjusting the setting screw is made by a hexagon socket spanner (spanner size 8).
- Turning in clockwise direction reduces the supply rate.
- Turning in anti-clockwise direction increases the supply rate.
- Max. lift of the setting screw = 3 rotations = 6 grids
- 1 rotation of the setting screw = 1 mm = 2 grids
- After the adjustment attach and tighten screw plug pos. 1 with sealing ring DIN 7603-A 14x18 Cu.

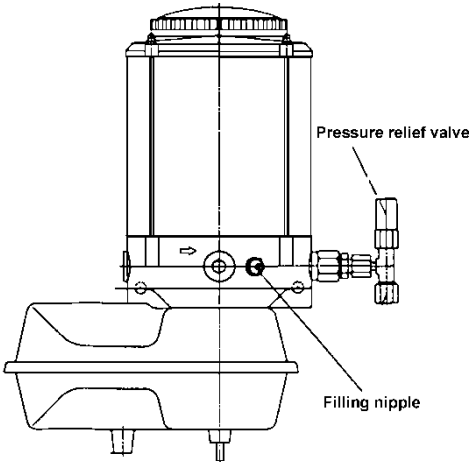




BEKA-MAX progressive central lubrication system with electric pump EP-1

The BEKA-MAX central lubrication system is a progressive system which can supply grease up to NLGI Kl. 2 (use grease with EP additives). Progressive means that the greasing points of a central lubrication system are all greased one after the other. Due to this greasing of the greasing points in succession it is possible to control a progressive central lubrication system very easily by means of a pressure relief valve. If a greasing point would not take any grease from the distributor, the progressive distributor blocks and in the central lubrication system a pressure of 280 bars is built up. Over a pressure relief valve on the pump the grease is sprayed.

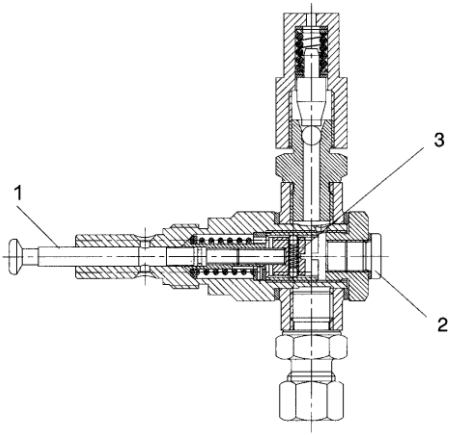
Structure of the BEKA-MAX central lubrication system:
An electrically driven piston pump EP-1 supplies the grease to the main progressive distributor. The task of this main distributor is to distribute the grease to the progressive sub-distributors in the right relation. The progressive sub-distributors then supply the grease to the individual greasing points**. It is possible to mount on request an electrical control unit controlling the stop time and greasing time of the pump.**
The filling of the supply reservoir is done via a conical grease nipple according to DIN 71412.

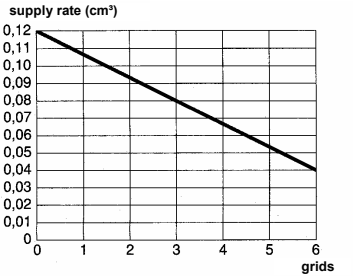


Adjusting the progressive central lubrication system, type BEKA-MAX
Regarding this kind of central lubrication system, the quantity of grease depends on the frequency and duration of the braking actions because the pump is controlled via the stop light. That means that there must be an individual adjustment of grease quantity according to use and kind of driving. E.g. vehicles which run long distance must be adjusted with a higher supply rate per braking than vehicles which are used mainly in city traffic.
The adjustment is made at the pump element adjustable as regards the quantity. This is mounted directly at the pump. It is possible to adjust from 0.12 cm³ per pump lift (max.) to 0.04 cm³ per lift. The optimum adjustment should be in a way that after one week of driving there is a small collar of surplus grease (approx. 2 mm) at a greasing point, e.g. at the brake shaft of the axle.
The factory setting of the system is the max. supply rate (0.12 cm³/per lift).

Adjusting the supply rate

For adjusting the supply rate, you must keep to the following instructions.
- Remove screw plug (2) by means of hexagon socket spanner (spanner size 5).
- Adjusting the adjustment disc (3) is made by a screwdriver.
- Turning in clockwise direction reduces the supply rate.
- Turning in anti-clockwise direction increases the supply rate.
- Max. lift of the adjustment disc = 2.4 mm = 6 grids
- 1 rotation of the adjustment disc = 0.8 mm = 2 grids
- Tighten screw plug (2) incl. joint ring.



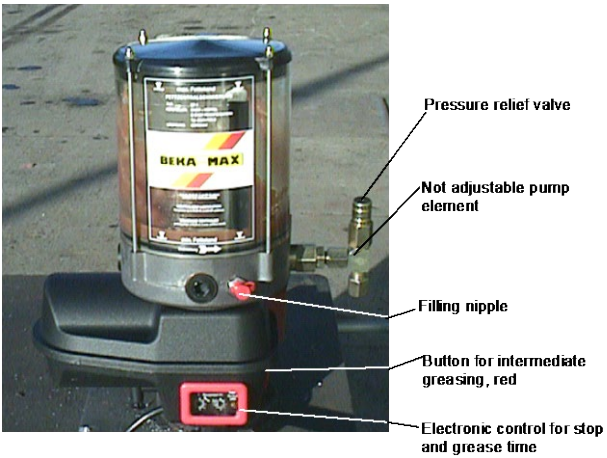


BEKA-MAX progressive central lubrication system with electric pump EP-1 and integrated control unit S-EP 4

The BEKA-MAX central lubrication system is a progressive system which can supply grease up to NLGI Kl. 2 (only use grease with EP additives). Progressive means that the greasing points of a central lubrication system are all greased one after the other. Due to this greasing of the greasing points in succession it is possible to control a progressive central lubrication system very easily by means of a pressure relief valve. If a greasing point would not take any grease from the distributor, the progressive distributor blocks and in the central lubrication system a pressure of 280 bars is built up. Over a pressure relief valve on the pump the grease is sprayed.

Structure of the BEKA-MAX central lubrication system:
An electrically driven piston pump EP-1 supplies the grease to the 3 main progressive distributors. The task of these main distributors is to distribute the grease to the progressive sub-distributors in the right relation. The progressive sub-distributors then supply the grease to the individual greasing points.

