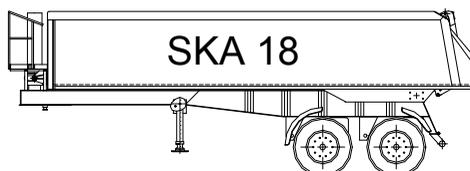
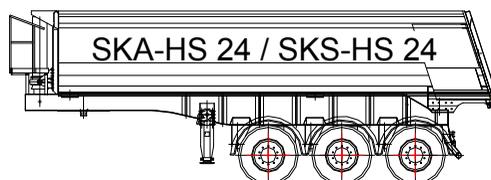
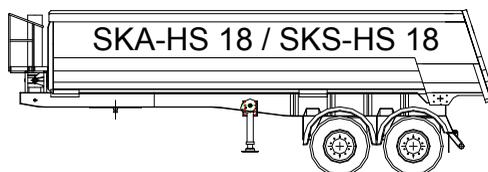


## Operating and maintenance instructions

Semitrailer with rear tipping device



### Semitrailer with steel or aluminium tipping box and rear tipping device



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## Operating and maintenance instructions

Semitrailer with rear tipping device

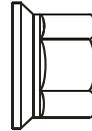


After having taken delivery of the vehicle, please check the fixed seat of the wheel nuts after 50 km. Please check it again after 50 km loaded driving (and also after every wheel change).

### Tightening torques

BPW axle with spigot alignment 630 Nm

SAF axle with spigot alignment 600 Nm

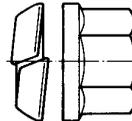


M 22x1,5

Wheel nut with pressure plate

BPW axle with bolt centering 510 Nm

SAF axle with bolt centering 430 Nm



M 22x1,5

## Operating and maintenance instructions

Semitrailer with rear tipping device



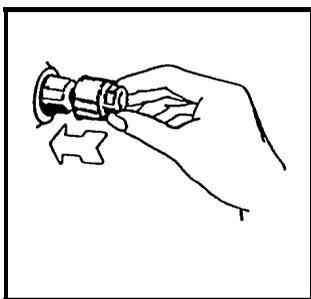
### Protecting cover for wheel nuts

#### Installation

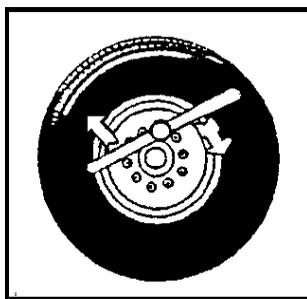
The protecting cover is attached by hand to the wheel nut to be protected and is tightened by means of the same key as the wheel nut by a clockwise rotation of approx. 15° to a stop. At the first tensions the click into place can be noticed clearly by a SNAP. At the same time with the rotation you should 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.

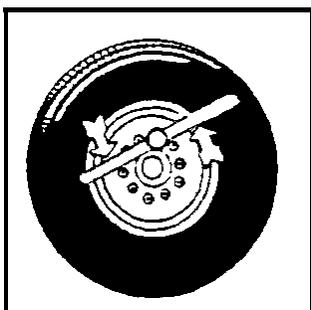
Attaching - very easily - without adhesion



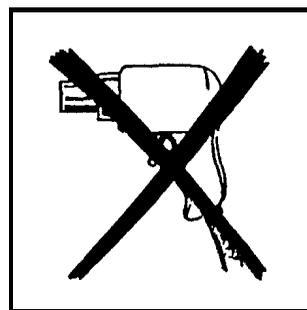
Tensioning with the key 15° to the right hand side



Disassembly with the key 15° to the left hand side



But do not use any impact wrench



# **Operating and maintenance instructions**

Semitrailer with rear tipping device





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Semitrailer with rear tipping device



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# Operating and maintenance instructions

Semitrailer with rear tipping device



## 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 a long vehicle endurance; many necessary repairs can be avoided by respecting the regularly 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 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

# Operating and maintenance instructions

Semitrailer with rear tipping device



## 1.0. General information on these instructions

In these present operating and maintenance instructions several trailer types corresponding 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 that these instructions are handed over to the new owner when selling the vehicle. If any changes are made afterwards on the vehicle (additional mountings or modifications) which concern the operation or maintenance of the vehicle, they must be documented in **“annex B”**.

### **Chapter 1 Introduction**

In this chapter you will find general security instructions.

### **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 National 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 Instructions for a long immobilisation of the vehicle**

In this chapter you will find information on a long time immobilisation 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.

### **Annex A Check list for periodical test and maintenance works**

In this chapter you will find a check list for the maintenance and servicing.

### **Annex B Supplements**

In this chapter all additional mountings or modification works concerning operation or maintenance of the vehicle must be filled in.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 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

The copyright for these instructions remains by Langendorf GmbH.

These instructions contain texts, prescriptions, pictures and drawings of technical kind which must not be copied, processed or utilised without authorisation to the purpose of competition and made known to other persons.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 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 changes on 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 other shops.

We can accept any guarantee claims only when using original spare parts.

#### Use according to the rules

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

The vehicle must be used 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 duly 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.

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

## **Operating and maintenance instructions**

Semitrailer with rear tipping device



### 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. When using public traffic ways the respective rules are valid.
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 transport of persons is not allowed!

### Driving operation

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

## Operating and maintenance instructions

Semitrailer with rear tipping device



### Use under special conditions

When working with vehicles near energised electric overhead lines and other lines, a security distance according to the voltage has to be observed.



It is observed when the following security distances are kept to:

- regarding overhead lines (according to VDE 0105)

Voltage (volt)	Security distance (meters)
up to 1000 V	1.0 m
more than 1kV up to 110 kV	3.0 m
more than 110 kV up to 220 kV	4.0 m
more than 220 kV up to 380 kV	5.0 m
or	
when voltage not known	5.0 m

- regarding lines of electric trains (according to VDE 0115)

Voltage (volt)	Security distance (meters)
up to 1000 v alternating current or 1500 v direct current	1.0 m
more than 1000 v alternating current or 1500 v direct current	1.5 m

The values for the security distance must also be ensured concerning the swinging out of lead cables, loads, carrying means and load taking means. Vehicle dimensions, movements of possible mounting machines as well as persons on vehicles and the use of devices for securing the load (chains, cables), have to be considered correspondingly.

Should a sufficient distance to electric overhead lines and other lines not be possible, the user has to take other security measures against transference of current with the owner or the operator of the lines.

Other security measures could e.g. be:

- switching off the current and earthing
- transferring the overhead or other lines
- cabling
- limitation of the working area

See also safety rules "Electric systems and working materials".

## Operating and maintenance instructions

Semitrailer with rear tipping device



### **Security instructions for the operation of semitrailers with large loading capacity (e.g. with a loading length of more than 8 m)**

These semitrailers are, because of their large loading capacity, particularly designed for transporting bulk material which can be dumped out easily.

When neglecting the following security instructions for these vehicles there is the increased danger of falling over resp. danger of damaging the vehicle frame.

Especially "tipping" of these long semitrailers requires special care under consideration of the local circumstances. Pay attention to the following:



#### 1. The right load

You can dump out without any problems only dry, gliding bulk material. Wet and adhesive material gathering on the floor of the tipping box and at the side walls leads to incalculable loads and dangers (danger of falling over, frame damages).

Bulk materials which can be dumped out easily are e.g.:

- grain
- grainy fodder material
- coal powder
- plastics
- steel or aluminium chips
- dry and grainy material



#### 2. Local circumstances

The semitrailer may only be tipped on an even ground which is able to support. For tipping, the total road train must stand straight to driving direction.



#### 3. Using a hydraulic or mechanic support

Only by using the support you will reach the best stability.

Additionally there is the possibility of adjusting the semitrailer - in connection with a spirit-level (special equipment) - to the horizontal.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 4. Taking wind forces into consideration

The forces caused by wind are often underestimated. The wind force having an effect on the semitrailer depends on the semitrailer's surface exposed to the wind and the wind speed.

wind force (Boyfort degree)	designation	wind speed "v"	force on surface	tipping procedure
		m/s	N/m <sup>2</sup>	
0	calm	0 to 0,2	0 to 0,025	unobjec- tionable
1	soft draught	0,3 to 1,5	0,04 to 1,4	
2	light breeze	1,6 to 3,3	1,6 to 6,8	
3	soft breeze	3,4 to 5,4	7,2 to 18,2	
4	moderate breeze	5,5 to 7,9	18,9 to 39,0	
5	fresh breeze	8,0 to 10,7	40,0 to 71,6	critical
6	strong wind	10,8 to 13,8	72,9 to 119,0	
7	stiff wind	13,9 to 17,1	120,8 to 182,8	very critical
8	stormy wind	17,2 to 20,7	184,9 to 267,8	
9	storm	20,8 to 24,4	270,4 to 372,1	forbidden
10	heavy storm	24,5 to 28,4	375,2 to 504,1	
11	violent storm	28,5 to 32,6	507,6 to 664,2	
12	hurricane	32,7 to 36,9	668,3 to 851,0	

Force on surface depending on wind speed v

### 5. Responsible behaviour

The above-mentioned points are a guideline for the driver/user who has to decide at site. The decision must always be made taking responsibility for the protection of the own person as well as of third persons.

Third persons must never be in the possible "area of hit" laterally next to the tipping trailer.

During the whole tipping and lowering procedure the user has to stay at the shift valve in order to watch the orderly procedure and to be able to act immediately in case of an emergency.

***In case of doubt, avoid any risk!***



## **Operating and maintenance instructions**

Semitrailer with rear tipping device



### Parking the vehicle

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

### Hydraulic system

Only workers with special knowledge and experiences in the hydraulics 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 any works.

### 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 tyres

1. Check that the vehicle is parked safely and secured so that it cannot roll away (chocks) for works on the tyres.
2. Repairs on the tyres 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 tyres!
4. Check the air pressure regularly!
5. Tighten the wheel screws with the corresponding tightening torque! (see page 2)

## **Operating and maintenance instructions**

Semitrailer with rear tipping device



# Operating and maintenance instructions

Semitrailer with rear tipping device



## 2. Technical Data

**Chassis number:** \_\_\_\_\_

Please take the actual weights from the vehicle papers / vehicle registration

### **Weights:**

Perm. semitrailer total weight: ..... \_\_\_\_\_ kg  
Perm. fifth wheel load approx. .... \_\_\_\_\_ kg  
Perm. semitrailer axle load ..... \_\_\_\_\_ kg  
Tare weight approx. .... \_\_\_\_\_ kg  
Payload with irregular load distribution approx. ( DIN 70020 ) ..... \_\_\_\_\_ kg

### **Dimension:**

Designed for a fifth wheel height (loaded) of approx. .... mm  
Loading length ..... mm  
Loading width ..... mm  
Height of tipping box ..... mm  
Volume of tipping box ..... m<sup>3</sup>

### **Delivery:**

\_\_\_\_\_  
(date, signature)

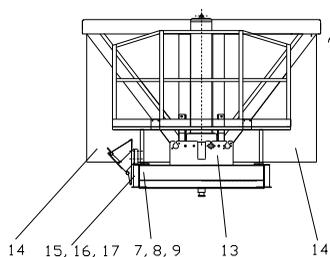
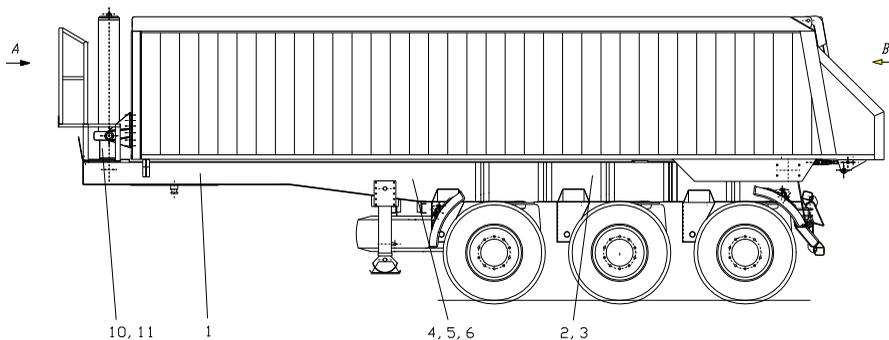


# Operating and maintenance instructions

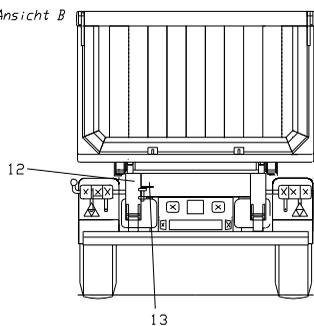
## Semitrailer with rear tipping device



### Labels and security hints



Ansicht A Ansicht B



# Operating and maintenance instructions

## Semitrailer with rear tipping device



### Position 1



## ATTENTION



### For safely tipping the semitrailer, following points must be paid attention to:

- Only "dry, gliding bulk material" may be tipped with this semitrailer. Bulk material which "sticks together" (e.g. due to rain, frost or longer storage) and does not "glide" evenly endangers the stability.
- Place the road train on a firm, even, horizontal ground in "straight position".
- If the above instructions cannot be completely observed, the vehicle must be equipped with a rear support authorised by the vehicle manufacturer. By using this support and arranging the vehicle in the horizontal a best possible stability can be achieved.
- When using air-suspended tractors with automatic levelling device (ECAS regulation), this device must be switched to "STOP position" for the tipping operation.
- For vehicles with air suspension it must be paid attention that the brake system is not continuously operated during the loading and unloading procedure (tipping). For the equipment with lift/lower valve and ECAS refer to the chapter air suspension in the operating instructions.
- Pay attention when opening the rear door(s)! As there is the load pressure on the door(s) it can open abruptly after unlocking. Make sure that there is nobody in the area of danger (swinging and unloading area). Open the rear wall by 270° and lock it on the side wall.
- For rear walls with automatic locking make sure that possibly mounted additional locking devices are opened before starting the tipping procedure.
- Tip the box only so far that the rear wall does not rest upon the bulk material or the floor. If necessary, drive forwards slowly and carefully until the tipping box is completely emptied. Pay attention that when driving forwards no steering movements or abrupt starting or brake processes must be done!
- Do not drive before the tipping box is completely lowered and the rear wall is locked.
- During the whole tipping and lowering process the operator must stay at the switch valve to watch the due procedure and to be able to act immediately, if necessary.
- In case of strong wind do not tip crosswise to the wind direction! For this refer to the security instructions in the operating and maintenance instructions!
- Always act in a responsible way and avoid any risk!
- Please pay attention to the general security hints!

The above-mentioned points are a guideline on the basis of which the driver / operator has to decide on-site. The decision must always be taken under consideration of the protection of the own person as well as of third persons.

Fahrzeugbau Langendorf

45731 Waltrop

## Operating and maintenance instructions

Semitrailer with rear tipping device



Position 2

BPW-axle with spigot alignment

SAF- axle with spigot alignment

Position 3

**Check rigid position of wheel nuts  
after 50 km of operation.  
Check again after 50 km loaded  
driving.**

Position 4

**Spring braking system**

Position 5

**Release valve**

Position 6

**EBS-diagnose**

Position 7

**Before putting into operation,  
read and pay attention  
to the operation instructions  
and security hints!**

Position 8

### **Instructions for cleaning:**

Wash with cold water only during the first three month.  
Do not use steam jets or high pressure tools.  
Do not use aggressive detergents.  
Min. distance of the spray nozzle to the vehicle 30 cm.

**Fahrzeugbau Langendorf**

Position 9

**For welding and adjusting works, please pay  
attention to our special indications as the  
vehicle is manufactured with fine corn steel.**

## Operating and maintenance instructions

Semitrailer with rear tipping device



Position 10 (only for EDBRO tipping cylinder)

**Damping ring**  
grease once per month

Position 11

**Operating pressure**  
150 bar

Low-pressure tipping hydraulics

**Operating pressure**  
250 bar

High-pressure tipping hydraulics

Position 12

**Attention!**  
**Tipping only with underride**  
**protection in upmost or**  
**downmost position.**

Position 14

### WARNING!

It is forbidden to stay at the sides and behind the vehicle when tipping !

When tipping, the vehicle has to be put on a stable and even ground !

When working under the tipped box, the box has to be supported safely !

Fahrzeugbau Langendorf

45731 Waltrop

# Operating and maintenance instructions

## Semitrailer with rear tipping device



### Position 15

<b>Langendorf Made in Germany</b>	
Typ	LANGENDORF GmbH
	e
Fahrzeugidentifizierungsnummer Vehicle Identification Number	VIN
Zulässige Gesamtmasse des Fzgs. Permissible total weight	kg
Zulässige Gesamtmasse des Zuges. Permissible combination weight	kg
Zulässige Achslast, Achse 1 Permissible axle load, axle 1	kg
Zulässige Achslast, Achse 2 Permissible axle load, axle 2	kg
Zulässige Achslast, Achse 3 Permissible axle load, axle 3	kg
Zulässige Sattellast Permissible fifth wheel load	kg
Länge (L)	m
Breite (W)	m
Abstand (a) <sup>2)</sup>	m
(b)	m

### Position 16

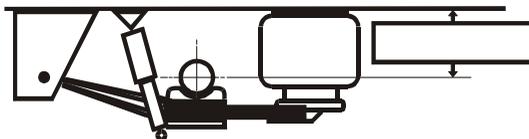
<b>WABCO</b>		Automatisch - lastabhängige Bremskraftregelrichtung (ALB) für Typ: Load sensing device for type: Dispositif de correction automatique de freinage pour type:	
Eingangsdruk . Input pressure Pression d'entrée		bar	
<b>Vorderachse . Front axle . Essieu avant</b>		<b>Hinterachse . Rear axle . Essieu arrière</b>	
Ventile Nr. Valves No. Valves N°:		Ventile Nr. Valves No. Valves N°:	
Achslast Axle load Charge essieu kg	Federungsdruck Suspension pressure Pression suspension bar	Ausgangsdruck Output pressure Pression de sortie bar	Achslast Axle load Charge essieu kg
Federungsdruck Suspension pressure Pression suspension bar	Ausgangsdruck Output pressure Pression de sortie bar	Achslast Axle load Charge essieu kg	Federungsdruck Suspension pressure Pression suspension bar
Ausgangsdruck Output pressure Pression de sortie bar	Achslast Axle load Charge essieu kg	Federungsdruck Suspension pressure Pression suspension bar	Ausgangsdruck Output pressure Pression de sortie bar



Position 17

## **Fahrzeugbau Langendorf**

Fahrhöhe an Achse mit Luftfederventil  
Ride height on axle with levelling valve  
Hauteur d'essieu avec valve de nivellement



## Operating and maintenance instructions

Semitrailer with rear tipping device



### 3. Operation instructions



**In these instructions a number of functions and equipment are described which do not belong to the normal scope of supply but which can be ordered in addition as special equipment!**

#### 3.0 Use

Semitrailers with rear tipping box are designated for bulk materials of different kind and state because of their construction.