The stop time and grease time of the pump is controlled by an electronic control unit.
The filling of the supply reservoir is done via a conical grease nipple according to DIN 71412.



! Pay attention to cleanliness when filling!

Function and adjustment of the Beka-Max central lubrication system

The Beka-Max central lubrication system works fully automatically and depending on the operation hours. The grease time (operation time of the pump) and the stop time are adjusted. These adjustments must be chosen in a way that the drawbar trailer is duly greased. The factory setting of the grease and stop time can be found in the enclosed instructional note.
If e.g. a grease time of 3 minutes and a stop time of 8 hours are adjusted, the central lubrication pump is switched on every 8 operation hours for 3 minutes. When parking the vehicle the greasing and stop times are interrupted and the accumulated data are saved. When switching on the ignition again, the functional flow begins at the point of interruption. The optimum adjustment should be in a way that after one week of operation there should be a narrow (approx. 2 mm) grease collar on a greasing point, e.g. on the brake camshaft of the axle.

The adjustment in the factory is based on experimental values. We recommend to check the central lubrication system in the first weeks after putting into operation for following points and to adapt the adjustment according to your wishes.

- **Sufficient dosage on the bearing points – grease collar (depending on the construction of the bearing and the conditions of use).**
- **Check piping (greasing points, torn off hoses, leaks)**

Intermediate greasing

When the ignition is switched on, an intermediate greasing can be activated with the red push-button on the housing of the pump. During the greasing process the yellow LED in the window control lights.
This greasing pulse should be done directly after each car wash.

Ventilation of the system

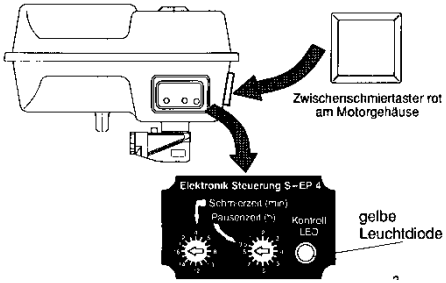
If the grease reservoir was inadvertently completely emptied, it might be necessary to ventilate the system.
This is done as follows:

1. Unscrew the main line from the pump outlet.
2. Activate the additional greasing pulse until bubble-free grease escapes the pump outlet.
3. Reconnect the main line.
4. Activate additional greasing pulse.

Adjustment of the stop and grease time
To adjust the stop and grease times, proceed as follows:

1. Remove the red frame of the control unit on the housing of the pump with a flat screwdriver and remove the 4 cross-head screws as well as the transparent lid.

2. Adjust the stop and grease time on both switches by means of a screwdriver.



3. If you do not duly close the control unit, water might penetrate. In this case the guarantee expires.

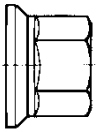
4. National obligations

The corresponding national regulations have to be observed.

5. First inspection

After 50 km driving, check the fixed seat of the wheel nuts. Check it again after 50 km loaded driving (also after each wheel change).

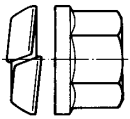
BPW axle with spigot alignment	630 Nm
SAF axle with spigot alignment	600 Nm



M 22x1,5

Wheel nut with pressure plate

BPW axle with bolt centring	510 Nm
SAF axle with bolt centring	430 Nm



M 22x1,5

A first inspection of your trailer / drawbar trailer must be carried out after 500 – 1000 km loaded driving. It should be made, so far as the location of the trailer makes it possible, in our work, otherwise a competent motor vehicle workshop must be called on.
To carry out the first inspection, special technical knowledge and experience with Langendorf vehicles is required, which cannot be given by these short instructions.
For add-on components such as axles, slack adjusters etc. the separate maintenance instructions of the manufacturer in question are valid independently from these instructions.

! If you exceed the time for the first inspection or if it is not carried out at all, guarantee claims cannot be accepted.

The following check list for the first inspection must be filled in by the workshop which carries out the inspection and it must be confirmed by signature and company stamp that the inspection has been made.

For any guarantee claim, this completed list and the corresponding invoice for the first inspection must be presented to the Langendorf service agency where you are lodging the claim.

Check list for the first inspection

Works to be carried out	without defect	does not belong to equipment	defect repaired	Notes
Check fixed seat of the wheel nuts(600/630 Nm)				
Visual check of the axle assembly				
Check shock absorbers and their fixation				
Check air bellow for damage				
Check tightening torque on the spring clips (SAF axle – 700 Nm for thread M24) (BPW axle – 650 Nm for thread M24)				
Check tightening torque of screws M30 – 1100 Nm				
Check slack adjuster				
Check axles according to the instructions of the manufacturer				
Check drawbar and trailer coupling.				
Check the height adjustment device of the draw-bar				
Check function of brake system; check connec-tions for tightness				
Check brake-piston stroke				
Check function of parking brake				
Make brake balance for road train between tractor and trailer.				
Check lighting system				
Visual check of vehicle frame				
Check oil level in hydraulic tank				
Check function and tightness of hydraulic system				
Exchange hydraulic filter				

Works to be carried out	without defect	does not belong to equipment	defect repaired	Notes
Check track; if necessary, adjust it				
Check the tight fit of the turntable screws				
Grease the turntable				
Check loading bed extension				
Grease ramp shaft				
Grease steering mechanic				
Retighten all screwed connections with directed tightening torque				
Check tires regarding pressure/pattern/damage				
Grease all lubrication points				
Grease the parts which are stressed with friction (without nipple)				
Check and adjust central lubrication system				
Driving test				

Notes regarding the first inspection: _____

_____

_____

_____

_____

_____

_____

_____

First inspection – Service Card

Dear Customer

Please have confirmed the execution of the first inspection by your Langendorf service workshop with date, signature and stamp.

Should the unlikely case of a complaint arise and you claim any guarantee service, you must present this confirmation to the Langendorf service agency where you are claiming the damage.

Vehicle type: _____

Chassis number: _____

Date of first registration: _____

Vehicle owner

Company: _____

Street: _____

Place: _____

Industry: _____

The due first inspection of the above-mentioned vehicle was made

on _____

(Stamp / Signature of the service workshop)

6. Maintenance and inspections

6.1 General indications concerning maintenance and inspection works

For all maintenance and inspection works, please also observe valid national regulations.

! Before carrying out any maintenance and inspection works on the unhitched trailer, please pay attention that the vehicle is standing stable. The trailer must be secured against rolling away.

- Before working on or under movable vehicle bodies or body parts in open or lifted position, these parts have to be duly secured or supported against unintentional falling down or closing.

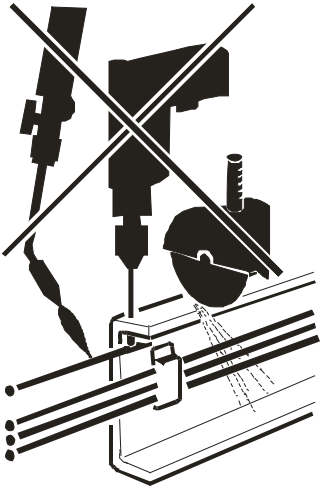
- For carrying out examination and maintenance works, certain special knowledge is required which cannot be given within the scope of these instructions.

- If the service and maintenance works are carried out on your own account, you must pay attention to certain pollution control measures. The legal directions must be kept to for the removal of operation and auxiliary material.

- For welding or adjusting works on the chassis, please ask for our instructions because the trailer has been manufactured by using high-quality special steel.

- For all welding works the air bellows, the parts of the air suspension, plastic and electric lines must be protected against flying sparks and weld splashes

- When welding, drilling or grinding near plastic and electric lines, safety measures such as covering or removal of the lines have to be taken.



Minimum bending radii for plastic lines

Line ø in mm	Material thickness mm	min. bending radius mm
6	1,0	40
8	1,0	40
12	1,5	60
15	1,5	90

- **The maintenance intervals depend on the operation of your trailer**.

We understand by "*normal* operation conditions":	We understand by "*extreme* operation conditions":
- regular "single-shift" operation - paved roads - temporary operation under full load - central European climate	- "multi-shift" operation - long standing times - non-paved (bad) roads - uneven ground - continuous operation under full load - extreme climate (humidity, temperature)

6.1.1 Cleaning of the vehicle

For cleaning the vehicle note following indications:

- Do not use high pressure or steam-jet tools during the first three months. Clean only with cold water without additives during this time.

- Wash with a lot of clear water in order to avoid scratches in the paintwork.

- Avoid water temperatures over 60° C.

- Only use ph-neutral detergent (ph-value 5-8).
  Pay attention to the fact that, especially with aluminium parts, aggressive (acid or alkaline) detergents destroy the protecting oxide coat. This may lead to corrosion or / and to blisters in the paintwork

- Damages in the paintwork have to be repaired professionally without delay.

- The distance between spray nozzle and vehicle must be 30 cm at least.

- Cleaning or rubbing off of chromium-plated piston rods with steam-jet tools or detergents which contain sodium carbonate (alkaline detergents) damage this chromium-plate and destroy the protection against corrosion.

! After having used high-pressure or steam-jet tools, all grease points have to be greased until escaping of grease. With this the possibly entered water is pressed out.

6.2. Regular maintenance and examination works

The following instructions refer to normal road conditions. In case of extraordinary conditions the maintenance works must be made more often. The repair of noted damages or change of wearing pieces must be made in a competent workshop if the owner of the vehicle has not the corresponding experts and the required technical devices to do it in his own works.

6.3. Examinations before driving

Each driver should make a habit to check his vehicle every day before driving with regards to traffic and functional safety. The careful execution of the following examinations is the condition for a long durability of the vehicle, for the safety of the driver and all other road users.

- **Check tires**
  The air pressure of all wheels incl. spare wheel must be checked according to the instructions of the tire manufacturer in dependence with the axle load. Regular visual examinations must be made on tires for damage and pattern.

- **Water of condensation**
  If there is no air pressure drier or if no automatic drainage valves are installed, you must drain off the water of condensation every day in the air tank of the brake system and air suspension. Especially when the weather is cold and wet, there is a lot of water during driving. This might lead to difficulties for releasing the brake cylinders, higher corrosion and freezing of the brake parts.

- **Lighting system/Power consumer**
  Check the function of all power consumers of the electrical system and especially of the lights. Defect bulbs must be exchanged immediately. We recommend having always a range of bulbs and fuses available in the vehicle.

- **Cleaning chromium-plated piston rods**
  It is recommended to wipe with hydraulic oil piston rods which are not completely retracted in parking position, regularly once or twice a week depending on use.

- **Check adjustment of the central lubrication system**
  Before driving you should visually check different lubrication points. At these lubrication points you should see a small collar of grease. Heaps of grease are showing an overlubrication, dry bearing points are showing an insufficient lubrication. In both cases you have to check in detail the system and adjust it. Please note operation instructions in paragraph 3.12 or contact our after-sales service.

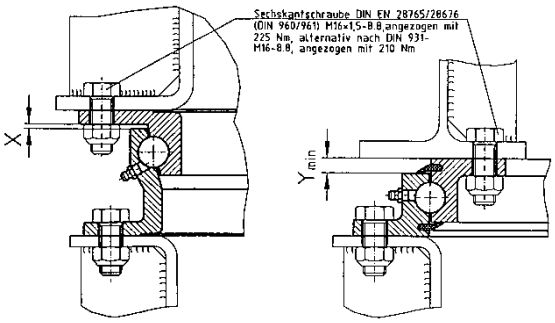
6.4 Maintenance works to be done every 3 months

Following maintenance works have to be done every 3 months (quarterly).

- **Check ball bearing turntable**
  For maintenance, the ball bearing turntable has to be lubricated at least every 8.000 to 10.000 km or once a month, with high-quality rolling bearing grease (with lithium mixed-base, NLGI consistency grade 2) by swinging it at the same time so that a grease collar escapes on the sealing lips over the whole length.

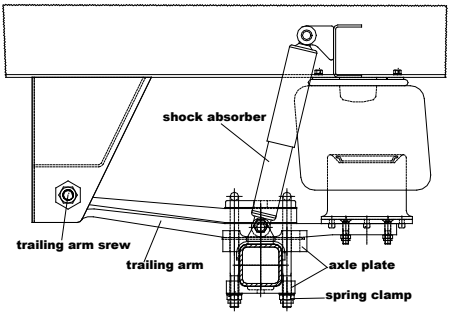
  The screwed connections have to be checked for the prescribed tightening torque.

  Steering turnplates are wear parts. All-important for durability is a regular and effective greasing. The end clearance max. permissible of 3,5 is reached when at some circumference point the horizontal running gap is X = 0 mm or $Y_{min.}$ = 7,5 mm.



- **Visual check of axle suspension**
  All independent wheel suspensions must be checked carefully for damage.