Due to the different behaviour of the bulk materials when transporting and unloading, it must be ensured that the semitrailer is suitable for the material in question.

Important features of the bulk materials are e.g.:

- the behaviour when tipping (flowing, trickling, sliding, rolling, bumping, bulky or sticking)
- the load / load distribution in the tipping box (possible point loads)
- the shape of the bulk material (from large rock pieces to fine sand)
- the sort (aggressive like e.g. fertilizer, coal dust or salts, or with high abrasion like e.g. steel chips or chipping)

Contrary to these points are the main features of the semitrailer such as e.g.:

- the shape of the tipping box (e.g. half-pipe)
- sort and execution of the rear flap (folding door, swing-flap, combined door or rear wall to be lifted hydraulically)
- the material of the tipping box (aluminium or steel)
- the load volume and the load distribution (length and height of the tipping box)
- the necessary payload (2-axle or 3-axle chassis)
- the perm. fifth wheel load
- the thickness and the abrasion strength of the floor and the side walls

As additional factor for the safe transport you have to take into consideration also the process and the surroundings, like e.g.:

- the area of use (road or off-road)
- the place of unloading (bunker, finishing machine, site, etc.)
- the kind of loading (wheel loader or silo; large rocks/blocks; loading from large heights)

Only if the owner / driver has, in advance, exact knowledge of the material to be transported, he can choose the suitable vehicle considering all factors. Below you find a list of the basic variants of tipping boxes and their use. This table can serve only as rough guideline because of the many different factors having an influence. Should you be unsure regarding the choice

## Operating and maintenance instructions

Semitrailer with rear tipping device



of the tipping boxes, please contact the service department of the company Langendorf. Our specialists will be happy to help you.

Type	Designated for transporting
Large-capacity box made of aluminium Loading length larger than 7.5 m	- easily sliding, trickling bulk material with large volume and low weight - transport of pallets
Tipping box made of aluminium Loading length up to 7.5 m	- soil dig and rough bulk material - sand, chipping, gravel, etc. - blacktop
Half-pipe made of aluminium	- sand, chipping, gravel, etc. - grain, fertilizer
Tipping box made of steel	- heavy soil dig and demolition - steel scrap
Half-pipe made of steel	- heavy soil dig and demolition

The semitrailer is **not intended**

- for transporting persons or animals
- for transporting goods which cannot be transported and/or unloaded without danger
- for transporting goods which the perm. total weight, the perm. fifth wheel load or the perm. axle load is exceeded with
- Semitrailers with disc brake are not suitable for permanent off-road use. (Please also take notice of the documents of the axle producer.)

Bowl-type steel boxes or box-type boxes made of HARDOX wearing steel



This high-performance tipping vehicle is for chemical non aggressive loads like stones, gravel, concrete and scrap metal. The use for the transport of aggressive material like acids, bases, salts, fertilizer, sludge and domestic rubbish is done on your own risk, because damages at the tipping box can result due to tension crack corrosion.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 3.1 Hitching and unhitching of the semitrailer



When putting together the road train take care that the fifth wheel heights fit one to another.

If this is not the case, it leads to critical axle load shifting and to damages on the fifth wheel coupling.



**Hitching and unhitching of the semitrailer is always allowed only on even, horizontal, carrying ground.**

#### Hitching:

Before hitching, proceed as follows:

1. Secure the wheels of the semitrailer.
2. The fifth wheel plate of the semitrailer must be on the same height as the upper edge of the fifth wheel coupling of the tractor, max. 10 mm lower. As concerns a mounted support system take care that it is retracted resp. extended correspondingly.
3. Open the locking mechanism of the fifth wheel coupling.
4. The coupling is then ready for hitching and locks automatically by driving the tractor under the semitrailer.



**The driver must check that nobody or nothing is between the tractor and the trailer before driving back.**

5. After a successful operation, check the locking mechanism and suspend the cab hooks. If it is not possible to suspend the cab hooks, repeat the hitching operation.
6. Couple the electro, hydraulic and air connections. Take care that the connection fits correctly and tightly. The lines must be leaded in a way that they are following slightly any movements when cornering without tension, friction and bending.
  - first line: connect brake line (yellow)
  - second line: connect supply line (red)

# Operating and maintenance instructions

## Semitrailer with rear tipping device



ABS socket



Air supply (red)



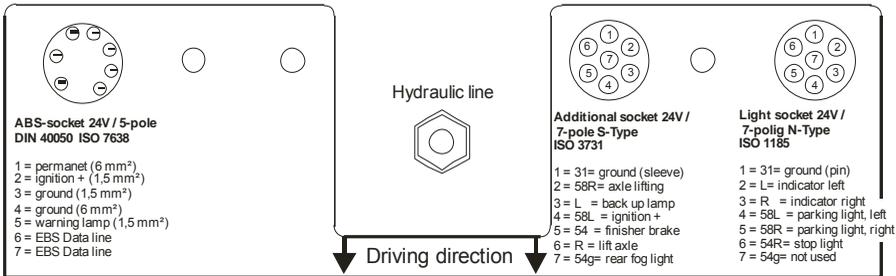
Additional socket with sleeve



Brake (yellow)



Light socket with pin



Air, hydraulic and electric connection with 2 x 7 pole socket

The semitrailer can optionally be equipped with a 15-pole socket. The standard equipment includes following wiring:

- |                                |                     |
|--------------------------------|---------------------|
| 1 = direction indicator, left  | 9 = ignition plus   |
| 2 = direction indicator, right | 10 = axle lift      |
| 3 = rear fog lamp              | 11 =                |
| 4 = earth                      | 12 = lift axle      |
| 5 = parking light, left        | 13 = earth          |
| 6 = parking light, right       | 14 =                |
| 7 = brake light                | 15 = finisher brake |
| 8 = back-up light              |                     |



The above-mentioned wiring is the standard wiring. The wiring might be different from the above description with regard to special equipment, such as hydraulic rear wall, EDSCHA tarpaulin or steering axles.

7. Put the chocks away and put them into the according supports. If equipped with support system, retract it to the stop and secure the hand lever.
8. Release the parking brake of the semitrailer.

## Operating and maintenance instructions

Semitrailer with rear tipping device



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



When combining the train (tractor - semitrailer) newly, you have to ensure before driving that all connection lines have the necessary length also at the max. steering angle. Furthermore pay attention to the fact that there is sufficient distance from tractor to semitrailer.

10. The combination is ready for driving.



**Unhitching by means of two workshop winches or with telescopic supports made of square tube may only be done in empty condition of the semitrailer. Danger of damage of the chassis frame resp. danger of falling over because of cracking of the support legs!**

If equipped with a mechanic telescope support system **including** the **stabilisation strut**, the semitrailer can be unhitched in loaded condition observing all security measures.



**You have to pay special attention when unhitching the loaded semitrailer. There is the danger, especially for vehicles with air suspension, that the supports break! Do not park the trailer for a longer period of time when loaded. Take special care that the ground under the support plates has enough carrying capacity; if necessary, put wooden planks under it. The carrying loads indicated on the type labels of the supports must not be exceeded.**



To unhitch 2-axle semitrailers following security hints must be paid attention to:

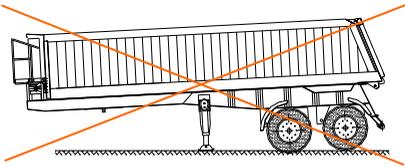


**2-axle semitrailers may only be unhitched in empty condition. Danger of falling over because of unfavourable load distribution!**

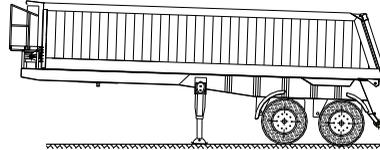
1. Before unhitching, the air suspension must be completely drained via drain-off valves.
2. The supports must be taken out so far that the semitrailer is inclined to the rear. Otherwise it might come to an unfavourable load, e.g. due to rainwater, in the front area so that the trailer falls over.

## Operating and maintenance instructions

Semitrailer with rear tipping device



**forbidden!**



**right**

### Unhitching:

For unhitching, proceed as follows:



Parking vehicles with air suspension over a **longer** period of time on an A-support, a repair winch or fifth wheel supports made of square tube requires special attention. After some time it is possible, due to leaks in the piping system, that the air spring gives way, i.e. the vehicle lowers. Due to the geometry of the axle imbedding there is a shifting of the semitrailer in longitudinal direction when the wheels are blocked. If the support or the support winch cannot compensate this movement, e.g. through a roller, the air spring must completely be lowered before placing the vehicle. This can be done via the drain valves, the lift/lower valve or by detaching the air spring valve linkage.

1. Secure the parking brake of the trailer and additionally block the wheels of the last axle with chocks.
2. Move back the tractor a little bit so that the lock of the fifth wheel coupling is released. The locking of the fifth wheel coupling can now be opened easily.
3. Lift the semitrailer by means of the support system (as far as existing) or by means of two workshop winches that high that there is still a sufficient pressure contact of the fifth wheel plate on the fifth wheel coupling of the tractor.
4. Release the electro, air and hydraulic hoses.
  - first line: remove the supply line (red)
  - second line: remove the brake line (yellow)

**This order must be respected in any way when removing the coupling heads because otherwise the trailer brake is released.**

Connect the connection couplings to the empty couplings of the front wall in order to avoid dirt accumulation.

## Operating and maintenance instructions

Semitrailer with rear tipping device



5. Drive away the tractor from under the semitrailer. The coupling is releasing automatically.

### 3.2. Load

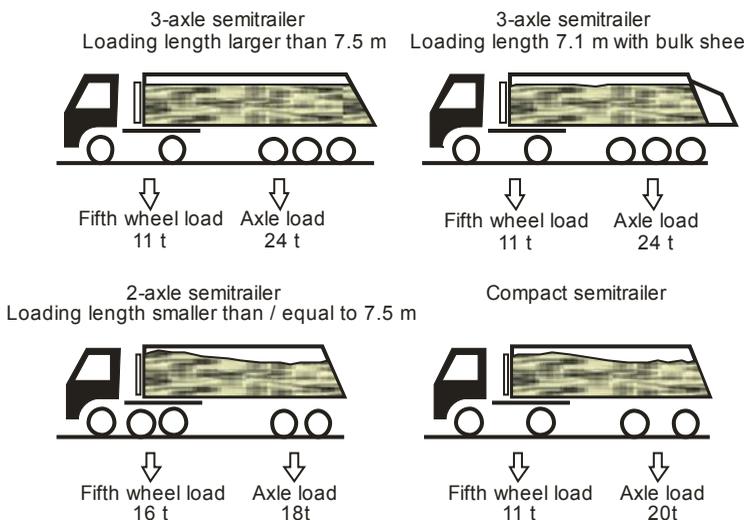
**When loading, following security measures must be observed:**

- It is forbidden to stay in the area of danger (area of work)!
- The load must not fall into the tipping box from a larger height.
- **The brake must be released during the loading process so that the air suspension (and the automatic lift axle, if existing) can adapt itself to the actual weight.**
- If loading with wheel loader, the driver has to pay attention that there is nobody on the opposite vehicle side. This side cannot be seen by the wheel loader driver.
- The driver has to ensure a load distribution as optimum as possible.

For this pay attention to the following:

For short and two-axle semitrailers the load centre of gravity is not in the centre of the tipping box. With regular load distribution and full load this would lead to reduced fifth wheel load and to excessive axle load. For these vehicles we recommend loading the bulk good a bit further to the direction of the fifth wheel plate.

**Please also pay attention to the indications on the load distribution in your vehicle documents.**



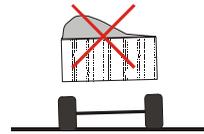
## Operating and maintenance instructions

### Semitrailer with rear tipping device



- The driver has to take care that the load does not accumulate exceeding the upper frame.
- After having loaded the material, the driver has to clean all flat points at the semitrailer from the bulk material remains.
- All accessory parts, such as lashing chains, ladders, tools, wooden planks etc. also have to be secured and fixed according to regulations. Pay attention that these parts cannot slide or fall down in normal driving situations as well as in extreme situations (drastic brake, obstacle-avoidance maneuver etc.).
- The driver sees for himself that the road train is in a state ready to drive according to the corresponding national regulations.

Keep within the permissible total weights and within the permissible axle loads of the tractor as well as of the semitrailer when loading. Overloading reduces life of tyres, axles, springs and chassis frame. In addition, the braking distance is longer than usual and the safety is reduced by overloading. Please make sure that there is an equal load distribution.



The max. permissible loading height is the upper edge of the upper frame. Never tamp the loading good by means of an excavator because this might lead to a bumping out of the tipping box.



If the semitrailer is equipped with plug-in cross bracings, tensioning chains, belts etc., these devices must be put in before starting to drive. This avoids that the tipping box is "bumping out".



After having transported aggressive goods such as fertilizer, coaldust, salts etc., all aluminium surfaces (even lacquered ones) must be cleaned carefully. Oxidation damages! Please refer also to chapter 6.1.1 Cleaning of the vehicle.

## Operating and maintenance instructions

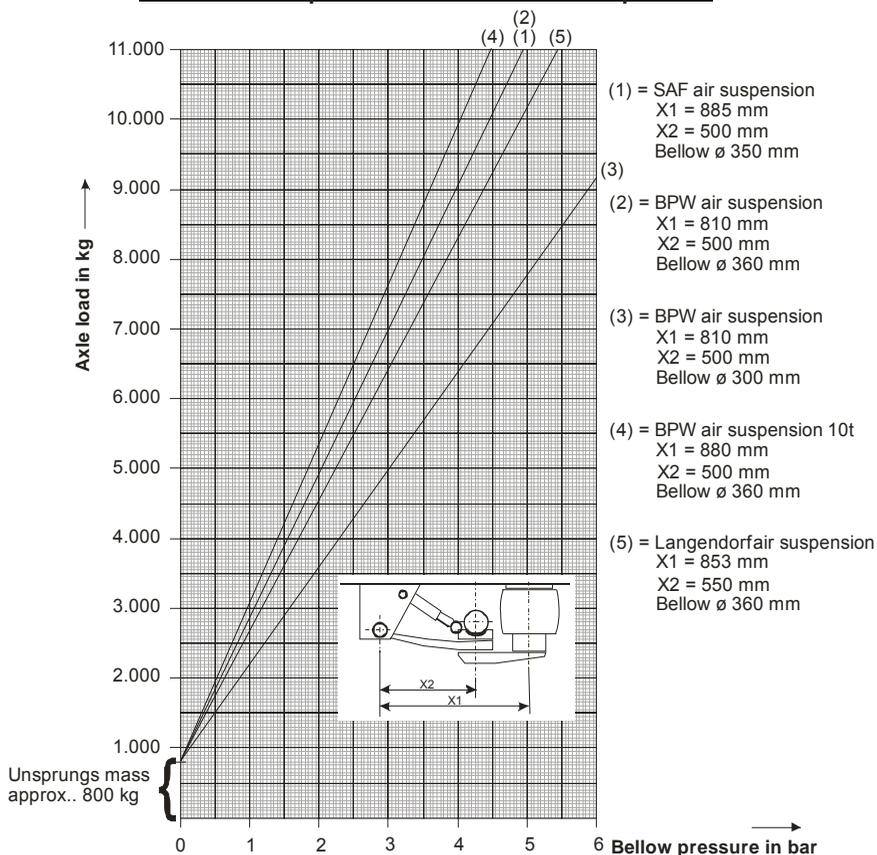
Semitrailer with rear tipping device



### 3.2.1 Compressed air manometer to check current axle loads

To check the actual axle load (after having loaded the tipping semitrailer), the current air bellow pressure can be read from the manometer on the longitudinal member. According to the axle unit and the air bellow pressure taken from the manometer, the current axle load can be found in following diagram.

#### Axle load in dependence on the air bellow pressure



Please note that only the axle loads are determined with this, and not the payload resp. total weight. In case of an unfavourable load distribution, the permissible fifth wheel load and therefore the permissible total weight might be exceeded despite keeping to the axle loads.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### **3.3 Axle lift**

The axle lift on the 1<sup>st</sup> axle is working fully automatically. I.e. when driving in empty condition the axle is lifted automatically, and in loaded condition it is automatically lowered. In addition there is the possibility to lift the 1<sup>st</sup> axle manually in loaded condition (only for 3-axle trailers). That does not count for public roads, but may only be used to manoeuvre and on the building site in order to increase the fifth-wheel pressure on the tractor. It has to be paid attention that the driving speed must be lower than 30 km/h then because otherwise the perm. tyre carrying capacity and the perm. axle load carrying capacity are exceeded. Switching is made via a key which can be found in the driver's cab. By pressing it shortly (less than 5 seconds) the 1<sup>st</sup> axle of the loaded semitrailer is lifted. When reaching a driving speed of 20 – 30 km/h, the axle is automatically lowered.

When pressing the key longer (more than 5 seconds), the lifted axle of the empty semitrailer is lowered (forced lowering).

When the ignition is switched off and again switched on, the axle lift switch is brought to basic condition (automatic regulation).

#### **3.3. 1 Axle ventilation as low-speed traction control**

It is possible (only for 3-axle semitrailers) to ventilate the air suspension of the 1<sup>st</sup> axle. That does not count for public roads, but may only be made on the building site in order to increase the fifth-wheel pressure on the tractor. It has to be paid attention that the driving speed must be lower than 30 km/h then because otherwise the perm. tyre carrying capacity and the perm. axle load carrying capacity are exceeded. Switching is made from the driver's cab of the tractor by means of a switch according to the signs.