- **Check shock absorber and shock absorber fixation**
  All shock absorbers must be checked carefully for leaking oil or damages. Defective shock absorbers must be replaced immediately.
  Check fixed seat of lower and upper shock absorber fixation. Tightening torque with M24 M_A = 400 – 450 Nm



- **Check tightening torque on the spring clamps**
  The axle plates and spring clamps must be checked carefully for damage and correct fitting. Damaged parts must be immediately replaced.
  Tightening torque BPW axle M_A= 650 Nm for thread M24
  Tightening torque SAF axle M_A= 700 Nm for thread M24

- **Check tightening torque on the suspension screws (only Langendorf air suspension)**
  All axle supports and suspension parts must be checked carefully for damages. Damaged parts must be immediately replaced.
  Tightening torque for suspension screws (M30) M_A= 1.100 Nm
  For the equipment with complete axle assemblies (BPW, SAF, Gigant, DB etc.) pay attention to the instructions of the manufacturer.

- **Check air bellows for damage**
  For doing so, the air suspension of the drawbar trailer must be completely lifted. All air bellows must be examined carefully for fabric damages or crack points. It should also be checked that the air bellows are duly bending in when the air suspension is lowered.

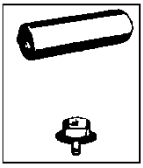
- **Check axles according to the instructions of the manufacturer**
  The inspection must be made depending on axle type and axle manufacturer according to their instructions.

- **Check brake system**
  According to German legislation, investigations of the brake system on trailers have to be made periodically. These investigations according to § 29, annexe VIII, may only be made by the manufacturer or by officially authorised brake service workshops.

  For the operation of the vehicle in other countries, please observe the valid legal obligations accordingly.

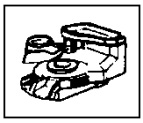
Maintenance and repair works on the brake system may only be made by qualified persons.
For all maintenance works you have to observe the legal regulations. Please be especially careful when welding, burning and boring near brake lines.

The brake system must in general be checked visually. Following criteria should be paid attention to and checked.
- Tube and hose lines as well as coupling heads must not be damaged or corroded at the outside.
- Dust-protection cups, e.g. on brake cylinders, must not be damaged.
- Joints, e.g. on fork heads, must duly be secured, free-moving and not worn.
- Cables and cable pulls must be guided flawlessly, must not show any cracks and must not be knotted.
- Check brake linings, the minimum thickness must be existing.



- Air bellows
  For vehicles being equipped with manual water-drainage valves, the reservoirs must be drained daily.

- Pressure reservoirs must not be damaged. There must not be any outer corrosion damages.



- Coupling heads
  Before coupling it must be ensured that the sealing washers are in flawless condition. Damaged washers must be exchanged.

- Brake power regulator
  The adjusting shaft of the control valve must be free-moving. Pay attention to possible damages of the trailing device.

Check the pressure decrease with full braking when the vehicle is standing. The pressure decrease must not exceed 0.8 bars as maximum for the two-line brake system. If the pressure decreases by more than 0.8 bars or if the travel of the brake cylinders reaches 2/3 of the total travel, the wheel brake must be adjusted.

Clean piping filters of brake system
The piping filters must be cleaned normally every 3 to 4 months depending on the operation conditions. For doing so, the filter cartridge must be taken out and blown out with compressed air. Damaged filter cartridges must be replaced.

Drawbar trailers with detachable gooseneck are equipped with a second pair of piping filters. These filters are mounted behind the connection to the gooseneck and serve for holding back the possibly existing soil particles coming into the system when coupling/uncoupling.

Slightly oil joints on brake valves, brake cylinders and brake linkages.

Check the tightness of the compressed air system
For doing so, the brake system must be activated with the normal operation pressure. The pressure decrease must not exceed max. 0.1 bar within 10 minutes with the tractor engine switched off. Otherwise wipe cable system with soap-suds. Seal leaky points or/and exchange leaky valves or screwed connections. If in case of a repair the WIRA plug connections must be released or exchanged, the following ***"Mounting instructions for WIRA plug connections"*** must be observed.

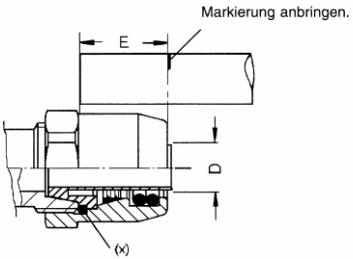
Mounting of the plastic tube into the plug connection
Cut off right-angled the plastic tube with tube nippers. The cutting points must be cleaned so that there are no sharp edges inside and outside.
Mark the depth to be put in with an adequate pin or with band on the plastic tube. The depth to be put in can be determined on the union nut (length E) or can be taken from below table.

Insert the plastic tube over the total depth to be put in up to the stop. The marking should then be exactly at the bottom hole of the union nut, if not, the tube was not inserted deep enough.
After the mounting, pull back the plastic tube strongly to check if a perfect tube fixation was achieved.

The plastic tubes to be placed must fit with their dimensions exactly to each plug connection. That means e.g. that in plug connections for plastic tube 10 x 1.5 only plastic tube 10 x 1.5 and not 10 x 1.25 or 10 x 1 is mounted.

Plug connections must not be used for plastic lines with brake function between frame and axle.

Connection	Tightening torque	Depth to be put in (E)
6L	14 Nm	18.0 mm
8L	17 Nm	18.0 mm
10L	22 Nm	19.5 mm
12L	30 Nm	19.5 mm
15L	38 Nm	19.5 mm
16LL	40 Nm	20.5 mm
18L	48 Nm	22.5 mm



Mounting of loose plug-in-units
Screw the plug-in-unit manually on the screwing union and after that tighten it with wrench. When doing so, the tightening torques indicated in above table must be observed.

Demounting of the plug connection
If a separation of the pipe from the installation connection is required, the plug-in-unit can be unscrewed from the union by means of a wrench. After having mounted the installation again, the plug-in-unit can also be installed again as described above.

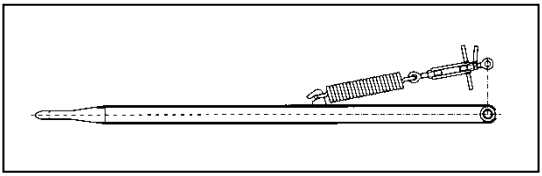
Demounting of the plug-in-unit
Remove the o-ring (x) with a special needle (can be supplied by us) or simply with a safety-pin from the thread recess. Push back the union nut on the tube and pull out the support sleeve. Then cut off the tube on the clamp ring to the union nut and draw off the clamp ring from the piece of tube which was cut off.
The plug-in-union after that can be put together again and used. However, it must be taken special care that the clamp ring has its initial stress and is not damaged. The o-ring (x) can be pressed into the thread recess again easily with the handle of the special needle.

- **Check function and tightness of hydraulic system**
  Works on the hydraulic system must only be made by persons especially trained for that and who know the dangers. Before repair works on the system, it must be free of pressure. Parts hold or moved by hydraulic cylinders must be secured mechanically.

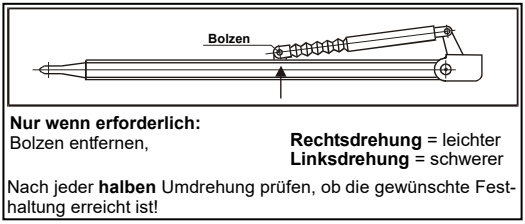
- **Check the drawbar**
  The drawbar must be checked for damage at least once a month or every 10,000 km.
  For reasons of road safety, a damaged drawbar must be replaced with a new one. Repairs may only be carried out at the manufacturer's works.
  As the drawbar is an important connecting element, it must not be welded or drilled for safety reasons.
  The diameter of the drawbar eye is 40 or 50 mm when new, wear up to 41.5 or 51.5 mm is permissible.
  The drawbar bearing must be greased via the grease nipples every 5,000 km.

- **Check the height adjustment device of the drawbar**
  By means of the height adjustment device, the drawbar is to be adjusted to the required coupling height.
  Three different systems are available for this purpose.

1. Tension spring with turnbuckle
   The height is adjusted by turning the turnbuckle.



2. Height adjustment device Klemmfix – “Version A” (tension)

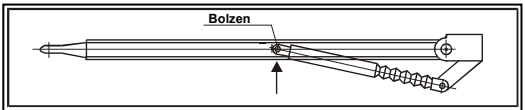


Nur wenn erforderlich:
Bolzen entfernen,

Rechtsdrehung = leichter
Linksdrehung = schwerer

Nach jeder **halben** Umdrehung prüfen, ob die gewünschte Festhaltung erreicht ist!

3. Height adjustment device Klemmfix – “Version C” (pressure)

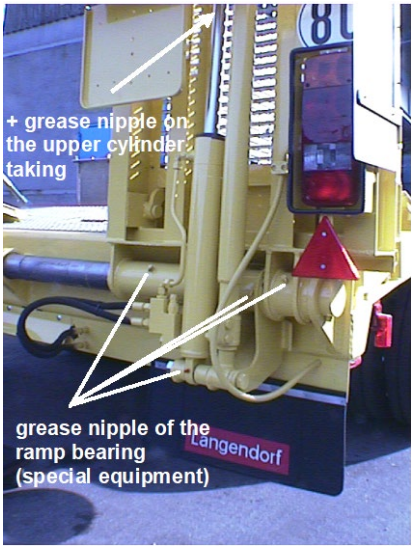


Nur wenn erforderlich:
Bolzen entfernen,

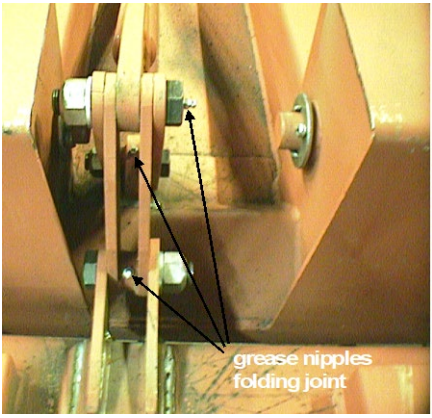
Rechtsdrehung = schwerer
Linksdrehung = leichter

Nach jeder **halben** Umdrehung prüfen, ob die gewünschte Festhaltung erreicht ist!

- **Check and grease ramp bearing, ramp shaft and ramp safety device**
  Ramp bearing, ramp shaft and the ramp safety device must not be damaged or worn. For greasing the ramp shaft it must be covered with mixed-based lithium multi-purpose grease. Depending on the customer's wish the loading ramp can be equipped with grease nipples. The upper and lower cylinder taking have grease nipples.



- **Check folding joint of the spreading ramp**
  The folding joints of the spreading ramp must be free moving and in faultless condition. The bolt connections must not be worn. The greasing is made over three grease nipples.



6.5 Maintenance works to be done every 6 months

Following maintenance works have to be done in addition to the quarterly maintenance every 6 months (half-yearly).

- **Check slack adjusters**
  To check the slack adjusters please pay attention to the instructions given by the manufacturer.

- **Check axles according to the manufacturer's instructions**
  Please note the separate instructions of the axle manufacturer.

- **Check fixed seat of the brake cylinder fixation**
  The tightening torque is M_A = 210 Nm for thread M16

- **Observe national legal directives**

6.6 Maintenance works to be done every 12 months

Following maintenance works have to be done in addition to the quarterly and half-yearly maintenance every 12 months (yearly).

- **Check axles according to the manufacturer's instructions**
  Please note the separate instructions of the axle manufacturer.

- **Check air suspension assembly**
  Lift the vehicle on the frame so that the axle suspension is discharged. Check whether the air bellows are fully extending. Check bellows for wear indications on the connections points between bellow and cover sheets. Remove carefully soiling on the edges of the cover sheets. Check shock absorbers for oil loss and damages. After having done so, charge the suspension again; the normal driving height must adjust itself. If this is not the case, please contact a specialized workshop or our after-sales service.

- **Check shock absorbers**
  Experience has shown that shock absorbers should be replaced after 150,000 km at the latest.

- **Observe national legal directives**

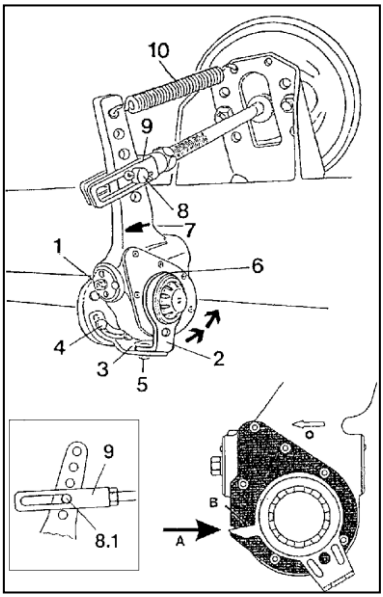
6.7 Make road train brake balance between tractor and trailer

The brake systems of tractor and trailer / drawbar trailer are adjusted to each other. Amongst others setting values such as e.g. advance and empty pressure of ALB (brake system with automatic load-dependent brake-power distribution) are checked and, if necessary, adjusted.
This examination and adjustment should be made every time when there are problems with the braking retardation. Following points might hint at an insufficient adjustment:

- Very different wear on brake linings on tractor and trailer
- When braking, the trailer overruns; i.e. the tractor is braked harder than the trailer.
- When braking, the road train is strongly stretched; i.e. the trailer is braked harder than the tractor.