### **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. 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. It must be paid special attention for fast loading procedures (e.g. when loading a silo) that before starting to drive, the air suspension has adjusted according to the load.

**!** 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

## Operating and maintenance instructions

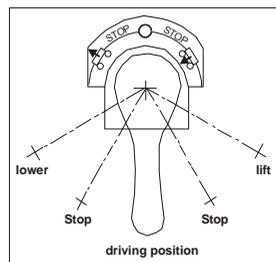
Semitrailer with rear tipping device



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.

### 3.4.1 Lift / lower valve

The driving height can be changed by means of the lift/lower valve. This might be required for example for loading or unloading or to drive through bridges and entrance gates. The lift/lower valve can be found on the left hand side in driving direction. To lift or lower the vehicle, the lever must be put to the corresponding symbol (note that the lever is locked in driving position). When the required height is achieved, put the lever into stop position.



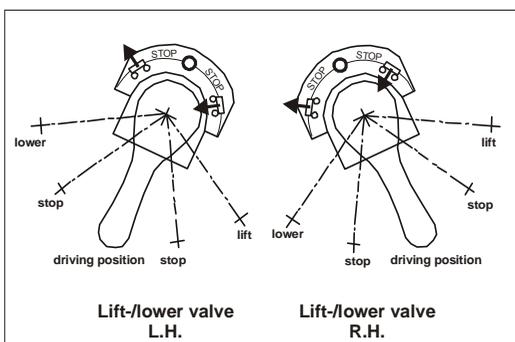
In this lever position there is no axle load compensation, that means that when driving over obstacles the full trailer weight might lay on one axle. For this reason the vehicle may only be driven at walking speed and must be brought into driving position (lever position in the middle) as soon as possible. The normal driving height is then adjusted.



During a tipping operation, the vehicle must not be lowered completely because otherwise the full weight would lay on the bumpers in the air bellows of the last axle and they could be damaged.

### 3.4.2 Control valves for left and right hand side lowering / lifting

The vehicle height can be changed by means of the two lift/lower valves for the left and right hand side. With this e.g. minimal slant positions can be compensated and the semitrailer can be arranged into the horizontal for the tipping operation. The lift/lower valves can be found on the left hand side in driving direction. To lift or lower a vehicle side, the lever of the valve must be put to the corresponding symbol (note that the lever is locked in driving position).



When the required height is achieved, put the lever into stop position.

In this lever position there is no axle load compensation, that means that when driving over obstacles the full trailer weight might lay on one axle. For this reason the vehicle may only be

## Operating and maintenance instructions

Semitrailer with rear tipping device



driven at walking speed and must be brought into driving position (lever position in the middle) as soon as possible. The normal driving height is then adjusted.

**During the tipping operation the valves must not be operated. Danger of falling over!**



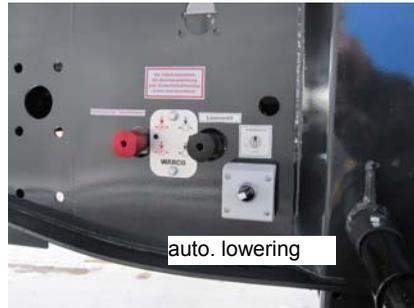
In addition the vehicle must not be lowered completely before tipping because otherwise the full weight would lay on the bumpers in the air bellows of the last axle and they could be damaged.

### 3.4.3 Automatic lowering when tipping

If equipped with an EBS-E system, the air suspension of the semitrailer is automatically lowered during the tipping procedure.

Different “tipping tests” showed that the best possible stability results from optimum load distribution with partial lowering.

For deactivating the automatic lowering, a turn-switch is mounted on the chassis frame.



## Operating and maintenance instructions

Semitrailer with rear tipping device



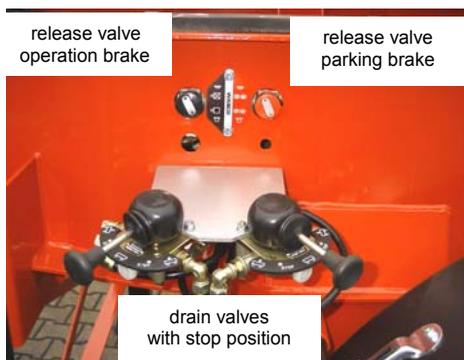
### 3.5 Brake system

Automatic load-dependent two-line compressed air brake including parking brake according to European regulations.

ABS 4-channel system 4S/2M including sensors for two axles.

***Optionally with WABCO-EBS brake system.***

The brake system is equipped with a double release valve for the operation brake and the parking brake. By pulling the release valve (black) the operation brake is released. The vehicle can be moved without coupled brake line.



**Before operating the release valve the semitrailer must be safely connected to the switching vehicle. The switching vehicle has to be in braked position!**

**You have to pay special attention for switching works with released operation brake because the semitrailer must be braked by the switching vehicle.**

## Operating and maintenance instructions

Semitrailer with rear tipping device



System design and particularities for the equipment with EBS:



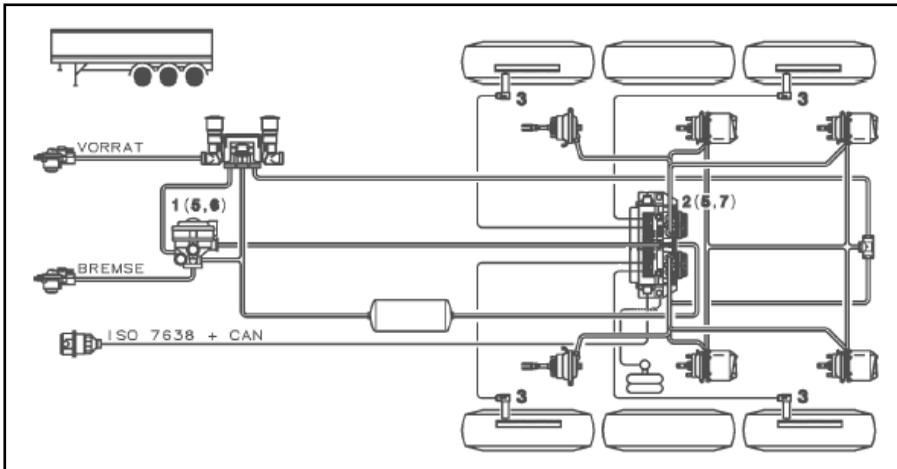
The semitrailer may only be operated behind tractors with plug-in connection according to ISO 7638 (5- or 7-poles).



When turning on the ignition, the EBS electric system carries out a detailed check of the system. E.g. also the voltage supply is checked. If during this self-check the starter is operated, this leads automatically to a voltage drop which in this moment is recorded by the system as a defect and is shown by the flashing of the warning device in the driver's cab.

Pay attention that when starting tractors **without** own system check, you have to wait for approx. 6 seconds after having switched on the ignition before operating the starter so that the WABCO-EBS system is able to carry out its self-check before.

The EBS standard system (**E**lectronic **B**rake **S**ystem) for the 3-axle semitrailer is shown schematically in the following diagram. It regulates the brake pressures electronically sidewise. The system consists of a two-circuit compact trailer modulator (2) with digital data interface acc. to ISO 1199-2 to the EBS tractor, an EBS trailer brake valve (1) as well as ABS sensors (3).



## Operating and maintenance instructions

Semitrailer with rear tipping device



The semitrailer with this brake system must be compatible to conventional and EBS-braked tractors. At a brake-down of the EBS in the trailer it can be braked pneumatically redundant. So there are three possible modes of operation:

**a.) Operation behind new tractors with EBS as well as extended ISO 7638 plug-in connection with CAN-interface (CAN = controlled area network) acc. to ISO 11992**

All EBS functions can be used. The brake request of the driver (rated value) is transmitted via the data interface to the trailer vehicle.

**b.) Operation behind conventional tractors with ISO 7638 plug-in connection for the trailer ABS supply, without CAN-interface**

All EBS functions except the rated value transfer, can be used via the CAN data interface. The rated value is given via the pressure sensor in the trailer brake valve. This pressure sensor measures the trailer control pressure.

**c.) Redundancy operation**

At a defect or if the electric voltage supply is not connected it is pneumatically braked, but **without load-depending brake force regulation** and **without ABS function**.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 3.5.1 Wear indication for disc brake

Axles with disc brakes can be equipped with a wear indication. Two different systems are used.



**The brake lining wear indication does not replace the prescribed checks concerning the actual condition of the brake linings and the brake discs!**

#### Indication via EBS system

With this equipment the wear indication is shown by the indicator lamp “parking brake” in the tractor. All brake linings are provided with a wear sensor cable. With this following states of wear can be indicated:

If the sensor cable of a brake lining is scratched, the indicator lamp flashes 4 times at the next ignition. This means that a brake lining has fallen below the lining thickness of 5 %.

If the sensor cable of a brake lining is cut, the indicator lamp flashes 4 times periodically at the next ignition. This means that at least one lining has fallen below the lining thickness of 0 % (wear measure 2 mm).



Between the scratching of the wire and the interruption lies approx. 1 mm lining wear which corresponds to a driving distance of approx. 5,000 – 10,000 km.

#### Indication via BPW brake monitor on the trailer

With this equipment the wear indication is shown separate display on the semitrailer.

Always check the indication of the BPW brake monitor before starting to drive:

The green LED must glow, the yellow LED “maintenance” must not flash and the mechanic indication must not show red.



via a

monitor

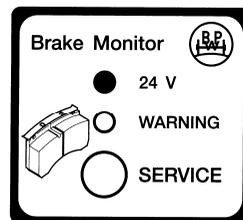
service

#### **Green LED:**

The device is in operation.

Operating voltage (24V) is available.

The wear limit of the brake linings is not yet reached.



## Operating and maintenance instructions

Semitrailer with rear tipping device

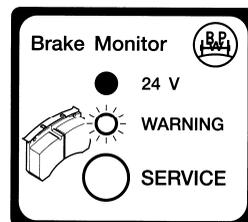


### Yellow LED flashes:

As soon as only one of the brake linings has reached the lining thickness of 4 mm, the yellow LED "WARNING" on the BPW brake monitor flashes.

(This indication is only working if the device and the axle are connected to the vehicle earth.)

Visit a workshop as soon as possible and have exchanged the brake linings including the wear sensors.

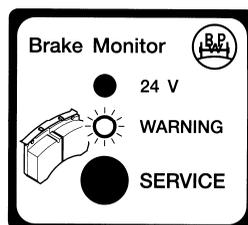


**The green and the yellow LED are flashing by turns, the service indication changes from black to red:**



The brake linings must immediately be exchanged!  
(The lining thickness is at minimum 2 mm)

The service indication (falling flap – red - ) remains also without operating voltage.



To avoid damage to the brake disc, the brake linings must be exchanged at the latest if a remaining brake lining thickness (without supporting plate) of 2 mm is measured at the thinnest point. If you do not observe this direction, there is the danger that the brake disc is damaged with worn out brake linings and therefore the brake effect is reduced or even fails entirely.



If connected to the trailer WABCO EBS, the driver is warned by the 4 times flashing of the ABS lamp every time switching on the tractor if the remaining lining thickness is reached.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 3.5.2 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).**

The parking brake is a spring parking brake. This kind of parking brake is a spring brake without linkage 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 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 with the combined release valve (left hand side in driving direction in front of the 1<sup>st</sup> axle). The power of the spring effects on the wheel brake via the piston rod.

When there is no air supply, the spring brake can be released by a mechanical emergency device.

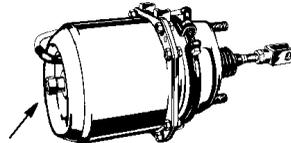


**Before releasing the spring brake cylinders, the semitrailer must be secured against rolling, because neither the service brake nor the parking brake are working.**

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

#### **Typ1**

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



## Operating and maintenance instructions

Semitrailer with rear tipping device



### 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 resp. replaced.



### **3.6. Antilock device (ABV)**

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 utilisation of the transmittable brake power and cornering forces between the tyres and the road.

*But ABV 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.*

## Operating and maintenance instructions

Semitrailer with rear tipping device



**When working on vehicles with ABV note the following:**

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

### **3.7. Rear support**

The rear support (hydraulic or mechanic) serves for increasing the stability during the unloading procedure (tipping). The supports have to be extended before the tipping procedure so far that the semitrailer is safely supported and arranged in the horizontal. Furthermore pay attention that the floor under the support legs has a sufficient load-capacity; if necessary, wooden boards must be placed under the supports.

## Operating and maintenance instructions

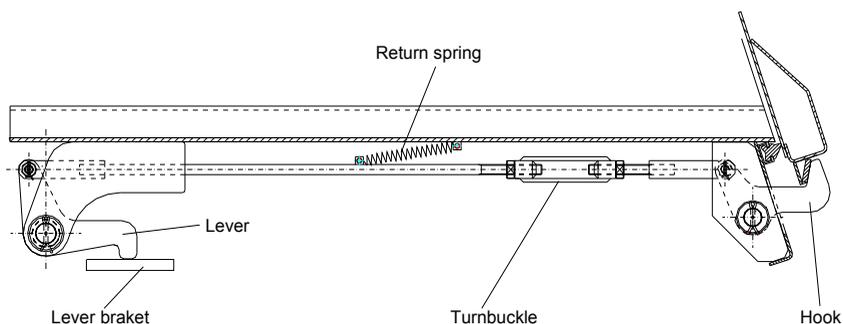
Semitrailer with rear tipping device



### 3.8 Automatic lock

The automatic lock is mounted on all tipping trailers with swing-flap and rear wall to be lifted hydraulically.

Opening and closing of the lock is carried out automatically when tipping.



When starting to tip the box, the knee lever gets free because it does no longer press on the support in the chassis. The linkage is drawn back by the release spring and therefore the locking hook is opened. The turnbuckle serves for adjusting the lock.



**Attention: Do not adjust the lock too tight because this inevitably leads to damages on the locking system.**

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 3.9 Rear walls

The semitrailer can optionally be equipped with a swing-flap, a hydraulically operated rear wall, a folding door (one-piece or two-piece) or a combined door.

#### 3.9.1 Swing-flap

This rear wall has a swing-bearing at the upper frame and is opened automatically at a tipping procedure. Optionally this kind of rear wall can be provided with a rubber sealing. The trade name of the sealing used is Keltan, BUNA AP. The sealing is suitable for temperatures from  $-40^{\circ}\text{C}$  up to  $+150^{\circ}\text{C}$ .

For mud-tight tipping boxes additionally lateral supplementary locking devices are used. These ones must be opened before starting to tip. When driving, these locking devices **have to be** closed.

#### 3.9.2 Hydraulically operated rear wall, electric control

The semitrailer can be equipped with an electro-hydraulic rear wall. The rear wall is moving upwards automatically during the tipping operation. The system is made for unloading the laden tipping box. When tipping an empty (light) tipping box the rear wall will open correspondingly later (higher tipping angle).



If equipped with roller tarpaulin, note that before the tipping operation the tarpaulin is completely opened and tightened. It has to be ensured that the folding joint of the rear wall is free-moving.

Optionally this kind of rear wall can be provided with a rubber sealing. The trade name of the sealing used is Keltan, BUNA AP. The sealing is suitable for temperatures from  $-40^{\circ}\text{C}$  up to  $+150^{\circ}\text{C}$ .

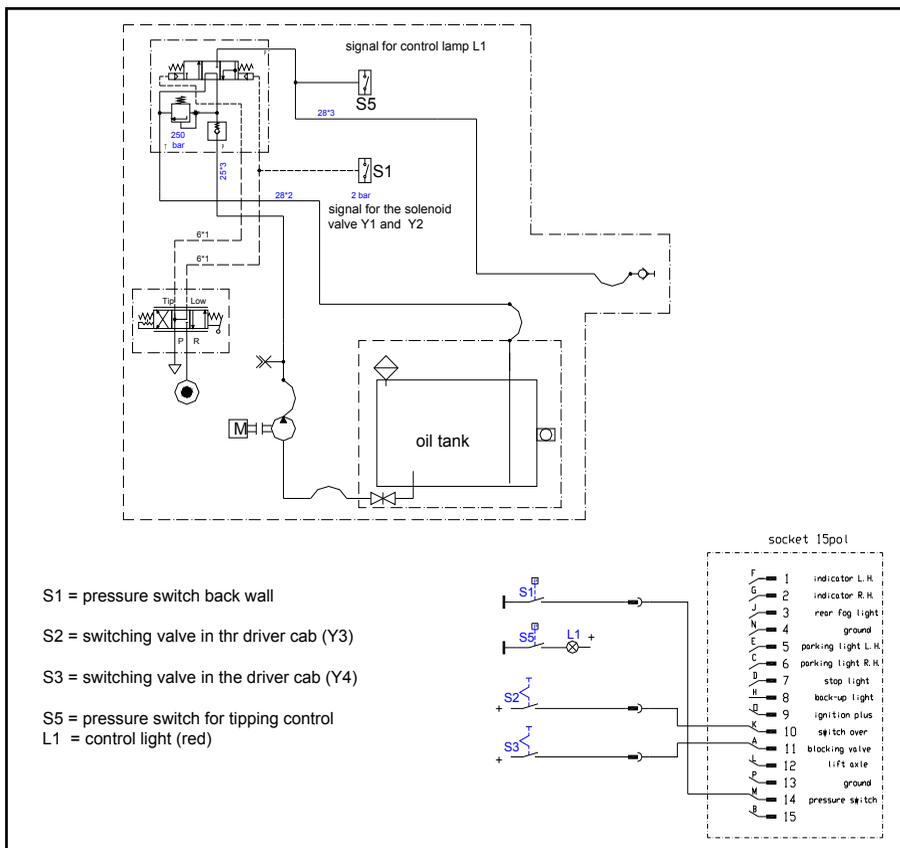
# Operating and maintenance instructions

Semitrailer with rear tipping device



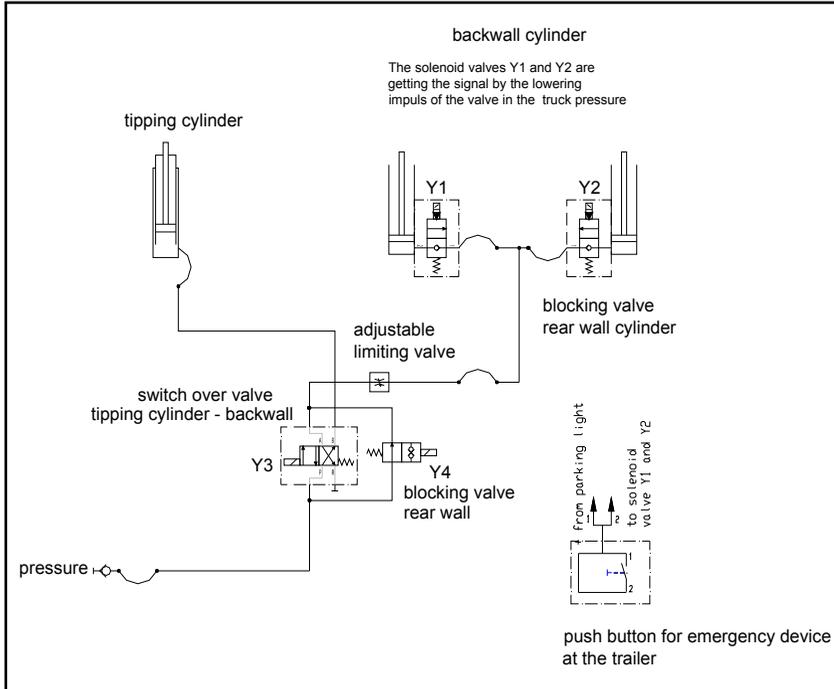
## Description of the system and function:

To guarantee a trouble-free function of the hydraulic rear wall, the tractor has to be equipped correspondingly. We recommend an equipment according to below wiring scheme.