If one of above-mentioned points occurs, the road train must be checked and adjusted in an authorized workshop.

6.8. Adjusting the automatic slack adjusters



- Cams and brake shoes are in zero position.

- Fix the slack adjusters on the camshaft.
  Axial clearance: Adjust the nominal value of 1.0 mm by means of the adjustment plates (6).
  Arrow mark (7) points to brake direction.

- Install the fixed point clip (3); use 2 fixing screws (4) in any case. Do not yet tighten the fixing screws (4).

- **Diaphragm brake cylinder**
  Before mounting it has in any case to be ensured that the brake cylinder is in starting position.

  But the spring cylinders have to be under full operation pressure (at least 6 bars).

  Important: If you do not pay attention to that, the basic adjustment is wrong!

- Turn the adjustment screw (1) until the boring at the slack adjuster 8.1 corresponds to the boring in the yoke end (9) (see drawing).

- Set in and secure split pin (8).

- Hang in the return spring (10).

- Press the control arm in turning direction of the arrow (operation direction of the slack adjuster) into its final position **without** resort to force.

  Remark:
  The stop must not be effected at one of the two fixing screws (4) of the fixed point clip (3). Should the occasion arise, displace the fixed point clip (3) in the fixing (4).

  Tighten strongly all fixing screws (4) and the pin screw (5) in this final stop of the control arm (2).

HINT FOR TRAILING STEERED AXLES

Weld fixed point clip (3) in this position.

- Adjust air clearance of the brake lining by turning the adjustment screw (1) until the brake lining has contact to the brake drum. Turn back the adjustment screw (1) until an empty stroke of the piston rod of 15-18 mm is reached. By this an air clearance of approx. 0.7 mm is adjusted in the brake shoe centre.

- In case of a faultless function of the adjustment coupling, a tightening torque of at least 20 Nm has to be noticeable when turning back the adjustment screw (1); a noise can be clearly heard when doing so.

- Operate the service brake several times, check free running of the brake drum, check air clearance; if necessary, repeat adjustment of the slack adjuster.

For other slack adjuster types please take note of the corresponding instructions of the manufacturer.

7. Hints for a long time stop period of the vehicle

For a longer stop period of the vehicle, lubricate every 4 weeks and move or operate the corresponding pieces. Drain all air tanks before stop period. Every 4 weeks, give pressure into the air pressure system and let it operate, so that the valves are working regularly and cannot settle.
Fill hydraulic oil reservoir completely. Clean hydraulic cylinders and conserve piston rods with acid-free grease. Before taking again into operation, clean carefully all hydraulic parts.

8. Tightening torque in Nm

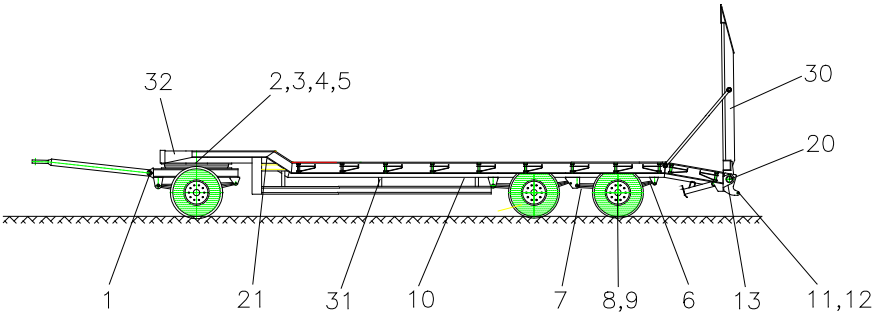
for screws and head support according to DIN 912, 931 etc.

These tightening torques are only valid, when no other values are indicated in the maintenance instructions or documents from the supplier companies (for example axle manufacturer).

Thread	SW	material		
		8.8	10.9	12.9
M 8	SW 13	25	35	41
M 8 x 1		27	38	45
M 10	SW 17	49	69	83
M 10 x 1		52	73	88
M 12	SW 19	86	120	145
M 12 x 1,5		90	125	150
M 14	SW 22	135	190	230
M 14 x 1,5		150	210	250
M 16	SW 24	210	300	355
M 16 x 1,5		225	315	380
M 18	SW 27	290	405	485
M 18 x 1,5		325	460	550
M 20	SW 30	410	580	690
M 20 x 1,5		460	640	770
M 22	SW 32	550	780	930
M 22 x 1,5		610	860	1050
M 24	SW 36	710	1000	1200
M 24 x 2		780	1100	1300
M 27	SW 41	1050	1500	1800
M 27 x 2		1150	1600	1950
M 30	SW 46	1450	2000	2400
M 30 x 2		1600	2250	2700

Approximate values for tightening the screw connection with tightening torque key, lubricated thread. Impact wrench not permissible.

9. Lubrication plan



Explanations regarding the lubrication plan

This lubrication plan serves as complement to the maintenance plan of chapter 6.

In case the trailer is equipped with a central lubrication system, following positions need not being lubricated because they are connected to the central lubrication. But in this connection these lubrication points should be checked.
Following points are connected: 1,2,3,4,5,6,7,8,9.

I. Nipple lubrication

Lubricate the lubrications nipples mentioned in the following by means of a suitable grease pump with lithium multipurpose grease just until fresh grease escapes from the bearing points.