# Operating and maintenance instructions

Semitrailer with rear tipping device



After switching on the PTO and operating the tipping valve the oil will flow to the tipping cylinder and the rear wall cylinders. The pressing switch S5 responds and signals by the indicator lamp L1 in the driver's cab that the box will be tipped.

For the control of the tipping cylinder and the rear wall following valves are installed in the semitrailer.

## 1. Shift valve tipping cylinder – rear wall cylinder (Y3)

This valve is addressed by the rocker switch S2 in the tractor. If this valve is operated, the total oil stream is led to the rear wall cylinders.



Before the rear wall can be opened the tipping box must be lifted until the automatic locking system of the rear wall is released.

This function can be used e.g. for opening the rear wall widely with a lower tipping angle, for unloading bigger stones, if necessary.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 2. Stop valve for rear wall (Y4)

This valve is addressed by the rocker switch S3 in the tractor. By operating this valve, the oil stream to the rear wall cylinders is cut off. This means that the rear wall will not be closed when lowering the tipping box.



By blocking the valve the oil flow will stop. As the rear wall is equipped with single acting cylinders it is possible that the rear wall will open caused by the load pressure or – in case of higher tipping angles – caused by its own weight. Therefore this kind of rear wall **cannot be used for measuring out the bulk goods**. Further it is only conditionally suitable for road finishers.

This function is designed for maintenance and cleaning works in the tipping box. Before starting these works the rear wall must be secured mechanically in addition.

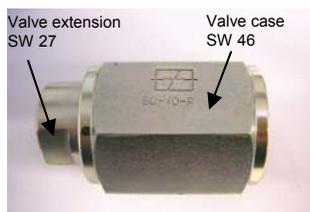
### 3. Adjustable reducing valve

With this valve the opening /closing speed of the rear wall can be adjusted. The valve is mounted in the front section on the longitudinal member.

For adjusting the valve proceed as follows:

Hold the extension of the valve with a fork wrench SW 27. By turning the valve case (fork wrench SW 46) the throughput can be adjusted. The case should be moved max. ¼ turn. After the adjustment it must be checked, if the opening speed has changed accordingly.

By turning the valve to the left throughput and speed will increase.



When lowering the tipping box and closing the rear wall following functions are carried out. When switching the pneumatic operation of the tipping valve the pressure switch S1 is addressed. By this stop valves Y1 and Y2 of the rear wall cylinders are operated. The rear wall is closed and the tipping box lowered.



Before the rear wall can be moved, the automatic locking must be opened. This means, that the tipping box must be tipped until the locking hooks of the rear wall are opened. **This means also that the rear wall must be closed before the automatic locking closes, i.e. before the tipping box is completely lowered.**

## Operating and maintenance instructions

Semitrailer with rear tipping device



### Emergency operation of the hydraulic rear wall

For operating the semitrailer with **a tractor which is not equipped**, an electric key is mounted on the chassis for closing the rear wall. For doing so proceed as follows:

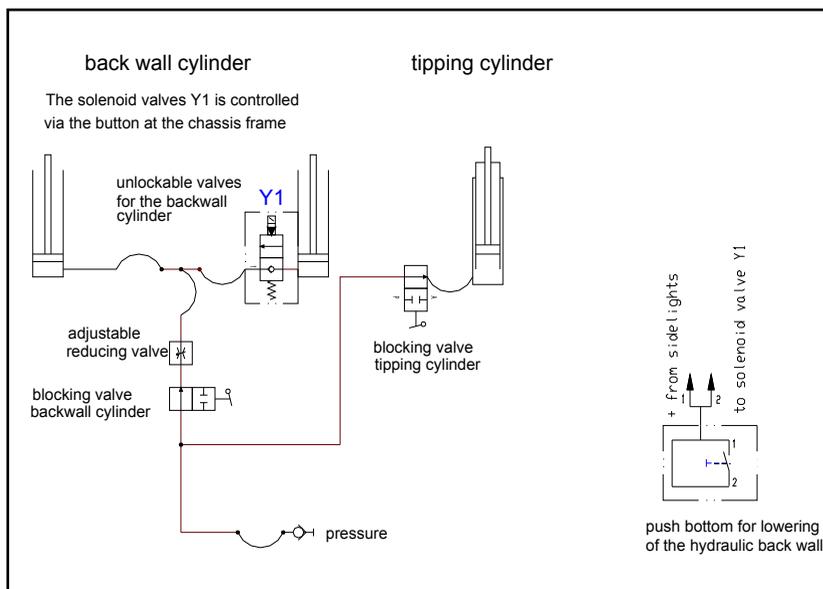
1. Tipping box is completely lifted. Rear wall is open.
2. Switch on parking lights. By this the power supply of the switch is ensured.
3. Switch the tipping valve to position „lower“ and immediately press the key until the rear wall is closed. This key replaces in this case the pneumatic pressure switch S1 in the tractor.



**The rear wall has to be closed before the automatic locking is closed, that means, before the tipping box is completely lowered.**



### **3.9.3 Hydraulically operated rear wall, manually controlled stop valves**



The semitrailer can be equipped with an electro-hydraulic rear wall. The rear wall is moving upwards automatically during the tipping operation. The system is made for unloading the laden tipping box. When tipping an empty (light) tipping box the rear wall will open correspondingly later (higher tipping angle).

Optionally this kind of rear wall can be provided with a rubber sealing. The trade name of the sealing used is Keltan, BUNA AP. The sealing is suitable for temperatures from  $-40^{\circ}\text{C}$  up to  $+150^{\circ}\text{C}$ .

#### **Description of the system and function:**

After switching on the PTO and operating the tipping valve the oil will flow to the tipping cylinder and the rear wall cylinders.

For the control of the tipping cylinder and the rear wall following valves are installed in the semitrailer.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 1. Stop valve tipping cylinder

If this valve is operated, the total oil stream is led to the rear wall cylinders.



Before the rear wall can be opened the tipping box must be lifted until the automatic locking system of the rear wall is released.

This function can be used e.g. for opening the rear wall widely with a lower tipping angle, for unloading bigger stones, if necessary.

### 2. Stop valve for rear wall

By operating this valve, the oil stream to the rear wall cylinders is cut off. This means that the rear wall will not be closed when lowering the tipping box.



By blocking the valve the oil flow will stop. As the rear wall is equipped with single acting cylinders it is possible that the rear wall will open caused by the load pressure or – in case of higher tipping angles – caused by its own weight. Therefore this kind of rear wall **cannot be used for measuring out the bulk goods**. Further it is only conditionally suitable for road finishers.

This function is designed for maintenance and cleaning works in the tipping box. Before starting these works the rear wall must be secured mechanically in addition.

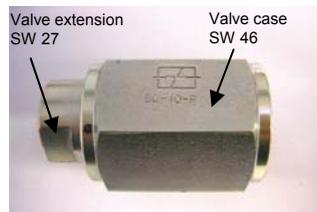
### 3. Adjustable reducing valve

With this valve the opening /closing speed of the rear wall can be adjusted. The valve is mounted in the front section on the longitudinal member.

For adjusting the valve proceed as follows:

Hold the extension of the valve with a fork wrench SW 27. By turning the valve case (fork wrench SW 46) the throughput can be adjusted. The case should be moved max.  $\frac{1}{4}$  turn. After the adjustment it must be checked, if the opening speed has changed accordingly.

By turning the valve to the left throughput and speed will increase.



**When lowering the tipping box and closing the rear wall following functions have to be carried out:**

1. Tipping box is completely lifted. Rear wall is open.

## Operating and maintenance instructions

Semitrailer with rear tipping device



2. Switch on parking lights. By this the power supply of the switch is ensured.
3. Switch the tipping valve to position „lower“ and immediately press the key until the rear wall is closed.



**The rear wall has to be closed before the automatic locking is closed, that means, before the tipping box is completely lowered.**

### 3.9.4 Folding door

The semitrailer can be equipped with a one-piece or two-piece folding door. The one-piece folding door can additionally be designed as swing-flap (combined door).

Before tipping note following when opening the rear wall:

1. Close additional rear locking.



The additional rear locking must be closed before opening the rotary bar locks. This shall prevent the doors from “flying open” due to the load pressure.

2. Open the rotary bar locks of the folding doors.
3. Stand at the side of the vehicle so that there is not any danger for you due to the material loaded pouring out, and open the additional locking.
4. The folding doors can be turned by 270° and fastened at the sidewall of the box.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 3.9.5 Combined door

This rear wall is designed in a way that it can be used as swing-flap or as folding door. Optionally this rear wall can be furnished with a rubber sealing. Further information on operation and maintenance of the combined door and the locking system please find in the documents enclosed.

### 3.9.6 Corn slide



Only dry, fine, gliding bulk materials which can be dumped out easily may be unloaded via the corn slide. It must be ensured that the corn slide does not block.

The tipping angle should be as small as possible to keep the centre of gravity of the tipping box as low as possible and to ensure the best possible stability. In addition it must be considered that the load pressure on the rear wall increases considerably and therefore suspension and locking might be damaged.

Before tipping take care that the locking hooks of the automatic rear wall locking are arrested by locking bolts.

If it is not used, the corn slide has to be secured against unintentional opening by means of the locking screws.

### 3.9.7 Measuring out device



The measuring out device may only be used for dry, fine, gliding bulk materials which can be dumped out easily. The opening angle of the rear wall must be adapted to the bulk material.

As regards these measuring out devices, it is distinguished between tipping boxes with bulk sheet and tipping boxes without bulk sheet.

Concerning tipping boxes with bulk sheet, a bar is inserted throughout the total width into the side panels of the bulk sheet. By this the opening angle of the rear wall is limited. Due to several plug-in possibilities different opening angles are obtained.

Concerning tipping boxes without bulk sheet a chain can be hung in between rear wall and tipping box. Different opening angles are obtained by different chain lengths.

The opening angle for both variants must be chosen in a way that the dry, gliding bulk material can slip off without any problems.

The tipping angle must be as small as possible to keep the centre of gravity of the box as low as possible and to ensure the best stability. In addition it must be considered that the load pressure on the rear wall increases considerably and therefore suspension and measuring out device might be damaged.

# Operating and maintenance instructions

Semitrailer with rear tipping device



## 3.10. Tipping operation



The vehicle may only be tipped on firm and straight ground. Otherwise a support is needed to adjust the vehicle to the horizontal.



Only "easily gliding bulk material" may be dumped out by semitrailers with large loading length. Please also see security instructions on page 13.



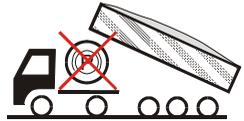
When using air suspended tractors with automatic level adjustment (ECAS control), the air suspension of the tractor has to be switched according to the regulations of the manufacturer.



The road train must stand straight-line. A bending of the tractor to the left or right hand side takes valuable stability because the so-called tipping edge moves inwards.



For vehicles with air suspension it has to be paid attention that during loading and unloading (tipping), the brake system is not operated continuously. In this case the air bellows could not be adjusted to the current pressure (corresponding to the weight of the load) and then would release the air pressure abruptly when releasing the brake.



If necessary, the vehicle must be secured against rolling by placing the chocks.



If there is crosswind of wind force 5 Bft (approx. 30-35 km/h) or more, there is the danger that the vehicle falls over – even if all other measures are observed. The longer or higher the tipping box and the larger the tipping angle, the more critical is the crosswind sensitivity.



## Operating and maintenance instructions

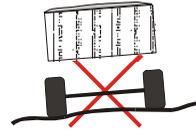
Semitrailer with rear tipping device



Special care must be taken when loading and unloading (tipping). Only a firm and straight ground guarantees a tipping of the load without danger.

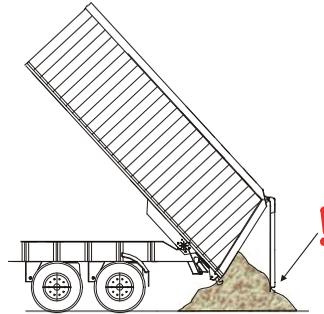
If the side inclination is recognisable even with the naked eye:

**Do not tip!**



### Attention

During the tipping operation it must be ensured that the rear wall is not supporting against the ground or the bulk material.  
Danger of damage!



- Before starting the tipping procedure the lateral additional locking (if existing) must be released. For **mud-proof** tipping boxes these locking devices **have to be closed** when driving.
- If equipped with a rear wall with swinging bearing, the lock opens automatically when tipping the box.  
As regards a hydraulically operated rear wall, pay attention to the hints in paragraphs 3.9.2 and 3.9.3.  
As regards an equipment with folding door, pay attention to the hints in paragraph 3.9.4.  
For tipping the load via a corn outlet or with a measuring out device pay attention to the notes in the corresponding paragraphs.
- Switch on the auxiliary drive



When tipping over a corn outlet or with a measuring out device, the tipping box may only be tipped so far until the load is slipping off slightly; under no circumstances tip the box so far that the whole weight of the bulk good weighs on the rear wall.

- Put the tipping valve to “tipping”. Motor speed max. 1200 min<sup>-1</sup>

## Operating and maintenance instructions

Semitrailer with rear tipping device

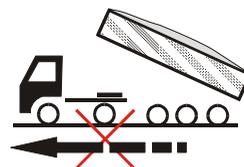


If it is required to drive the vehicle forwards during the tipping operation, the **auxiliary drive must be switched off or the tipping valve must be switched to “neutral”** before engaging a gear. The maximum motor speed of  $1200 \text{ min}^{-1}$  must not be exceeded. Otherwise there might be damages on the tipping hydraulics and on the switch gear of the motor vehicle.

- When the front wall press is completely extended, put the tipping valve to “stop”, switch off the auxiliary drive.
- If the vehicle is equipped with rubber sealing, this sealing must be cleaned before lowering.

### **Attention: Danger of bruise!**

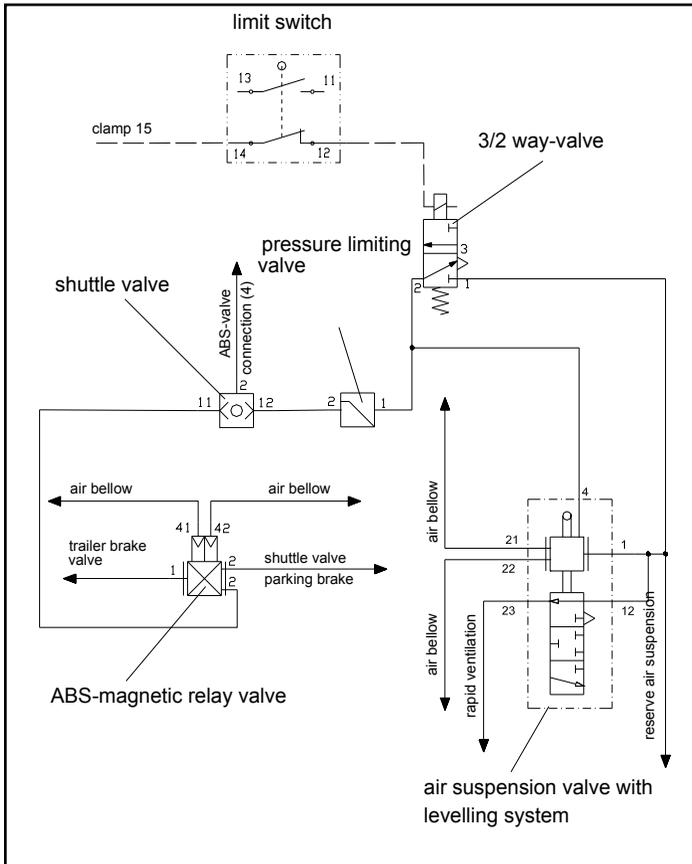
- After the emptying of the tipping box the box must be completely lowered and the tipping valve must be put into position “neutral”.
- Do not drive before the tipping box is resting and the rear wall is locked. For mud-proof tipping boxes the additional locking must be closed.



### **3.10.1 Tipping into a road finishing machine (standard brake system)**

For tipping into a road finishing machine pay attention to following points:

1. Completely fold up the underride protection and secure it with the locking bolt.
2. Drive near to the road finishing machine.
3. Switch on the electric switch (with integrated or external red indicator lamp) in the driver's cab of the tractor. When tipping the box, a limit switch is actuated and a 3/2 way magnetic valve is supplied with current. This valve regulates compressed air via a pressure limiting valve, two-way valve to the connection (4) of the ABS magnetic relay valve. The magnetic valve regulates the limited pressure to the brake cylinders of the semitrailer. The initial pressure of the pressure limiting valve is adjusted to 0.8-1.1 bars (approx. 8-10 % braking of the loaded trailer). After the use in front of the road finishing machine the electric switch in the driver's cab must be switched off. Additionally the limit switch under the box interrupts – for safety reasons resp. legal regulations – the current flow in lowered condition.