Pos.	Designation	pcs.	Grease intervals
1	Spring bolt on the drawbar	2	weekly
5	Ball bearing turntable	8	weekly
6	Steering stabiliser	2	weekly
8	Axle	X	see instructions
9	Brake	X	of manufacturer
10	Spindle hand brake	1	quarterly
11	Ramp lifting cylinder	2	quarterly
12	Folding joint on spreading ramp	3	monthly
13	Loading ramp (only ramp to be shifted hydr.)	2	as required

II. Greasing by covering

Thoroughly clean surfaces and remove completely old grease

Pos.	Designation	pcs	Grease intervals
30	Ramp shafts		weekly
31	Support profile of warning sign		quarterly

III. Drop lubrication by means of oil can or spray oil

Pos.	Designation	pcs.	Grease intervals
40	Folding joint of spreading ramp		monthly
41	Folding joint of warning signs		monthly
42	Folding mechanism of side protection		monthly
43	Hinges of tool box		monthly
44	Folding supports of loading bed widening		as required
45	Bearing shaft lifting bed		quarterly

! After having used steam jet cleaners and high-pressure washing installations, especially with chemical additives, all lubrication points must immediately be greased.

Check list for periodical test and maintenance works

The following schedule shall serve as supplementary overview for the maintenance works indicated in chapter 6.

Works to be done **Further information on the works please find in chapter 6 of these instructions**	Before driving	Every 3	Every 6 months*	Every 12 months*	Remarks
Check tight seat of wheel nuts		X			Additionally after every wheel change
Check ball bearing turntable		X			Page 60
Visual check of axle suspension		X			Page 61
Check shock absorber and fixation		X			Page 61
Exchange shock absorber					Every 2 years
Check air bellow for damage		X			Page 61
Check ramp bearing, ramp shaft and ramp securing		X			Page 67
Check slack adjusters	X	X	X	X	Manufacturer's instructions
Check axles acc. to instructions of manufacturer	X	X	X	X	Manufacturer's instructions
Check lighting system	X				Page 59
Brake system; check tightness of connections		X			Page 62
Clean line filter of brake system		X			Page 63
Check function of service and parking brake	X				According to legal regulations
Check tight seat of brake cylinder fixation (M_A=210 Nm for M16)			X		Page 68
Inspection of trailer acc. to § 29 StVZO (German legislation)			X		Legal regulations
Main inspection acc. to § 29 StVZO (German legislation)				X	Legal regulations

* Serves as supplement to the maintenance works to be done every 3 resp. 6 months.

Works to be done **Further information on the works please find in chapter 6 of these instructions**	Before driving	Every 3 months	Every 6 months*	Every 12 months*	Remarks
Road train brake balance between tractor and trailer					As required; page
Check drawbar		X			Page 65
Check height adjustment device of the drawbar			X		Page 66
Check hydraulic winch	X	X	X	X	Manufacturer's instr.
Check function and tightness of hydraulic system		X			
Visual check of vehicle frame		X			
Check air suspension assembly				X	Page 68
Retighten all screwed connections with directed tightening torque			X		Page 75
Check tyres regarding pressure/pattern/damage	X				Page 59
Greasing of all lubrication points		X			Page 76
Grease the parts which are stressed with friction (without nipple)		X			Page 76
Check and adjust central lubrication system	X				Page 60
Clean chromium-plated piston rods	X				Page 59

Record of the inspections which have been carried out

* Serves as supplement to the maintenance works to be done every 3 resp. 6 months.

Below list shall assist you for planning the inspections to be carried out.

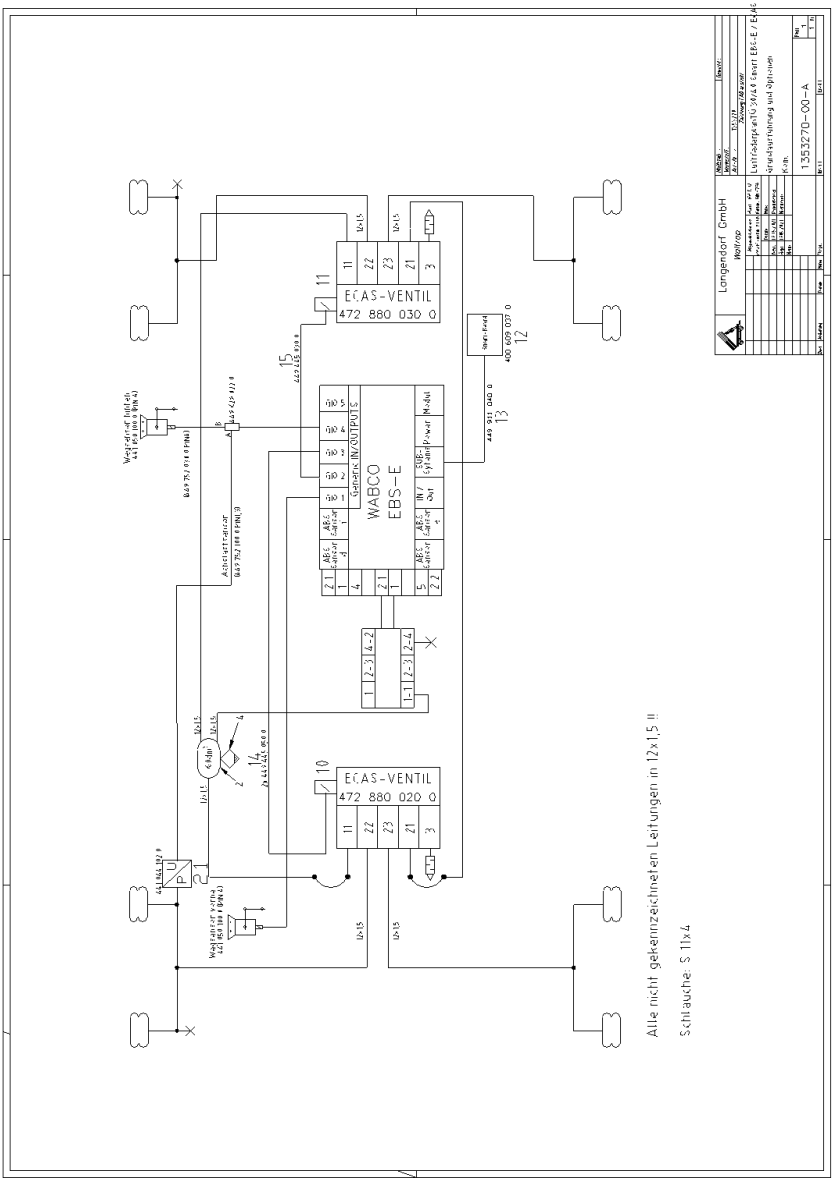
Date of first registration: _____

	after 3 months	**after 6 months**	**after 9 months**	**after 12 months**
1rst year of operation	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
2nd year of operation	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
3rd year of operation	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
4th year of operation	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
5th year of operation	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
6th year of operation	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
7th year of operation	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
8th year of operation	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
9th year of operation	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
10th year of operation	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)

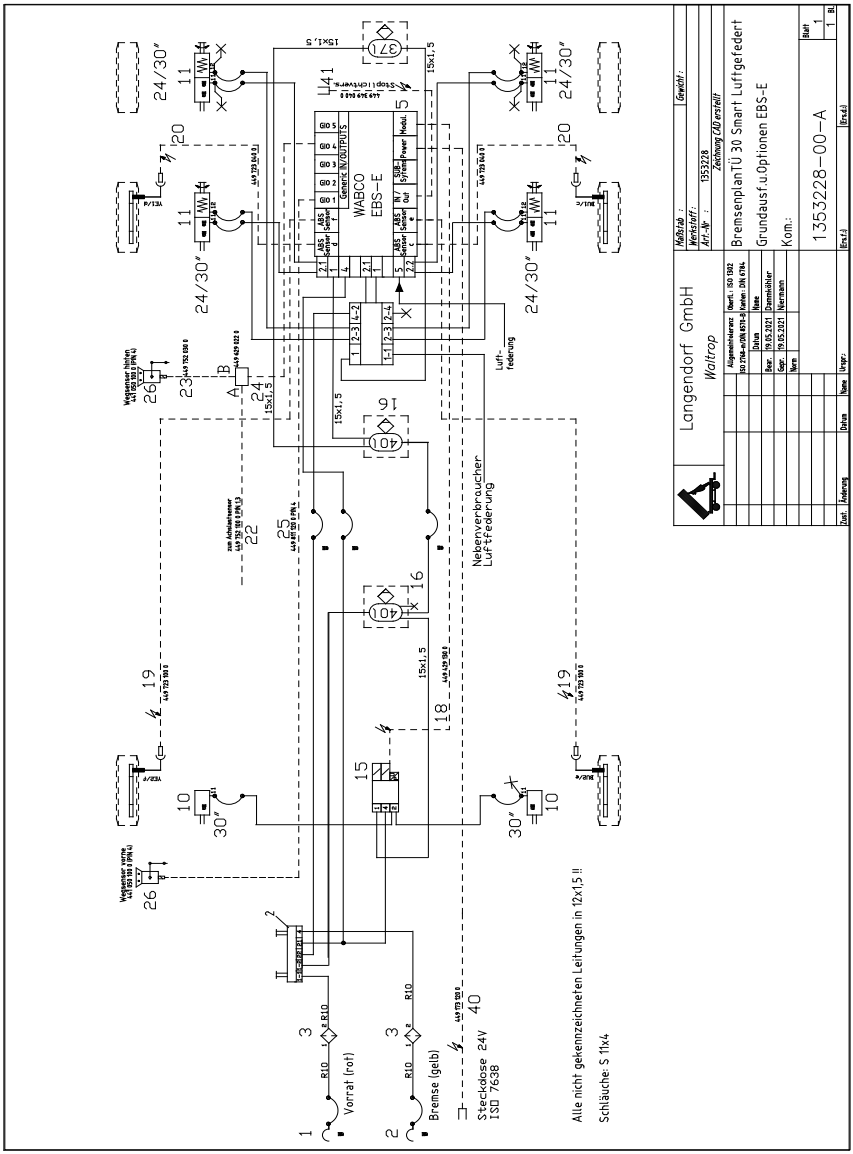
Supplements

On the following pages all changes (additional mountings and modifications) on the vehicle must be documented. The aim is that when selling the vehicle the new owner can operate and maintain the vehicle without any danger

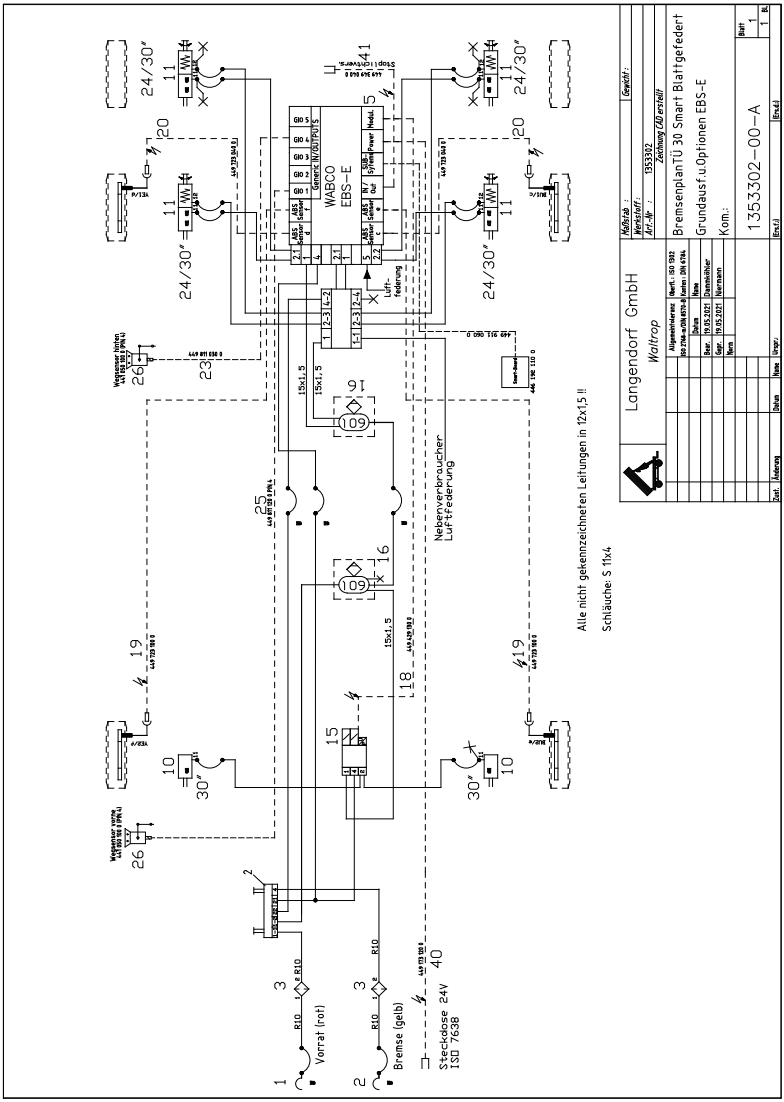
Air suspension



Brake system for trailer with air suspension



Brake system for trailer with mech. suspension



Lighting system