## Operating and maintenance instructions

Semitrailer with rear tipping device



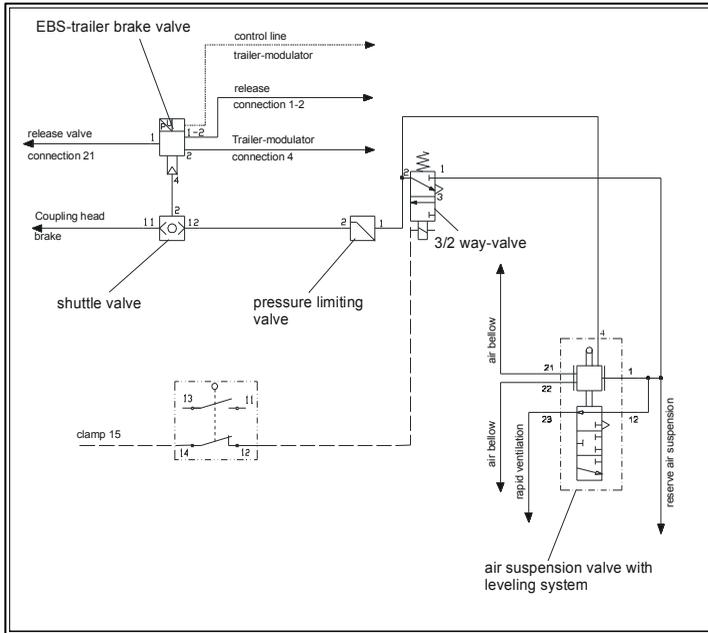
### **3.10.2 Tipping into a road finishing machine (EBS brake system)**

For tipping into a road finishing machine pay attention to following points:

1. Completely fold up the underride protection and secure it with the locking bolt.
2. Drive near to the road finishing machine.
3. Switch on the electric switch (with integrated or external red indicator lamp) in the driver's cab of the tractor. When tipping the box, a limit switch is actuated and a 3/2 way magnetic valve is supplied with current. This valve regulates compressed air via a pressure limiting valve, two-way valve to the connection (4) of the EBS trailer brake valve. The valve regulates the limited pressure to the brake cylinders of the semitrailer. The initial pressure of the pressure limiting valve is adjusted to 0.8-1.1 bars (approx. 8-10 % braking of the loaded trailer). After the use in front of the road finishing machine the electric switch in the driver's cab must be switched off. Additionally the limit switch under the box interrupts – for safety reasons resp. legal regulations – the current flow in lowered condition.
4. Lifting of the driving height as additional equipment variant  
If the driving height is too low, the driving level can be increased by approx. 70 mm by adjusting the zero point of the air suspension valve. The control connection (4) on the air suspension valve is ventilated via a manual 3/2 way valve and/or 3/2 way magnetic valve.
5. After having finished the tipping procedure (the tipping box must be completely lowered) the finisher brake must be switched off. The red indicator lamp goes out and the normal driving height of the air suspension is adjusted. The underride protection must be folded back into driving position.

# Operating and maintenance instructions

## Semitrailer with rear tipping device



### 3.11. Trailing steering axle

The semitrailer can be equipped with a trailing steering axle. The stabilisation when driving straight-ahead is done via compressed air cylinders which get pressure in dependence with the load and therefore are counteracting the steering motion. When cornering a steering angle of the axle is caused by the appearing side forces. To avoid this steering angle, e.g. when driving backwards, the axle can be locked. For doing so the axle must be in "straight position". Depending on the equipment the locking is done from the tractor via an electric switch or as alternative directly on the trailer via a block ball cock (according to the labelling). The steering linkage of the axle is locked by a bolt which is moved by a compressed air cylinder.



To avoid an unintentional steering angle of the axle, it has to be blocked before driving backwards.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 3.12. EDSCHA tarpaulin system

The vehicle can be equipped with a tarpaulin system with hydraulic and/or mechanic drive. The hydraulic drive is switched by a tip switch in the instrument panel of the tractor. For this the auxiliary drive must be switched on. The tarpaulin system must not be driven against the stop with the hydraulic drive. The mechanic crank drive can be found on the RH side on the front wall. When driving with opened tarpaulin system pay attention that the total vehicle height is approx. 150 mm higher.



The maximum loading height is the upper edge of the upper frame of the tipping box (pay attention to the payload!). Never tamp the loading good by means of an excavator because this might lead to a bumping out of the tipping box and also the function of the tarpaulin system is considerably affected.

In addition the tarpaulin system must not be used as levelling device for accumulations of bulk material because the tarpaulin resp. the drive might be damaged.

### 3.13 CRAMARO tarpaulin system

The vehicle can be equipped with a tarpaulin system with electric and/or mechanic drive. The electric drive is switched by a tip switch on the semitrailer or optionally in the instrument panel of the tractor. The mechanic crank drive can be found on the front wall. Pay attention also to the documents of the producer of the tarpaulin system.



The semitrailer must be parked only with closed tarpaulin system! If the tarpaulin is open there is the danger that rain water collects in the folds of the open tarpaulin. If this water freezes in the cold season the tarpaulin system would be damaged when closing the tarpaulin. In addition persons could get hurt by ice pieces falling down.



The maximum loading height is the upper edge of the upper frame of the tipping box (pay attention to the payload!). Never tamp the loading good by means of an excavator because this might lead to a bumping out of the tipping box and also the function of the tarpaulin system is considerably affected.

In addition the tarpaulin system must not be used as levelling device for accumulations of bulk material because the tarpaulin resp. the drive might be damaged.

Before road driving the tarpaulin system must be closed. If equipped with rubber bands, these ones have to be duly fixed and attached to the designated points. Otherwise the tarpaulin system could "lift off" due to the airstream.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### **3.14. Walkway**

The walkway is mounted on the chassis up to a tipping box height of 1,600 mm. As regards tipping boxes with a larger loading height, the walkway is mounted on the front wall of the tipping box. Climbing up is possible optionally from the right, left or from both sides. Pay attention that the possibly mounted safety devices against falling (chain or bow) are duly used in the area of climbing up.

### **3.15. Roller tarpaulin**



The maximum loading height is the upper edge of the upper frame of the tipping box (pay attention to the payload!). Never tamp the loading good by means of an excavator because this might lead to a bumping out of the tipping box and also the function of the tarpaulin system is considerably affected.

On the front side of the semitrailer a walkway is mounted for operating the roller tarpaulin. Depending on the tipping box height it is mounted on the chassis or on the front wall of the box. Look out for a safe position when opening or closing the tarpaulin. The roller tarpaulin must be secured with the corresponding fixations against falling down when rolled up or down.

Pay attention that the tarpaulin is duly tightened before driving. It has to be ensured that the airstream cannot get under the tarpaulin so that it would "lift off".

When the vehicle is loaded, the roller tarpaulin must be closed. It is of great importance especially when bulk material is loaded which could be blown out of the box by the air stream (e.g. sand, gravel, corn etc.)

## Operating and maintenance instructions

Semitrailer with rear tipping device

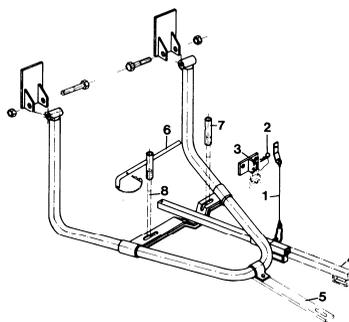


### 3.16 Spare wheel holder

The semitrailer can be equipped with different spare wheel holders:

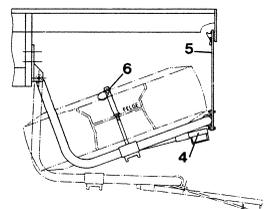
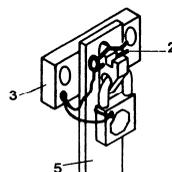
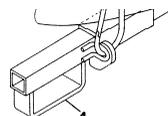
#### Spare wheel holder type 89

For taking and refastening spare wheels you have to proceed as follows:



Taking the spare wheel

1. Release the karabiner of the safety rope (1) from the spare wheel.
2. Remove the spring pin (2) and, if necessary, the padlock (special equipment) from the hook part (3).
3. Pull out the lifting bar (4).
4. Slightly lift the spare wheel holder by means of the lifting bar and take the flap (5) out of the hook part; after that set down the spare wheel holder onto the hand protection bow.
5. Loosen the rim securing (6) and take it away:
  - Pull out the spring pin of the connection bar.
  - Loosen the pipe nut (7) and hook screw (8).
6. Take the spare wheel.



## Operating and maintenance instructions

Semitrailer with rear tipping device



### Refastening the wheel

1. Put the spare wheel / spare wheel rim with defective tyre on the folded spare wheel holder with the lifting bar (4) pulled out.
2. Lift the spare wheel holder by the pulled out lifting bar and jolt it.



A largely intact spare wheel positions itself by doing so. A defective spare wheel gets in position by shifting the rim.



3. Take the hook screws (8) through the rim holes and long holes of the spare wheel holder. Put on the nuts and tighten with max. 80 Nm („solid“); depending on the state of maintenance resp. condition of the bolted connection, the transverse bar (6) can be used for increasing the torque.

4. Secure the transverse bar by means of the spring pin.

5. Hang the flap (5) into the hook part (3).



Take care that the flap (5) is moved over and above the gap and so lies on the hook part (3).

Secure the flap by putting in the spring pin (2) and possibly fixing of the padlock (special equipment).

6. Hang in the karabiner hook (safety rope – 1) and at the same time lock the lifting bar (4), i.e. the karabiner hook has to be taken through both eyes.



The safety rope serves as 2nd safety device for the spare wheel holder against folding down; therefore the rope has to be hung in at the provided point and carried tightly.

During the daily departure check pay attention, among other things, that the spare wheel holder is duly secured and the safety elements are secured against losing.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### Spare wheel holder with winch

The spare wheel holder is mounted in the middle under the chassis. By a winch mounted laterally under the longitudinal member the spare wheel can be lifted or lowered over a deflection pulley by means of the wheel support hanging on a steel rope.



### Lowering the spare wheel

After having removed the spring pin, the locking pin can be taken off. By means of the locking pin the pipe nuts can be released. After having removed the pipe nuts, the spare wheel can be lowered by operating the winch.



Pay attention that the threaded pins are not damaged when lowering. The wheel support is removed through the hub hole.

### Taking up the spare wheel

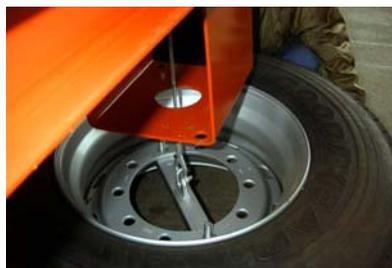
The wheel is laid under the spare wheel holder. After having lowered the rope the wheel support is taken through the hub hole of the wheel and inserted into two wheel bolt holes opposite each other with the threaded pins.



The wheel is lifted by operating the winch. The threaded pins of the wheel support must be taken through the holes of the spare wheel holder.



Pay attention that the threaded pins are not damaged when lifting the spare wheel.

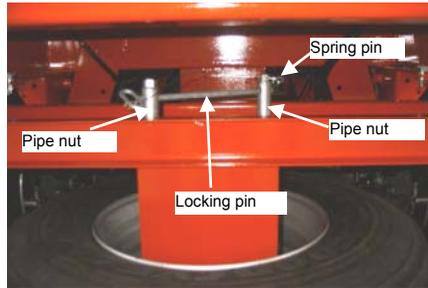


## Operating and maintenance instructions

Semitrailer with rear tipping device



The wheel is screwed on with two pipe nuts and these ones are firmly tightened by means of the locking pin. Both pipe nuts have to be connected by the locking pin. The locking pin has to be secured against loosening by means of the spring pin.



### 3.17 Wheel change

When changing a wheel on the semitrailer pay attention to following security hints:



Spare wheels older than 2 years must no longer be taken for the constant use as permanent wheel. They have to be exchanged as soon as possible against a new wheel and then can be used again as spare wheel.



When checking the air pressure of the wheels, always also the air pressure of the spare wheel has to be checked.

The spare wheel can be carried with, depending on the vehicle equipment, under the chassis by a special spare wheel holder.

To change a wheel you have to proceed as follows:



**When changing the wheel on public roads make sure that the vehicle is sufficiently secured. Ensure that you are not in the area of traffic (area of danger) during the whole procedure of the wheel change!**

1. Secure the vehicle against rolling.
2. Take the spare wheel out of its support.
3. Never put the jack on the axle centre but always on the axle body of the corresponding side of the wheel change.
4. Release the wheel nuts and unscrew them except three wheel nuts arranged opposite each other.

## Operating and maintenance instructions

Semitrailer with rear tipping device



5. Lift the vehicle by means of the jack just that high that the wheel to be changed does not have any more contact to the ground.
6. When the wheel sticks on the bolts without tension, the remaining three nuts can be removed. Pay attention that you do not damage the bolt threads when taking away and putting on the disc wheels.



Before putting on the disc wheels, clean the contact surface of the brake drum, the rim and the wheel nuts from corrosion and dirt. Check centring of the wheel.

7. Tighten the wheel nuts crosswise with the help of a torque wrench to the tightening torque indicated. (Pay attention also to the corresponding instructions of the axle manufacturer)
8. Take away the jack.
9. Fix the damaged wheel to the vehicle by means of the spare wheel holder.

### **3.18. Tipping box heating**

The vehicle can be equipped with a tipping box heating on request. By shifting the two-way flap the exhaust fumes are led into the floor construction and so e.g. a freezing of the load during the cold season is avoided.

### **3.19. Central lubrication system**

The vehicle can be equipped, if requested, with a central lubrication system. The central lubrication system is filled with grease of "Li" quality by the factory. Please note when refilling the system, that grease of the same specification is used. For progressive systems grease with EP additive (extreme pressure) have to be used. 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 to clear away this surplus grease regularly (every three months).

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 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:

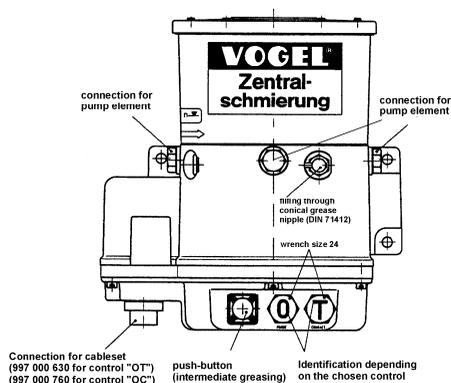
The electrically driven piston pump KFGS has 3 grease outlets for the connection of 3 progressive distributor circuits which are independent from each other. For each outlet a separate pump element is required.

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!

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 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)

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 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.

## Operating and maintenance instructions

Semitrailer with rear tipping device



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

1. **First of all the adjustment for the semitrailer 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 semitrailer 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 cm<sup>3</sup> per minute (min.) up to 2.4 cm<sup>3</sup> 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 cm<sup>3</sup>/minute).

**When changing the greasing times for the semitrailer 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)**

## Operating and maintenance instructions

Semitrailer with rear tipping device



### Ventilation of the system

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

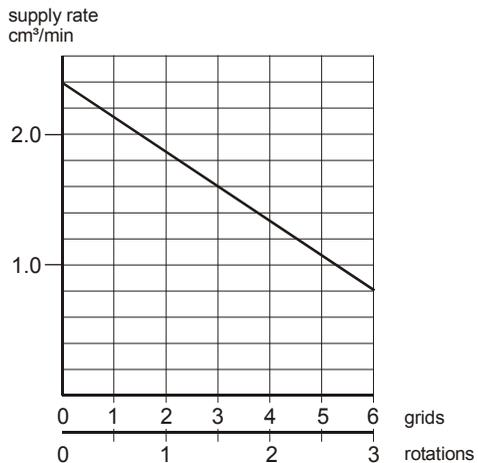
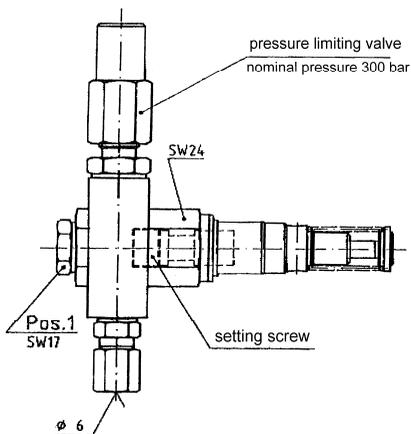
This is done as follows:

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.



## Operating and maintenance instructions

Semitrailer with rear tipping device



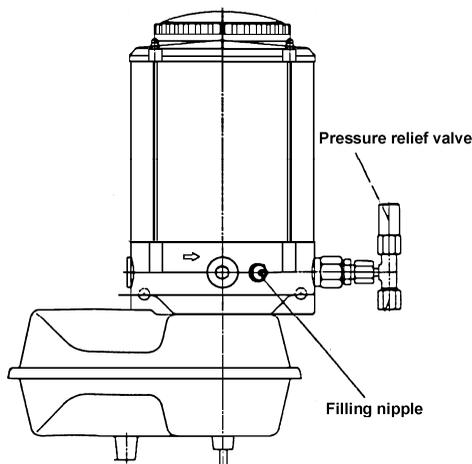
### BEKA-MAX progressive central lubrication system with electric pump EP-1

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.



## Operating and maintenance instructions

Semitrailer with rear tipping device



### 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.

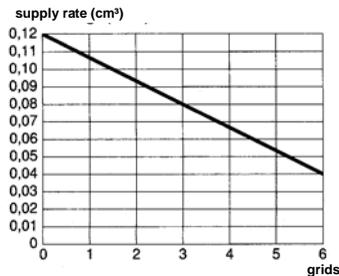
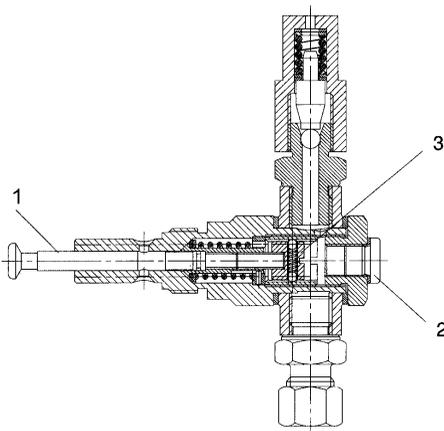
The adjustment is made at the pump element adjustable as regards the quantity. This is mounted directly at the pump. It is possible to adjust from 0.12 cm<sup>3</sup> per pump lift (max.) to 0.04 cm<sup>3</sup> per lift. The optimum adjustment should be in a way that after one week of driving there is 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 cm<sup>3</sup>/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.



## Operating and maintenance instructions

Semitrailer with rear tipping device



### **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.

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.

#### **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.**

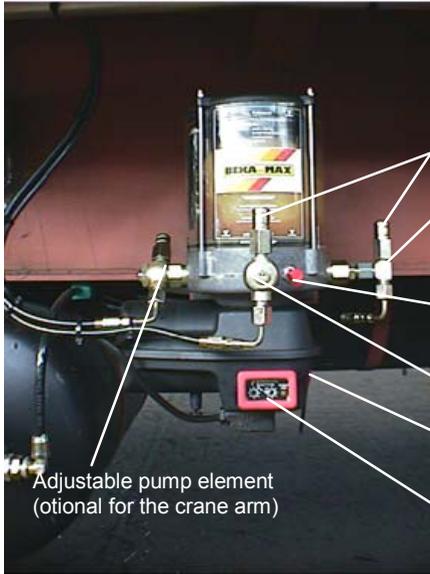
The filling of the supply reservoir is done via a conical grease nipple according to DIN 71412.



Pay attention to cleanliness when filling!

## Operating and maintenance instructions

Semitrailer with rear tipping device



Pressure relief valve

Not adjustable pump element  
for the trailer

Filling nipple

Adjustable pump element  
(optional for the crane foot)

Button for intermediate  
greasing (red)

Electronic control for stop- and  
grease time

Adjustable pump element  
(optional for the crane arm)

### General Information for the adjustment of the central lubrication system, brand BEKA-MAX

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

- 1. First of all the adjustment for the semitrailer 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 semitrailer is duly greased. The factory setting is a grease time of 3 minutes and a stop time of 8 hours.  
That means that 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.
- 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 0.12 cm<sup>3</sup> per pump lift (max.) up to 0.04 cm<sup>3</sup> per lift is possible. The optimum

## Operating and maintenance instructions

Semitrailer with rear tipping device



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 (0.12 cm<sup>3</sup>/lift).



**When changing the greasing times for the semitrailer 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)**

### **Intermediate greasing**

When the ignition is switched on, an intermediate greasing can be activated with the push-button on the housing of the pump. During the greasing procedure the yellow light-emitting diode in the window control is shining.

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.

### **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.

## Operating and maintenance instructions

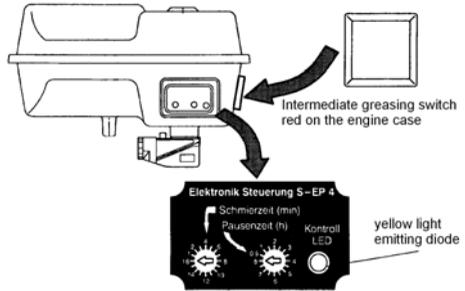
Semitrailer with rear tipping device



### Adjustment of the stop and grease times for the semitrailer

To adjust the stop and grease times proceed as follows.

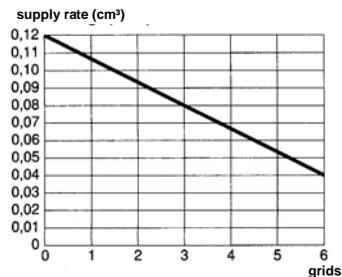
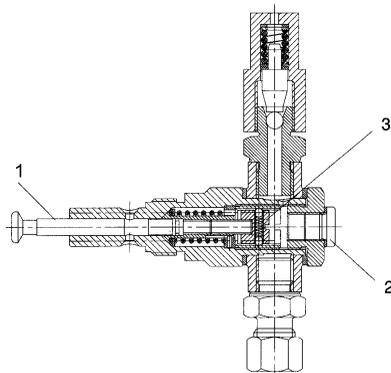
1. Remove the red frame of the control on the engine protective case by means of a flat screwdriver as well as the 4 recessed-head screws and the transparent cover.
2. Adjust the stop or grease time on the two switches with a slotted-head screwdriver.
3. If the control is not duly closed, water can get into it; in this case the guarantee period expires.



### Adjusting the supply rate on the adjustable pump elements

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.



## **Operating and maintenance instructions**

Semitrailer with rear tipping device



### **4. Legal obligations**

The corresponding national rules must be observed for vehicle homologation in foreign countries!

# **Operating and maintenance instructions**

Semitrailer with rear tipping device



## Operating and maintenance instructions

Semitrailer with rear tipping device

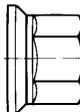


### 5. First inspection

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



A first inspection of your trailer / semitrailer 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.

# Operating and maintenance instructions

Semitrailer with rear tipping device



## 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				
Visual check of the axle assembly				
Check shock absorbers and their fixation				
Check air bellow for damage				
Check tightening torque on the spring clamps For BPW-axes M24 → 650 Nm For SAF-axes M24 → 700 Nm				
Check axle lift				
Check slack adjuster				
Check axles according to the instructions of the manufacturer				
Check lighting system				
Check function of brake system; check connections for tightness				
Check brake-piston stroke				
Check function of parking brake				
Check air suspension system including lift/lower valves and drain-off valves				
Check function of the finishing brake				
Make brake balance for road train between tractor and trailer.				
Check function of the trailing steering axle				
Check rear support				
Check function and tightness of hydraulic system				
Check fixed seat of king-pin				
Visual check of vehicle frame				

# Operating and maintenance instructions

Semitrailer with rear tipping device



Works to be carried out	without defect	does not belong to equipment	defect repaired	Notes
Check fifth wheel plate; grease it				
Check function and fixation of the support system / unhitching supports				
Check bearing of rear wall				
Check rear wall locking for function and damage				
Check seat of the noise reduction ring and grease the ring				
Check the tipping cylinder fixation				
Check the tipping bearing				
Check the EDSCHA tarpaulin system				
Check tipping box supports				
Retighten all screwed connections with directed tightening torque				
Check tyres 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:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 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)

## Operating and maintenance instructions

Semitrailer with rear tipping device



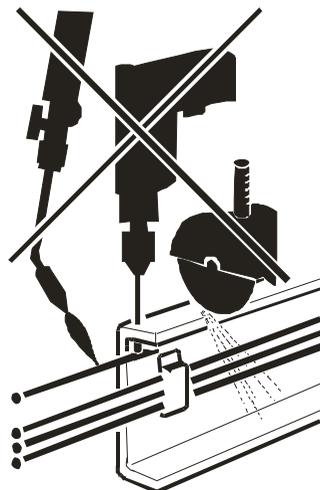
## 6. Maintenance and inspections

### 6.1 General indications concerning maintenance and inspection works

- ! - 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.
- When working on or under movable parts, these parts have to be secured or supported accordingly.
- 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 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 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 $\varnothing$ mm	Material thickness mm	Minimum bending radius mm
6	1,0	40
8	1,0	40
12	1,5	60
15	1,5	90



## Operating and maintenance instructions

Semitrailer with rear tipping device



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

We understand by “*normal* operation conditions”:

- regular “single-shift” operation
- paved roads
- temporary operation under full load
- central European climate

We understand by “*extreme* operation conditions”:

- “multi-shift” operation
- long immobilisation time
- 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 clean any electric parts (lamps, keys, solenoid valves, junction boxes etc.) with steam-jet tools.
- Never turn the steam-jet directly to greasing and bearing points.
- 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.

## Operating and maintenance instructions

Semitrailer with rear tipping device



- 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 devices to do it in his own work.

### **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 tyres**

The air pressure of all wheels incl. spare wheel must be checked according to the instructions of the tyre manufacturer in dependence with the axle load. Regular visual examinations must be made on tyres 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.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### - 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 always to have a range of bulbs and fuses available in the vehicle. As main distributor box the licence plate support is used. All fuses are mounted here, too.



All fuses are mounted in the distributor box behind the licence plate lights.

### - 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 3.15 or contact our after-sales service.

## Operating and maintenance instructions

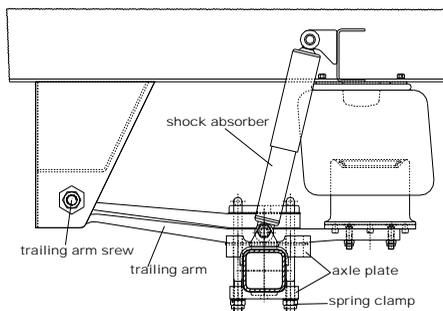
Semitrailer with rear tipping device



### 6.4 Maintenance works to be done every 3 months

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

- **Visual check of axle suspension**  
All axle 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.



A slight oil film on the shock absorber casing does not in every case point at a defective shock absorber. It might be that the absorber "sweats". It is recommended to clean the shock absorber carefully from the oil film and to check it again after approx. 100 km driving.

Check fixed seat of lower and upper shock absorber fixation.

Tightening torque with M24  $M_A = 400 - 450 \text{ Nm}$

- **Check tightening torque on the spring clamps**  
The axle plates and spring clamps must be checked carefully for damages and correct seat. Damaged parts must be replaced immediately.  
Tightening torque BPW axle  $M_A = 650 \text{ Nm}$  for thread M24  
Tightening torque SAF axle  $M_A = 700 \text{ Nm}$  for thread M24
- **Check tightening torque on the trailing arm screws (only Langendorf air suspension)**  
All axle supports and trailing arms must be checked carefully for damages. Damaged parts must be replaced immediately.  
Tightening torque of the trailing arm screws (M30)  $M_A = 1.100 \text{ Nm}$   
For equipment with complete axle assemblies (BPW, SAF, Gigant, DB etc.) please pay attention to the instructions of the manufacturer.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### - Check air bellows for damage

For doing so, the air suspension of the semitrailer 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 instructions of the manufacturer

Depending on axle type and axle manufacturer the axles have to be checked according to the corresponding 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.

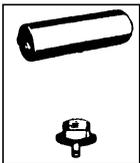


Maintenance and repair works on the brake system may only be made by qualified persons.

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.

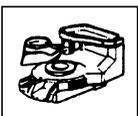
- Tube and hose lines as well as coupling heads must not be damaged or corroded at the outside.
- Dust-protection cups, e.g. on brake cylinders, must not be damaged.
- Joints, e.g. on fork heads, must duly be secured, free-moving and not worn.
- Cables and cable pulls must be guided flawlessly, must 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.

## Operating and maintenance instructions

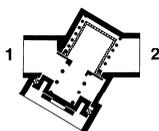
Semitrailer with rear tipping device



- 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.

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 screwings. 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.

## Operating and maintenance instructions

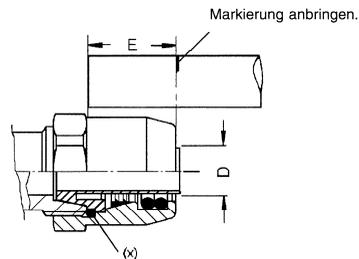
Semitrailer with rear tipping device



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 are 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.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### - Check kingpin



Kingpins are subject to approval with reference to construction and are parts connecting vehicles which highest demands regarding safety are made on. Damaged or deformed as well as repaired (e.g. welded) components must no longer be used because otherwise the operational and traffic safety is in danger and the type approval becomes extinct.

The fifth wheel locking and kingpin are subject to a certain wear. The pin must be checked for tight seat and wear with the unhitched trailer.

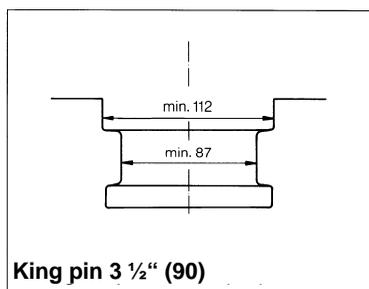
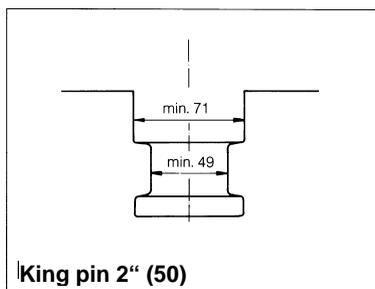
The fastening screws must be checked with the tightening torque according to below table.

Manufacturer / Designation	Check tag	Size	Screw	Tightening torque $M_A$ =
Georg Fischer +GF+ 662 101 109	D: M 4623 EG: e1-00-0475	2" (50)	M14x1,5 SW 22	190 Nm
JOST KZ 1012-01	D: F3148 EG: e100-0145	2" (50)	M14x1,5 SW 19	190 Nm
JOST KZ 1412-01	D: F3191 EG: e100-0147	3 ½ " (90)	M14x1,5 SW 19	190 Nm
JOST KZ 1016-01	D: F3188 EG: e100-0150	3 ½ " (90)	M20 SW 30	500 Nm
JOST KZ 1516-01	D: F3203 EG: e100-0148	2" (50)	M20 SW 30	500 Nm

The type designation can be found on the lower end of the kingpin.

In case the kingpin mounted in your vehicle cannot be found in above table, please get in contact with our after-sales service.

If the limiting values mentioned below are fallen under, the kingpins must be replaced by original parts.



## Operating and maintenance instructions

Semitrailer with rear tipping device



### - Check bearing of rear wall

The rear wall bearing should not show any wear indications or damages.

If the vehicle is equipped with wing door, it must be possible to duly lock the door in opened condition. Worn out or damaged bearing parts must immediately be exchanged.

### - Check rear wall locking for function and damage

The locking has to function duly. The setting parts must be free-moving; connections (e.g. fork joints) must not have any deviation. All moving connection points must slightly be greased with spray grease.

### - Check EDSCHA tarpaulin system / CRAMARO tarpaulin / roller tarpaulin

The tarpaulin system should be in impeccable condition. Damages on the tarpaulin or the tarpaulin system should be immediately repaired. The tarpaulin system must open and close faultlessly. Please pay attention also to the maintenance instructions of the manufacturer.

It must be possible to safely fix the roller tarpaulin in open as well as in closed condition.

### - Check function and tightness of hydraulic system

Works on the hydraulic system may only be made by persons who have corresponding training and know the dangers. Before starting repair works on the system, let off pressure. Parts held or moved by hydraulic cylinders have to be secured mechanically.

## Operating and maintenance instructions

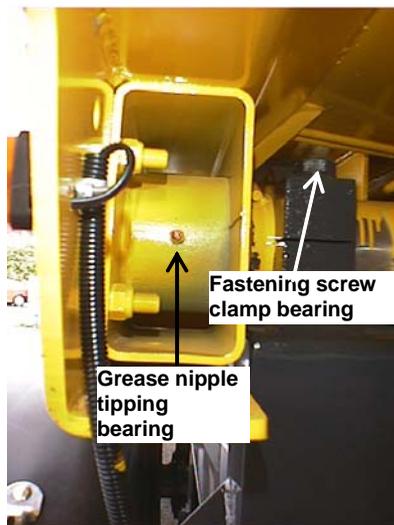
Semitrailer with rear tipping device



### - Check and grease tipping shaft bearing

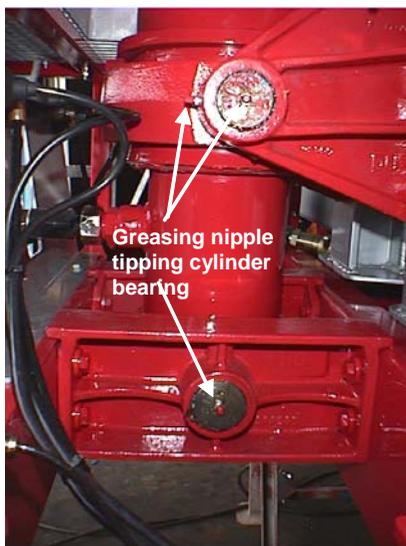
The tipping shaft bearing must not show any damages. Greasing of the tipping bearings is done via a greasing nipple.

The fastening screws (M20) of the clamp bearings must be checked with a tightening torque of 410 Nm.



### - Check and grease tipping cylinder bearing / stop

The tipping cylinder bearing must be fastened safely in the chassis and must be free of damages. Greasing of the bearing is done via the attached greasing nipples.



## Operating and maintenance instructions

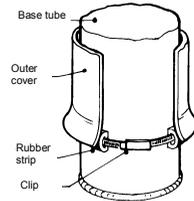
Semitrailer with rear tipping device



### - Check, adjust and grease the noise stop ring on the EDBRO tipping cylinder

Adjustment of the noise stop ring is to be done as follows.

- Extend the tipping cylinder by approx. ca. 30 cm.
- Make sure that the mounting area of the noise stop ring is free of grease and oil.
- Release the clamp of the ring.
- Retract the tipping cylinder completely.



- Push the ring, as shown in figure 1, up to under the outer cover of the cylinder and tighten the clamp slightly so that the ring does not slip any more.

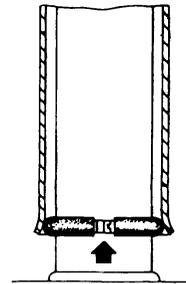
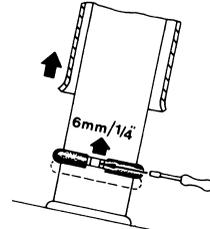


Fig 1

- Extend the tipping cylinder and push, as shown in figure 2, the ring 6 mm upwards. Secure the ring by tightening the clamp with a tightening torque of 5 Nm.
- To grease the ring, spread it with a lithium-saponified multi-purpose grease.



### - Check tipping box supports

Depending on the customer's wish the vehicles are equipped with tipping box supports made of wood or with rubber/metal supports. The supports shall ensure an even support on the chassis frame when the box is loaded. To avoid damages on the tipping box it is important that all tipping box supports are found in impeccable condition. We recommend to replace the wooden supports every 2 years.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### - Check and grease supports

Check supports and fastening parts for damage. Check all fastening screws for tight seat.

All wear parts, especially spindle and nut of the telescope support device, must be checked and replaced, if necessary (at the latest after 4 years of operation).

The re-greasing of the spindle is done via the bottom greasing nipple laterally on the shaft. Use the spindle grease JS 12 of BP for this. Grease the spindle with the fully extended support device and during the slow retracting.

### - Check rear support

Check supports and fastening parts for damage. Check all fastening screws for tight seat.

Only mechanic support:

All wear parts, especially spindle and nut of support, must be checked and replaced, if necessary (at the latest after 4 years of operation).

The re-greasing of the spindle is done via the bottom greasing nipple laterally on the shaft. Use the spindle grease JS 12 of BP for this. Grease the spindle with the fully extended support device and during the slow retracting.

### - Grease complete vehicle

Please pay attention to the lubrication plan in chapter 9.

## **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  $M_A = 210 \text{ Nm}$  for thread M16

### - Check, clean and grease fifth wheel plate

Unhitch the vehicle; clean the fifth wheel coupling and plate. Grease the fifth wheel plate, wear parts, contact surfaces of the kingpin and the kingpin with high pressure grease (EP) with MoS<sub>2</sub> or graphite additive (e.g. BP L21 M, BP HTEP 1, Esso multipurpose grease M, Shell Retinax AM).

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 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 connection 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 specialised workshop or our after-sales service.

#### - **Check shock absorbers**

Experience has shown that shock absorbers should be replaced after 300,000 km at the latest.

#### - **Check hydraulic hoses**

According to the regulations (ZH 1/74) of the government safety organization all hydraulic hoses have to be checked at least once a year.

Should you notice one of the defects mentioned in the following, the corresponding hose has to be replaced immediately.

- Damage of the outer layer up to the filler, such as chafe marks, cuts, cracks etc.
- Embrittlement of the outer layer (crack formation in the hose cover).
- Deformation not corresponding to the natural shape of the hose line. This is valid for the condition without pressure as well as with pressure or at bending. E.g. delamination, blistering, crushing or kink points.
- Leaky points.
- Damage or deformation of the hose fitting.
- Working loose of the hose out of the hose fitting.
- Corrosion of the hose fitting reducing the function or the stability.
- Exceeding of the period of use of 6 years. You can find the corresponding date of manufacture on the hose fitting.

#### - **Observe national legal directives**

## **Operating and maintenance instructions**

Semitrailer with rear tipping device



### **6.7 Make road train brake balance between tractor and trailer**

The brake systems of tractor and trailer / semitrailer 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 authorised workshop.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 6.8. Adjusting the automatic slack adjusters, type HALDEX

- 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).

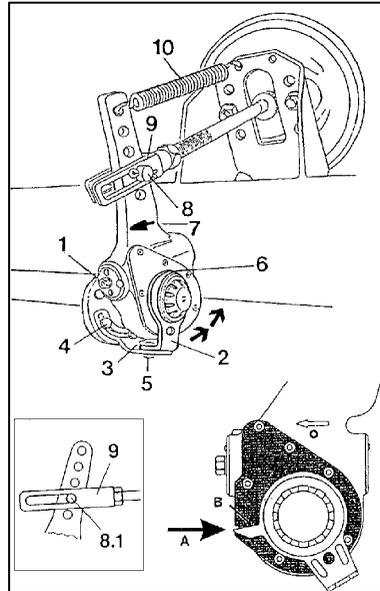
**Important:** If you do not pay attention to that, the basic adjustment is wrong!

- 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).



## Operating and maintenance instructions

Semitrailer with rear tipping device



### 7. Instructions for a long time immobilisation of the vehicle

For a longer immobilisation of the vehicle, lubricate every 4 weeks and move or operate the corresponding pieces. Drain all air tanks before immobilisation. Every 4 weeks, give pressure in the air pressure system and let it operate, so that the valves are working regularly and cannot settle.



You have to take special care when placing vehicles with air suspension for a longer period of time on a support or a landing gear. After some time it is possible because of leaks in the pipe system that the air spring gives way. I.e. the vehicle lowers itself. There is a displacement of the semitrailer in longitudinal direction because of the geometry of the axle fixation when the wheels are locked. If the support or the landing gear cannot balance this movement, e.g. by means of a roller, you have to let off the air spring entirely before placing the vehicle. This can be made via the drain valves, the lifting/lowering valve or by unhooking of the air spring valve linkage.

## **Operating and maintenance instructions**

Semitrailer with rear tipping device



## Operating and maintenance instructions

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### 8. Tightening torque in Nm

for screws and head supports according to DIN 912,931 etc

#### Note

These tightening torques are only valid if no other values are indicated in the maintenance instructions or documents of 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

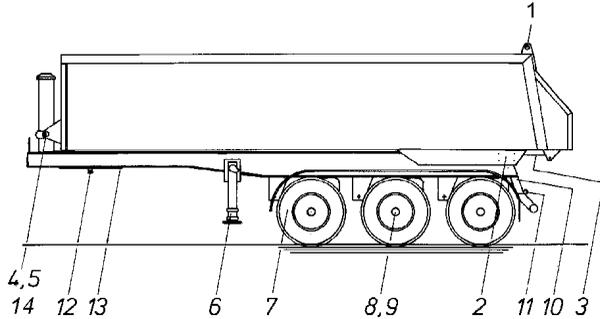
Approximate values for tightening the screw connection with tightening torque key, slightly lubricated thread. Impact wrench not permissible.

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 9. Lubrication schedule



#### Explanation of the lubrication schedule

This schedule serves as a completion to the maintenance instructions; chapter 6

In case the trailer is equipped with a central lubrication system, following positions need not be greased because they are connected to the central lubrication system. However, the greasing points should be checked at the occasion.

The following positions are connected: 2, 3, 4, 5, 6, 7, 8, 9, 11\*

#### 1. Nipple lubrication

Grease the following lubrication nipples by means of a suitable lubrication gun with multi-purpose Lithium grease, until clean grease is escaping of the lubrication points.

Pos.	Designation	Pcs.	Intervals
1	Spring bolt at the self-aligning bearing	2	weekly
2	Case of tipping box bearing	2	weekly
3	Lever of automatic locking system	2	weekly
4	Neumeister tipping cylinder	6	weekly
5	Edbro tipping cylinder	4	weekly
6	Support device	2	1/2 year
7	Axle lift	1	monthly
8	Axle - Brake camshaft	4	see sep. instructions
9	Axle - Slack adjusters (not for AGS)	2	of axle manufacturer
10	Parking brake winch	1	1/4 year
11	Spring bolt at the underride protection	2	weekly

-----  
\* only at the customer's request

## Operating and maintenance instructions

Semitrailer with rear tipping device



### 2. Lubrication by coating

Clean all surfaces carefully and remove old grease entirely.

Pos.	Designation	Pcs.	Intervals
12	King pin		1/2 year
13	Pick-up plate		1/2 year
14	Noise reduction ring (Edbro tipping cylinder only)		weekly



After using high-pressure or steamjet tools, especially in connection with chemical detergents, all grease points have to be greased.



## A. Check list for periodical test and maintenance works

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

<b>Works to be done</b> 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
Check fixed seat of wheel nuts		X			Additionally after every wheel change
Visual examination of the axle suspension		X			Page 89
Check shock absorbers and fixation		X			Page 89
Replace shock absorbers					Every 2 years or every 300,000 km
Check tightening torque on the spring clamps For BPW axles M24 → 650 Nm For SAF axles M24 → 700 Nm		X			Page 89
Check tightening torque of trailing arm screws M30 → 1100 Nm		X			Page 89
Check air bellow for damage		X			Page 90
Check bearing of rear wall		X			Page 94
Check function and condition of rear wall locking		X			Page 94
Check EDSCHA tarpaulin system / roller tarpaulin		X			Page 94
Check and grease tipping shaft bearing		X			Page 95
Check and grease tipping cylinder bearing / stop		X			Page 95
Check noise stop ring on the EDBRO tipping cylinder		X			Page 96
Check tipping box supports		X			Page 96
Check and grease support winches			X		Page 97
Check slack adjusters	X	X	X	X	Manufacturer's instructions
Check axles according to the manufacturer's instructions	X	X	X	X	Manufacturer's instructions
Check lighting system	X				Page 88
Brake system; check tightness of connections		X			Page 90

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

## Operating and maintenance instructions

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<b>Works to be done</b> 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
Clean piping filters of brake system		X			Page 91
Check function of operation and parking brake	X				According to legal regulations
Check fixed seat of brake cylinder fixation ( $M_A=210$ Nm for M16)			X		Page 97
Inspection of trailer acc. to § 29 StVZO (German legislation)			X		National legal regulations
Main inspection acc. to § 29 StVZO (German legislation)				X	National legal regulations
Road train brake balance between tractor and trailer					If required; see page
Check fixed seat of kingpin		X			Page 93
Check, clean and grease fifth wheel plate			X		Page 97
Check rear support		X			Page 97
Check hydraulic system for function and tightness		X			Page 94
Check hydraulic hoses				X	Page 98
Visual examination of vehicle frame		X			
Check air suspension assembly				X	Page 98
Retighten all screwed connections with directed tightening torque			X		Page 103
Check tyres regarding pressure/pattern/damage	X				Page 87
Greasing of all lubrication points		X			Page 104
Grease the parts which are stressed with friction (without nipple)		X			Page 105
Check and adjust the central lubrication system	X				Page 88
Clean chromium-plated piston rod	X				Page 88

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

# Operating and maintenance instructions

Semitrailer with rear tipping device



## Record of the inspections which have been carried out

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
<b>1<sup>st</sup> year of operation</b>	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
<b>2<sup>nd</sup> year of operation</b>	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
<b>3<sup>rd</sup> year of operation</b>	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
<b>4<sup>th</sup> year of operation</b>	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
<b>5<sup>th</sup> year of operation</b>	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
<b>6<sup>th</sup> year of operation</b>	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
<b>7<sup>th</sup> year of operation</b>	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
<b>8<sup>th</sup> year of operation</b>	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
<b>9<sup>th</sup> year of operation</b>	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)
<b>10<sup>th</sup> year of operation</b>	(Date, Signature)	(Date, Signature)	(Date, Signature)	(Date, Signature)





## Operating and maintenance instructions

Semitrailer with rear tipping device



### C. Referenzbremswerte nach ECE R13.10 für SK ...../ WDE 60502S

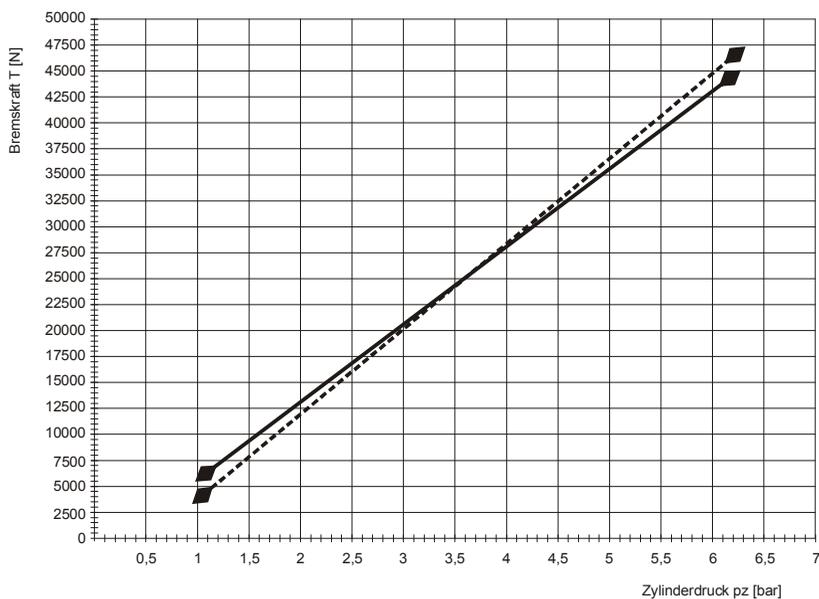
Radbremse: BPW SN 4218

Zylindergröße: Achse 1: 24  
Achse 2: 24/30  
Achse 3: 24/30

Bremshebel: 165 mm

Reifengröße: 385/65R22.5 – 425/65R22.5

Reifen  $R_{dym}$ : 518 – 542 mm



## Operating and maintenance instructions

Semitrailer with rear tipping device



### Referenzbremswerte nach ECE R13.10 für SK ...../WDE 60503S

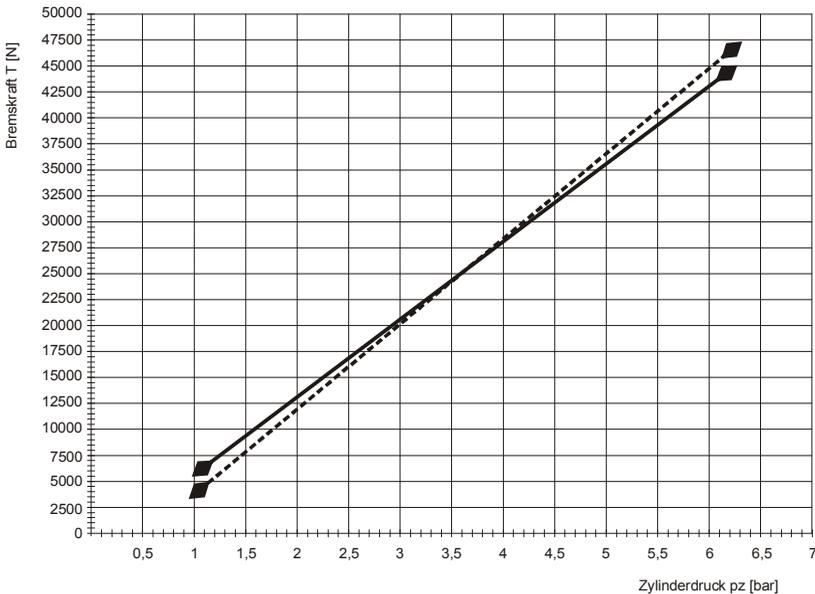
Radbremse: BPW SN 4218

Zylindergröße: Achse 1: 24  
Achse 2: 24/30  
Achse 3: 24/30

Bremshebel: 165 mm

Reifengröße: 385/65R22.5 – 425/65R22.5

Reifen  $R_{dym}$ : 518 – 542 mm



## Operating and maintenance instructions

Semitrailer with rear tipping device



### Referenzbremswerte nach ECE R13.10 für SK ...../ WDE 60536S

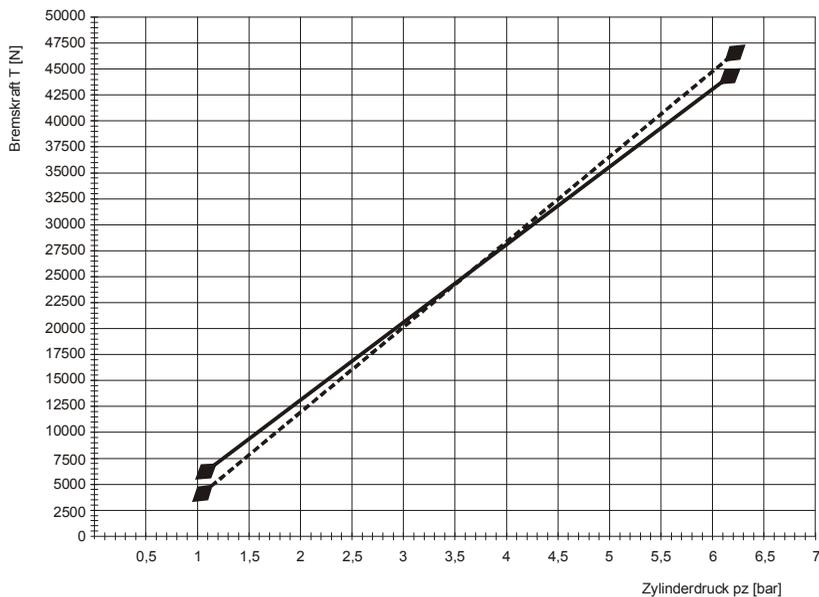
Radbremse: SAF SNK 4218-11S

Zylindergröße: Achse 1: 24  
Achse 2: 24/30  
Achse 3: 24/30

Bremshebel: 140 mm

Reifengröße: 385/65R22.5 – 425/65R22.5

Reifen  $R_{dym}$ : 518 – 542 mm



## Operating and maintenance instructions

Semitrailer with rear tipping device



### Referenzbremswerte nach ECE R13.10 für SK ...../WDE 60537S

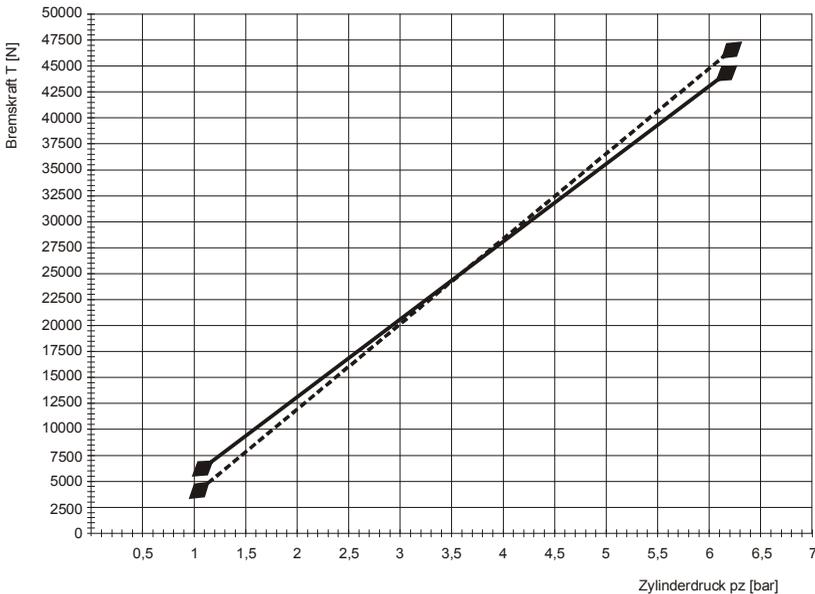
Radbremse: SAF SNK 4218-11S

Zylindergröße: Achse 1: 24  
Achse 2: 24/30  
Achse 3: 24/30

Bremshebel: 140 mm

Reifengröße: 385/65R22.5 – 425/65R22.5

Reifen  $R_{dym}$ : 518 – 542 mm



## Operating and maintenance instructions

Semitrailer with rear tipping device



### Referenzbremswerte nach ECE R13.10 für SK ...../ WDE 62306S

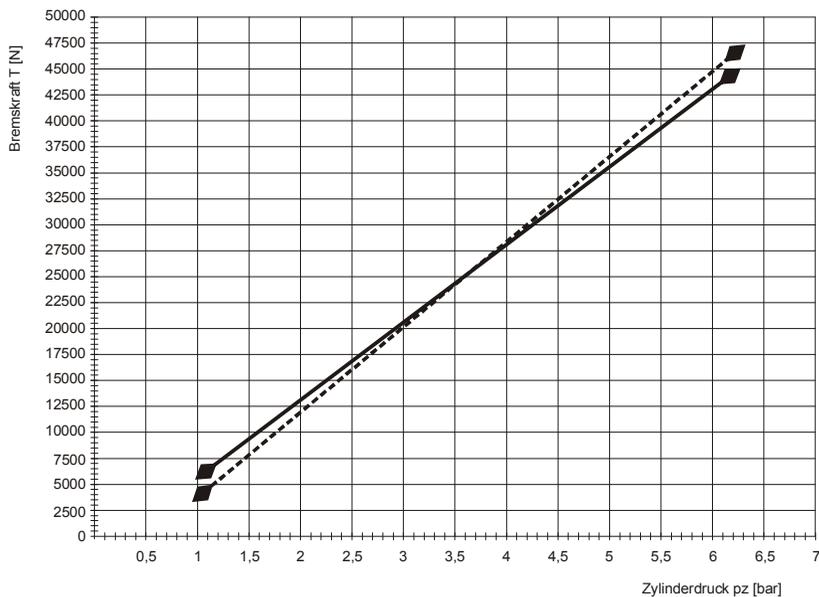
Radbremse: BPW SB 4309

Zylindergröße: Achse 1: 20  
Achse 2: 20/24  
Achse 3: 20/24

Bremshebel: 76 mm

Reifengröße: 385/65R22.5 – 425/65R22.5

Reifen  $R_{dym}$ : 518 – 542 mm



## Operating and maintenance instructions

Semitrailer with rear tipping device



### Referenzbremswerte nach ECE R13.10 für SK ...../WDE 62307S

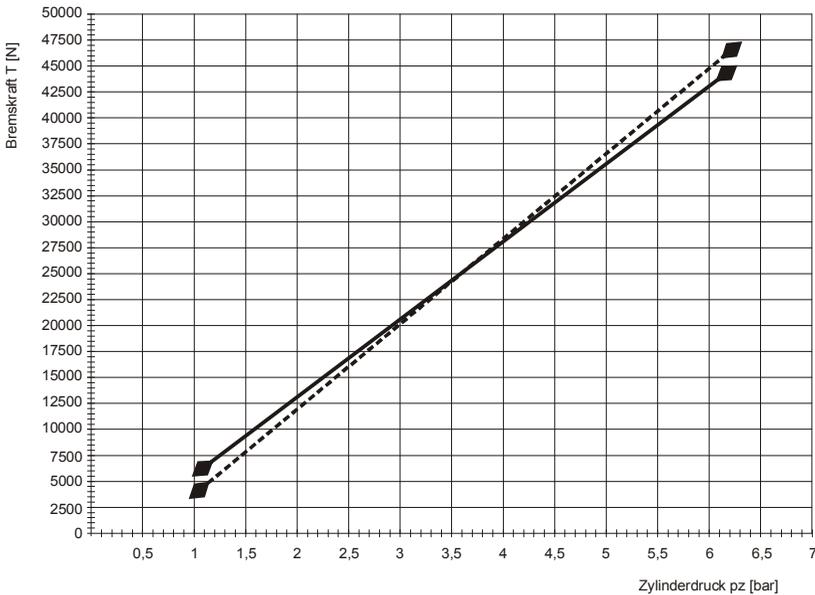
Radbremse: SAF SB 7.../SK/...

Zylindergröße: Achse 1: 20  
Achse 2: 20/24  
Achse 3: 20/24

Bremshebel: 76 mm

Reifengröße: 385/65R22.5 – 425/65R22.5

Reifen  $R_{dym}$ : 518 – 542 mm



## Operating and maintenance instructions

Semitrailer with rear tipping device



### Referenzbremswerte nach ECE R13.10 für SK ...../ WDE 62308S

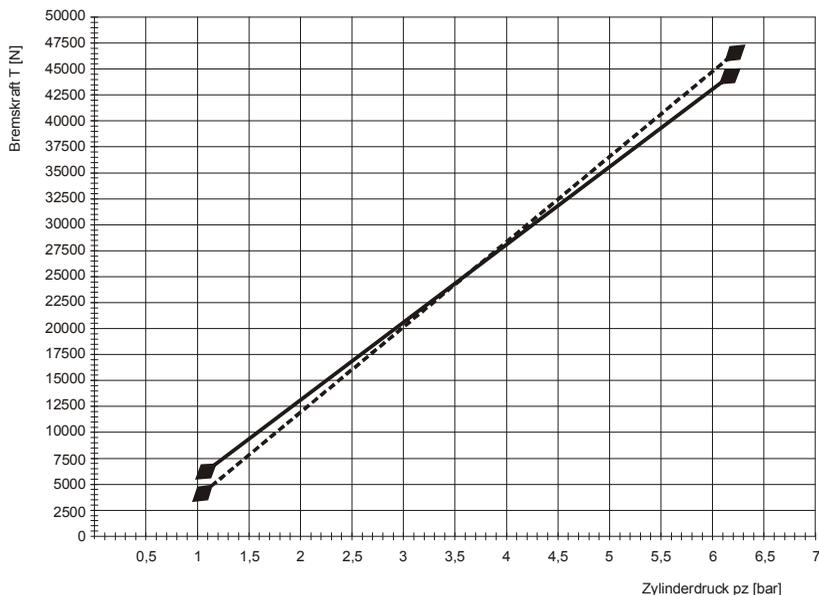
Radbremse: DAIMLER CHRYSLER AG SK 7 ...

Zylindergröße: Achse 1: 20  
Achse 2: 20/24  
Achse 3: 20/24

Bremshebel: 76 mm

Reifengröße: 385/65R22.5 – 425/65R22.5

Reifen  $R_{dym}$ : 518 – 542 mm



## **Operating and maintenance instructions**

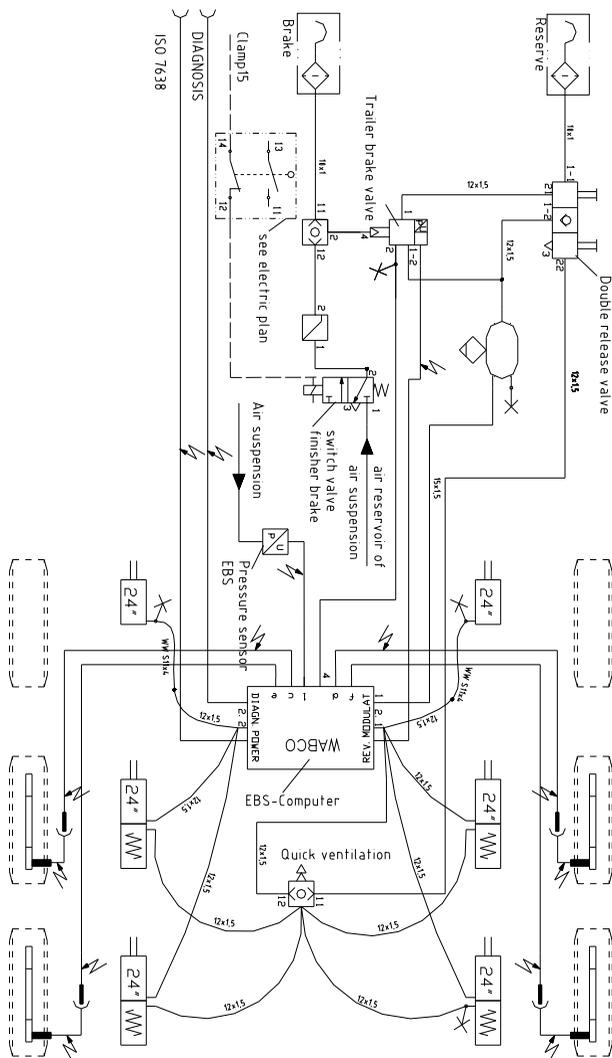
Semitrailer with rear tipping device





### C. Wiring schemes

#### Brake plan with finisher brake



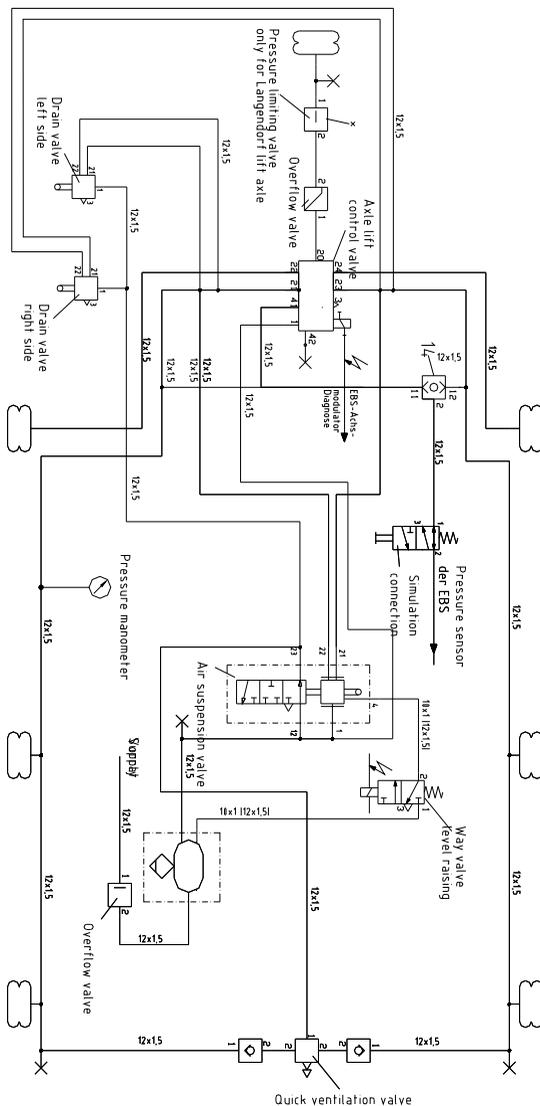


# Operating and maintenance instructions

## Semitrailer with rear tipping device

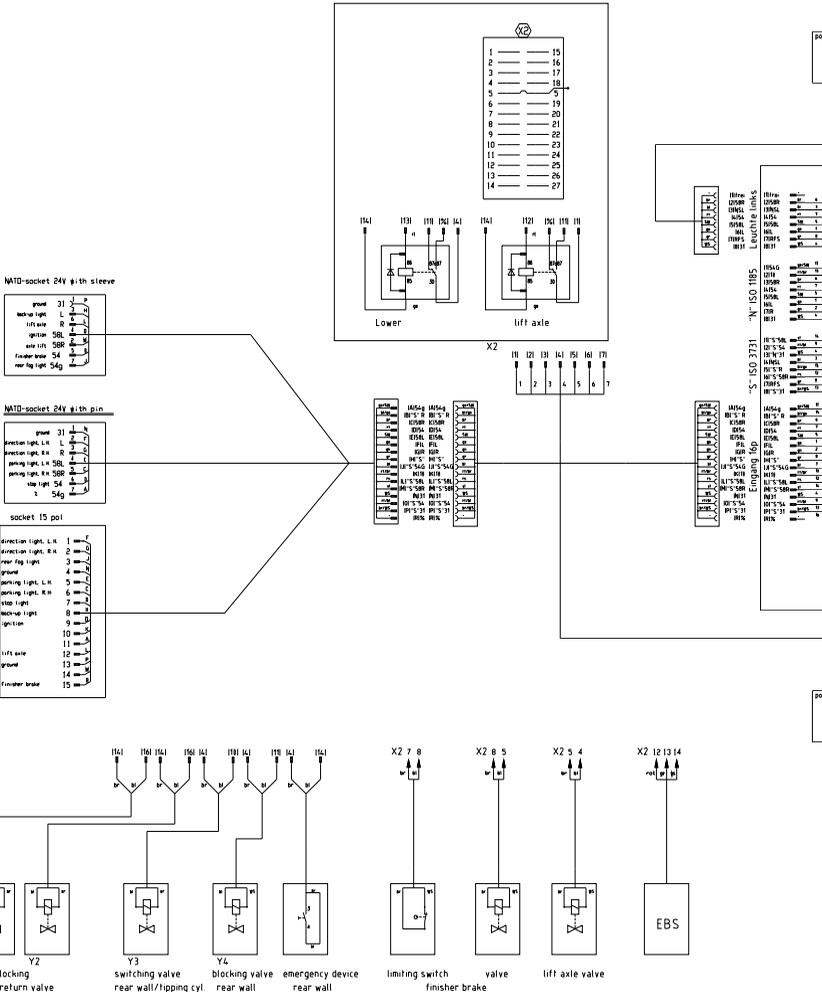


Air suspension plan (lift axle, lift and lower valve, any side, level raising)



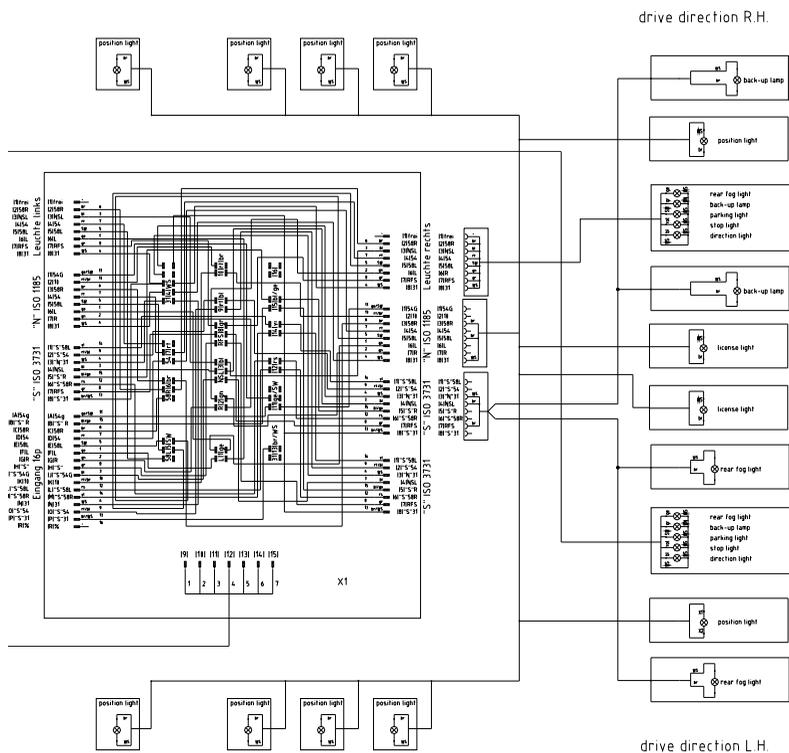
# Operating and maintenance instructions

## Semitrailer with rear tipping device



# Operating and maintenance instructions

## Semitrailer with rear tipping device



## **Operating and maintenance instructions**

Semitrailer with rear tipping device





## Service-station in Germany

<b>Firma</b>	<b>Ansprechpartner</b>	<b>Telefon / Fax</b>
AU-BRE-TA GmbH Im Bommersfeld 6 66822 Lebach / Saar	Herr Bettscheider	Tel.: 06881 92487-0 Fax: 06881 92487-29
H K M Fahrzeugbau GmbH i.G. Poststraße 5 04600 Altenburg	Herr Mundry Herr Liebegott	Tel.: 03447 85350 Fax: 03447 853544
Haueis GmbH Kfz.- Handel – Ersatzteile – Reparatur Dorfstraße 24 24629 Kisdorf	Herr Haueis	Tel.: 04193 4001
MAN Nutzfahrzeuge Vertrieb GmbH Niederlassung Frankfurt – Service Gießen Friedrich-List-Straße 10 35398 Gießen	Herr Valentin Herr Kuhl	Tel.: 0641 9682-0 Fax: 0641 9682-80
Fa. Plugge Kölner Straße 111 57439 Attendorn	Herr S. Plugge	Tel.: 02722 9384-0 Fax: 02722 938448
Fa. Pachel GmbH Karosserie- u. Fahrzeugbau Lange Wanne 4 38644 Goslar – Bassgeige	Herr G. Pachel	Tel.: 05321 379920 Fax: 05321 379929
TSK Truck Service Köthen GmbH Dessauer Straße 104 06366 Köthen	Herr Kessel	Tel.: 03496 4203 Fax: 03496 420431

**Service-station international**

<b>Firma</b>	<b>Ansprechpartner</b>	<b>Telefon / Fax</b>
Carrosserie Langenthal AG Aarwangenstraße 90 CH-4901 Langenthal Schweiz	Herr Daniel Moser	Tel.: 0041 629194242 Fax: 0041 629194243
INTERACTIV SERVICE S.RL. Sos. Alexandriei nr. 335 bis Communa Bragadiru RUMÄNIEN	Herr Stefan Serbanescu	Tel.: 0040 214480109 Fax: 0040 214480116
JSC „GTC“ OAO Kontinent for GTC Office 3 Sedova str. 11/2 193019 Sankt Petersburg RUSSIA	Herr Vasilyev Herr Kolgonow	